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COTTON:

AN

ACCOUNT OF ITS CULTURE

IN THE

AS-005056

BOMBAY PRESIDENCY,

PREPARED FROM

GOVERNMENT RECORDS AND OTHER AUTHENTIC SOURCES,

IN ACCORDANCE WITH A

RESOLUTION OF THE GOVERNMENT OF INDIA.

BY

WALTER R. CASSELS.

Bombay:
PRINTED BY ORDER OF GOVERNMENT,
AT THE BOMBAY EDUCATION SOCIETY'S PRESS.
SOLD BY ALL BOOKSELLERS.

1862.

PREFACE.

THIS volume has been prepared at the desire of the Bombay Government, and in accordance with a Resolution of the Government of India, dated the 22nd of July 1861.

It is strictly a chronicle of facts relative to the culture of Cotton in the Bombay Presidency, collected from the records of Government, and from other authentic sources.

The defective state of these records, and the unsystematic manner in which the proceedings of many of the Experimental Establishments have been reported, has rendered research laborious, and its results imperfect. Success might have made details unnecessary, but the want of them has hitherto rendered failure comparatively uninstructive. The lessons of experience have certainly been paid for, but few have been placed in a position to profit by them.

Much statistical and general information connected with Cotton has been reluctantly omitted from this volume, the limited libraries of Bombay not affording the necessary data.

Individual opinion has been carefully excluded from all subjects which could rest solely on facts. In such questions as Land Tenure and Assessment, which, to some extent, are matters of judgment as well as of experience, a correct statement of the case could scarcely be given without the enunciation of opinions formed from personal observation and inquiry. Great Britain is not a safe standing-point from which to view the condition of the Hindoo, and arguments drawn from the farmers of England are not very applicable to the ryots of India.

The conclusions to be deduced from the facts recorded in this volume are, unfortunately, too apparent; but it is much safer and better to recognise an unpleasant truth, than to be deceived by a pleasant fiction. There is a remedy for the one, but the other can only lead to disappointment.

I am greatly indebted to Mr. A. D. Robertson, the Acting Chief Secretary to Government, for the very valuable assistance which he has rendered me throughout this work, and for the invariable readiness with which he has complied with my frequent and troublesome requests for information. I have to express my obligations to Colonel H. B. Turner, Acting Secretary to Government in the Public Works Department, for the kindness with which he has at all times favoured me with information, and for the trouble which he has taken in preparing the maps for this volume. My best thanks are also due to Mr. Hart, the Revenue Commissioner, Southern Division, for the obliging manner in which he has aided my inquiries; but, indeed, I have to thank all those to whom I have had occasion to apply, whether officers of Government, or private friends, for their kind and ready assistance.

In the Resolution which originated this work, the Governor General stated, "It is essential that the task should be completed with as little delay as possible. An imperfect compilation, which might be available within the next six months, would be far more useful than one which thoroughly exhausted the subject, but which could not be published till a year hence." For this reason, therefore, it has been considered better to publish this volume at once, without waiting for returns and information, not yet received, which might have made it very much more complete.

WALTER R. CASSELS.

Bombay, 22nd December 1861.

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CHAPTER I.

RISE AND PROGRESS OF THE INDIAN COTTON TRADE.

1600—1830.

Commencement of the East India trade—Opposition to it in England—Importation of Indian Goods and Yarns—Progress of British Manufactures—Importation of Cotton into England—Character and Position of Indian Cotton—Efforts to improve its quality—Experiments with Exotic Cotton—Statistics of the Cotton Trade. 1812—1830.

On the last day of the year 1600 Queen Elizabeth granted the first Charter to "one bodie corporate, and politique indeed, by the name of 'The Governor and Company of Merchants of London trading into the East Indies.'"

The first outward consignment of the Company was made by four ships of an aggregate capacity of 1,400 tons, and consisted of woollen goods and metals to the value of £6,860, and bullion to the amount of £21,742.[1]

The success of the Company was great, but for nearly a century it encountered opposition in England, from the belief that not only was the balance of trade against the nation, but that many branches of industry, then in their infancy, were being crippled by the extensive introduction of Indian fabrics. On the 8th of March 1623 the subject was warmly debated in Parliament, and the East Indian trade was pronounced "injurious to the national interests from its draining the nation of treasure, of which it was said they exported to the amount of £80,000 per annum." [2]

The woollen manufacture of England was at that epoch the great national industry, and the first imports of cotton cloth were regarded as a dangerous innovation. The great industrial revolution, which machinery afterwards

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[1] Macpherson's History of Commerce, pages 79—95.

[2] Milburn's Oriental Commerce, xxi.

effected, had not then commenced, and India supplied Great Britain with yarn and cotton goods long before she furnished a pound of the raw material. Even now that this order of trade has been reversed, many of the cloths of England retain the names of their Indian originals, and the "calicoes" of Manchester find their way to Malabar, to their native "Calicut," still preserving the memory of the place whose trade they have supplanted.

In 1621 Mr. Munn, an eminent merchant of London, and one of the Directors of the East India Company, estimated the annual importation of Indian calicoes at 50,000 pieces. He stated the average cost on board in India to be 7*s.*, and the selling price in England 20*s.* a piece.[1] The importation in 1674-75 had increased to the value of £160,000.[2] Indian muslins had in a great measure superseded French cambrics, and the linens of Flanders and Germany, and her printed calicoes, had come into extensive use for household furniture. The silk and wool weavers became alarmed for their trade, and serious riots took place in various parts of England, in consequence of which the further introduction of Indian goods was interdicted in the year 1700. They continued, however, to be smuggled in considerable quantities, and in 1721 an Act of Parliament was passed "to preserve and encourage the Woollen and Silk manufactures," by which their use was prohibited under a penalty of £5 for each offence on the part of the wearer, and £20 on the part of the seller.[3]

Daniel Defoe echoed the popular feeling in 1708, when he inveighed against the East India trade. "Let any man," he wrote, "but look into the cargoes exported and imported between 1697 and 1699, and he will find the account so surprising that a man hardly dare put it in print, there being exported in bullion only, besides goods, and by the Companies, besides private trade, 7,157,372 ounces of plate, and the cargo home amounted in the hands of the retailers to above £700,000 sterling; that several single ships brought home 200,000 pieces of goods at a time, directly interfering with our home manufactures."

The quantity of cotton yarn imported from India kept the spinning of England for a long period almost stationary. The following table, compiled from statistics furnished by the Secretary of the East India Company to Dr. Ure, shows the annual importation of Indian yarn, and the prices at which the article was sold in England :—[4]

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1 Milburn's Oriental Commerce, xix.
2 Macpherson's History of Commerce, page 134.
3 Milburn's Oriental Commerce, xlvii.
4 Ure's Cotton Manufactures, vol. i. page 321.

Years.	lbs.	Price.	Remarks.
1703	114,100	} No particulars.	
1704	72,938		
1705	39,155		
1706	48,120	2*s.* 2¾*d.*	
1707	219,879	1*s.* 11¼*d.*	
1708 to 1712	No particulars.	}	
1713	135,546		
1714	12,768		
1715	Nil.		
1716	Nil.		
1717	Nil.		
1718	37,714		
1719	Nil.		
1720	21,350	} No particulars.	
1721	50,624		
1722	10,800		
1723	24,025		
1724	21,588		
1725	5,809		
1726	54,300		
1727	27,254		
1728	11,424		
1729	18,816	1*s.* 10½*d.*	
1730	32,351	2*s.* 4¾*d.*	
1731	20,496	2*s.* 2½*d.*	
1732	46,405	2*s.* 3¾*d.*	
1733	70,976	2*s.* 2¼*d.*	
1734	5,924	2*s.* 4½*d.*	
1735	91,391	3*s.*	
1736	40,274	2*s.* 3¼*d.*	
1737	2,083	3*s.* 5½*d.*	A few bales 8*s.* 1*d.*
1738	3,024	3*s.* 9¼*d.*	Ditto 8*s.* 8*d.*
1739	8,445	5*s.* 5½*d.*	Ditto 21*s.* 2*d.*
1740	3,339	None sold.	
1741	20,055	4*s.* 5½*d.*	Ditto 17*s.* 2*d.*
1742	11,366	5*s.* 6¼*d.*	Ditto 14*s.* 7*d.*
1743	9,904	7*s.* 2¼*d.*	Ditto 12*s.* 8*d.*
1744	14,593	4*s.* 7½*d.*	Ditto 8*s.* 1*d.*
1745 to 1749	Nil.	{ 1745.. 6*s.* 0½*d.* 1749.. 4*s.* 11¾*d.*	
1750	14,112	3*s.* 5½*d.*	
1751	4,704	None sold.	
1752	336	4*s.* 5½*d.*	
1753 to 1754	Nil.	1753.. 6*s.* 8¼*d.*	
1755	37,632	3*s.* 10*d.*	
1756	6,061	4*s.* 0½*d.*	
1757	4,357	2*s.* 9⅜*d.*	Ditto 15*s.*
1758	12,869	2*s.* 11½*d.*	Ditto 15*s.*
1759	4,390	4*s.* 8*d.*	Ditto 14*s.*
1760	2,814	None.	

Under these circumstances the demand for the raw material continued small, and in 1710 the total import of cotton wool into Great Britain amounted only to 715,000 lbs. Indeed, during the first half of the 18th century the quantity received from all sources did not exceed an average of 2,000,000 lbs., a considerable part of which was used for candle-wicks.[1] It was reserved for Hargreaves and Arkwright, and, above all, for the genius of Watt, to give their full development to the manufactures of Great Britain, and rapidly to multiply and disseminate the products of British industry.

The annual value of the cotton manufactures of Great Britain in 1760 was estimated at £200,000, and four years later at £600,000.[2] At this period, however, cotton goods were in reality a compound of cotton and linen, the "weft," or transverse threads of the web, being of cotton, and the "warp," or longitudinal threads, wholly composed of Irish or German linen yarn.[3]

In 1767 James Hargreaves invented his "spinning jenny" for the preparation of "weft," by which one girl could work 120 spindles; and two years later Richard Arkwright obtained his first patent for the "spinning frame," which supplied the "warp" in still greater abundance. His second patent, for the complete and improved machine, was taken in 1775. The first English goods made wholly of cotton, warp and weft, were produced in 1772. In that same notable year 1769, when the inventions of Arkwright and Hargreaves had prepared the manufactures of Great Britain fully to benefit by further improvement, James Watt obtained his first patent for the steam-engine, although it was not applied to cotton-mills until 1785, the year in which Arkwright's patent right terminated, and threw open his invention to the world. Fifty years after, this machinery, directly or indirectly, employed more than a million of the inhabitants of England.[4]

The effect of these discoveries on the consumption of cotton wool in Great Britain was immense. Within ten years, from 1780 to 1790, it increased nearly five-fold, and by the end of that century it had multiplied eight-fold. The export of cotton goods during the last twenty years of the century increased fifteen and a half-fold.[5] The following statement shows the total import of cotton wool into Great Britain, distinguishing East Indian, and the rate of progression from various epochs :—

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[1] Ure, vol. i. pages 189 & 321. [2] Baines' History of Manufactures, page 110.
[3] McCulloch's Dictionary.
[4] McCulloch; and Baines' History of Manufactures, page 83.
[5] Baines' History of Manufactures, pages 214—216.

Remarks.	Years.	Aggregate Import.	Proportion of East Indian.	Ratio of increase per Cent.
		lbs.	lbs.	
Hargreaves' Patent for Spinning Jenny, 1767	1764	3,870,392	.....	
Arkwright's Patents for Spinning Machine, 1769 and 1775	Average 1771 to 1775	4,764,589	.....	
	Average 1776 to 1780	6,766,613	.....	
	1781	5,198,778	....	
	1782	11,828,039	....	
	1783	9,735,663	114,133	
	1784	11,482,083	11,440	
Application of Watt's Steam Engine, and expiry of Arkwright's Patent, 1785	1785	18,400,384	99,455	319½
	1786	19,475,020	....	
	1787	23,250,268	....	
	1788	20,467,436	....	
	1789	32,576,023	4,973	
	1790	31,447,605	422,207	
	1791	28,706,675	3,351	
	1800	56,010,732	6,629,822	67½
	1801	56,004,305	4,098,256	

The imports of Indian cotton had attained some importance before any of the growth of America reached Great Britain. It is the younger trade that has since acquired the supremacy. The first shipment from Charleston was made in 1747, and consisted only of 7 bales. In 1784 about 14 bales were shipped to England, part of which was seized in Liverpool as contraband, under the belief that the cotton could not be the produce of the United States, so little was their capacity to grow it then known.[1] It was first shipped in any quantity in 1791, when about 189,316 lbs. were exported, but the following year the amount decreased to 138,328 lbs.[2]

In 1793 Whitney invented the saw-gin, an instrument which had as immediate an effect in developing the cotton trade of America, as Arkwright's spinning frame produced on the manufactures of Great Britain. Reports of the experimental performances of this gin, which enabled one man in a day to clean more cotton than he previously could in a month, spread abroad in the state of Georgia, where Eli Whitney then resided. An eager crowd, whose

[1] Burn's Glance. [2] Pitkin's Statistics; McCulloch.

industry had been restrained by the want of means to separate, with sufficient rapidity, the cotton from the seed, broke into his workshop before his machine was even complete or a patent secured, and carried it off.[1] Such was the expansion which this invention immediately gave to the trade, that the year after its completion (1794) the export of cotton from the United States rose to 1,601,760 lbs., and the following year to 5,276,300 lbs. Ten years later the quantity had increased to 32,500,000 lbs. In fact, the export the first year after its invention, as compared with the year before that event, multiplied about 38-fold, and ten years after, in 1805, little less than 240-fold.[2]

The constantly increasing demand for cotton soon excited the interest of the East India Company, as well as the country at large, in regard to the supply from India. A representation on the subject was made by British manufacturers to the Court of Directors, in consequence of which, in 1788, they earnestly called the attention of the Governor General to the article, with a view to generally encouraging and improving its cultivation. They particularly instanced the finer sort, upon this occasion, from which the superior Dacca muslins were manufactured, the supply of which had recently diminished.[3] They requested the Governor General, in concert with the Government of Bombay, to forward to them at once and annually 500,000 lbs. weight of the best Broach and Surat cotton, or a similar quality.

The following was the estimated production of Guzerat, reported by the Bombay Government in 1790, distinguishing the quantities exported and used for home consumption:—

Districts.	Produce.	Home Consumption.	For Exportation.
	lbs.	lbs.	lbs.
Surat Pergunna	3,920,000	1,568,000	2,352,000
Broach ditto	9,408,000	2,352,000	7,056,000
Jumbooseer and Ahmood Pergunnas...	9,408,000	1,960,000	7,448,000
Bhownuggur Pergunna	10,976,000	1,176,000	9,800,000
Total...	33,712,000	7,056,000	26,656,000

It was stated that the best quality was produced in Jumbooseer, Ahmood, and throughout the Pergunna of Broach. The growth of Surat was said to be inferior, and that of Bhownuggur the worst of all, being estimated 7 per cent.

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[1] Ure, vol. i. page 138. [2] McCulloch.

[3] East India Company Reports on Cotton, &c., page 3.

lower in quality than Ahmood, "owing, in great measure, to the soil, and also to the bad method of extracting it." [1]

The custom of the Company, at that period, was to receive the cotton loose, and to pack it themselves. This enhanced the price four or five rupees a candy, but they calculated that they gained a commensurate advantage by the prevention of fraud in packing, and the avoidance of seedy or leafy parcels. The Bombay Government considered that the annual purchase of the quantity ordered would not affect Indian manufactures, though it might slightly raise the price of the staple. They added, "it appears by the present season that the cultivation still increases with the demand for it." [2]

With a view to encourage the trade, the Court of Directors, at the close of the same year 1790, authorised ships carrying convicts to Botany Bay to go to Bombay, and to load home cotton on private account, "under the inspection and direction of the Company's servants at that settlement, provided such cottons were sold at the Company's sale, subject to the usual expenses." [3]

In execution of the Court's order, 422,207 lbs. were consigned to London by the Bombay Government in 1790, which only realised from 7¾*d.* to 10½*d.* per lb., a price which was not considered satisfactory. A quantity of Surats smuggled from Ostend did not "turn to a more productive account." The Court of Directors emphatically conclude, "It is evident therefore, notwithstanding the flattering allurements held out by British Manufacturers, that the article will by no means answer." [4]

During the next two years, consequently, very little of this cotton was imported into England, but, encouraged by considerable improvement in price, the Court were induced in 1799 to instruct the Bombay Government to fill up any spare tonnage with cotton wool. The following year prices receded to 1*s.* 3*d.* per lb., and they again rescinded this permission if it were possible to secure other freight for spare tonnage, only in default of which they "would rather have them filled up with cotton than sent away dead freighted." [5]

In a report from the Bengal Presidency in 1802, it was stated that the average quantity of cotton annually imported to Bengal, by the Ganges, had for years been about 43,200,000 lbs. of which about 17,280,000 lbs. were the produce of the Deccan or various districts so low as Nagpoor, from which neighbourhood the finest qualities were received, with the exception of those supplied by Ahmood and Jumbooseer. The report added, "when the price of Broach and Surat, as before 1790, was from Rs. 80 to 95 per candy, Bengal, so far from

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[1] East India Company Reports, p. 10 & 11. [2] East India Company Reports, p. 12.
[3] Ditto page 13. [4] Ditto page 15. [5] Ditto page 19.

being able to compete in the export of cotton, was indebted to Surat for supplies for her own manufactures." [1]

In 1797 a small experimental plantation was established at Randatarra, in Malabar, under the superintendence of Mr. M. Brown. It was more particularly intended for the cultivation of spices, but about the beginning of the present century a small portion was devoted to exotic and indigenous cotton. [2] Six bales of the staple grown on this farm were sent home in 1802, and, from their excellent quality, gave the Court hopes that its cultivation might "reimburse with profit the expenses of forming the plantation." This small garden parcel consisted partly of Bourbon, and partly of indigenous cotton, which realised respectively 2*s.* 2*d.* and 1*s.* 3⅞*d.* per lb., whilst ordinary Surats were selling at 9*d.* to 11*d.* per lb. The indigenous kind was represented as not being so inferior in quality to the other as the difference in price seemed to point out, but was not so well cleared of seeds and extraneous matter.[3]

The China trade of the East India Company, at this period, occupied much of the attention of the Indian Government. In the report on the external commerce of the country for 1802, the Bengal Government stated, "The importance of obtaining an investment of cotton for the China market, in the Ceded Provinces, on better terms than are now paid by the Honourable Company either at Bombay or Surat, supersedes every other consideration." The district of Broach and other territories in Guzerat ceded to the Company in 1776 under the "Poorundur Treaty," then paid a portion of their revenue in cotton. This practice of collecting revenue in kind was not originated by the Company, but was really a very ancient Indian principle of taxation, transmitted to them by the Marathi Government, and based upon a division of the actual produce of the soil between the sovereign and the cultivator. Assessment or rent of land was simply a claim for a portion of the crop raised upon it, which is now converted into the equivalent in money. The danger of over-assessment under such circumstances was not overlooked by the Bombay Government, and they cautioned the Magistrate of Broach that they "would not have the object of commercial advantage pursued to the prejudice of the just claims of the cultivator of the soil."[4] In addition to cotton received thus in payment of assessment, the Company purchased a quantity of the staple for shipment to China.[5]

In the year 1810, however, a representation was made by Messrs. Bruce

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[1] East India Company Reports, page 22. [2] East India Company Reports, page 20.
[3] East India Company Reports, page 28. [4] Papers relating to E. I. Affairs 1813, page 18.
[5] East India Company Reports, page 19.

Fawcett & Co., and Forbes & Co., that their purchases had raised cotton to the "ruinous price" of Rs. 175 per candy on the Bombay Green, and they prayed Government for a season to withdraw its competition, offering at the same time to form a secret convention to supply, at its actual cost, the quantity of cotton required by the Company for the China trade during the current year. This proposal, being warmly supported by Messrs. Rickards and Lechemere, then members of the Bombay Council, was acquiesced in by that Government. Mr. Rickards, who was the leading advocate of the measure, asserted that Government actually retained a monopoly of the article, "which had the effect of doubling the price of cotton in Guzerat," and "that, if the Company were to relinquish the monopoly, and the trade were thrown open, the price would materially fall." He produced a *pro forma* account, by which he proved that cotton purchased even at Rs. 150 per candy must leave a considerable loss in China. The Court of Directors denied that they monopolised the market, or procured cotton below its just value, "which it was not the interest of the Company to do," and they expressed their persuasion that "a more extraordinary proposal did not stand upon their records" than this, which they termed "a secret combination between buyers to narrow competition." They consequently removed Messrs. Rickards and Lechemere from the Council of Bombay.[1]

The Court continued to apprise the Government of Bombay of the urgency of the demand for cotton in England. When the American non-intercourse Act was passed, which suspended existing relations with the United States, the Court in 1809 wrote as follows :—"The measures which have been lately adopted by the Legislature of the United States of America will, in their consequences, operate to check very seriously some of the manufactures of this country, unless a liberal supply of cotton wool can be procured from other sources than these States, and it is to our territorial possessions in Asia that the hopes of the manufacturing classes are principally directed."[2] The fears and hopes of 1809 were the same as those of the present day, and the expectations of half a century are still prolonged, and still remain unrealised.

Various efforts were made to improve the quality of Indian cotton. The newly-invented Whitney saw-gin had been sent to Bombay in 1793 by the Court, and, with a view to the better selection of cotton, samples of the most desirable qualities of Broach, Georgia Upland, and Grenada kinds, were now forwarded, together with a quantity of West Indian and American cotton seed, and a paper of printed instructions for cotton planters, prepared by Mr. R.

[1] Papers relating to East Indian affairs, p. 10—27. [2] East India Company Reports, p. 29.

Hunt for the African Society. This was translated into the vernacular with a view to its distribution in Guzerat, but the directions were not considered applicable to the ryots of India.[1]

In anticipation of deficient supplies from America, the Court authorised all private ships to bring cotton from India to London. This encouragement considerably increased the export of the staple. In 1809 about 30 million pounds were shipped to England, of which about 1,250,000 lbs. were consumed by British manufacturers, and 3,250,000 lbs. were re-exported to the Continent, making together 4,500,000 lbs. The Court wrote, on the 29th August 1810, that the balance of 25½ million pounds remained unsold in their warehouses, from "the renewed intercourse with America, and the coarse nature of Indian cotton."[2] At the time when the Indian staple was thus neglected, and England re-exported more than 2½ times as much of it as she herself consumed, the general statistics of the trade were as follows :—

Years.	Aggregate Importation.	Proportion of American.	Proportion of East Indian.	Exported of all growths.
	lbs.	lbs.	lbs.	lbs.
1809	92,812,282	13,500,000	12,517,400	4,351,105
1810	132,488,935	36,000,000	27,783,700	8,787,109
1811	91,576,535	46,750,000	5,126,100	1,266,867
1812	63,025,936	26,000,000	915,950	1,744,912

Under these circumstances, and believing that there was "no prospect of a demand on the part of the manufacturers for a great length of time, possibly some years," the Court appealed to the English Government to permit Indian cotton for a limited period to be used in Great Britain, free from duty, and to be exported to any place where goods were allowed to be exported by license. They decided, at the same time, that "it would not be consistent with commercial policy to persevere in the importation of Indian cotton into England, if the British manufacturers continued to manifest so adverse a disposition to the use of it." The following year, when imports of American cotton again became large and regular, they wrote still more despondently, "Indian cotton now remains a ruinous and unproductive burthen both upon the Company and the private importers." They ordered that no cotton should be shipped to England on their account in 1812-13.[3]

The Court urged upon the Indian Government in the strongest manner the

[1] East India Company Reports, p. 15—30. [2] East India Company Reports, p. 30.
[3] East India Company Reports, page 35.

absolute necessity of securing greater cleanness in the cotton of the country. They were assured, "by well-informed persons," that the mixture of seeds and dirt was the chief objection to its use. They repeatedly gave their "positive order" to remedy this defect, and warned their servants that "no excuse would thereafter be admitted by them for its continuance." Samples of cotton cleaned in various ways were ordered to be sent home for report. Two bales cleaned by hand-picking, bowing, and switching or beating were forwarded. The report of competent judges was "that the switching was not of the least advantage; that the staple did not appear in any respect better than if it had been prepared in the usual manner, but rather the contrary, and that, upon the whole, the cotton was of less value than it would have been if not switched." The bowing was said to injure the staple, and the expense of hand-picking rendered that system impossible.[1]

Although several experiments with Bourbon cotton seed had already been made in the Bombay Presidency without success, a fresh supply was secured from the Mauritius in 1812, and distributed, together with printed directions for its culture, to the Collectors of Broach and Surat, "with authority to take measures for sowing it to a small extent, under each collectorship, on the Company's account, delivering any surplus which might remain to such of the ryots upon whose care they could depend for affording it a fair trial." One consideration which led the Court strongly to desire the introduction of this, or other finer kinds of cotton, was the great saving in expense by the improvement in quality. They instanced the one item of freight, which at that time amounted to 4*d.* per lb. Cotton of a quality equal to Bourbon was worth 2*s.* a pound in London, and the indigenous sort of India only produced 9*d.*[2] The charge for freight therefore amounted to 16½ per cent. in the one case, whilst it was actually 44 per cent. in the other.

The attention of the Bombay Government had been directed by the Court of Directors, in 1810, to the Island of Salsette, as presenting, in "superabundance, the description of situation, as to site and exposure, which are most desired for American cotton." A report on the capabilities of the locality being called for, it was stated that, although Bourbon plants were partially flourishing wild in hedgerows on some parts of the island, yet every attempt to cultivate the species there had failed, although several experiments had been made. Many acres had once been devoted to cotton, and subsequently the cultivation had been abandoned with considerable loss. In 1812, however, about an acre of well chosen land was entrusted to "a person

[1] East India Company Reports, p. 37 & 38.

[2] East India Company Reports, p. 40 & 41.

well qualified," in order to ascertain the possibility of introducing a better system of culture, and superior kinds of cotton. It was hoped that success might induce others to extend the experiment. It was decided that one-half of the ground should be irrigated to test the advantage of that course.[1]

The Collector of Caranjah, not being able to induce the ryots to cultivate Bourbon cotton seed, undertook the experiment himself, and succeeded in producing a garden sample, which was "reported to be superior in every respect to any cotton produced in the Broach pergunnas." Encouraged by this degree of success, he applied for, and was granted, permission to cultivate a quantity of waste land with the seed on his own account.

An attempt on a larger scale was made in the Kaira district in 1815. About 4,750 beegahs of land had been planted with this cotton, under the superintendence of Mr. Surgeon Gilders. About one-half of this quantity at first seemed to promise well, but, subsequently, the crop to a great extent failed, whilst the indigenous cotton in the vicinity yielded well. This failure was attributed to want of moisture. The rapid development of the indigenous annual, which reached maturity in six months, found sufficient nourishment in the moisture which remained in the ground, whilst the slow-growing perennial Bourbon, attaining full vigour only in eighteen months, perished in the dry soil. The moisture was just sufficient, it was reported, to produce blossoms, but failed almost entirely at the time when its aid was most required. Mr. Gilders was authorised to make a further trial with the aid of irrigation.[2]

A bale of cotton, the produce of these experiments with Bourbon seed, was consigned to London in 1816, and realised 1*s.* 5*d.* per lb., or 2*d.* per lb. more than the best Surat at the time. The staple was considered rather fine, and such cotton was said to be generally saleable. The Court of Directors, consequently, recommended a continuation of the experiments at Kaira, Caranjah, and Salsette, and suggested that trials should also be made at Fort Victoria and Malwan, "on the sheltered slopes of hills."[3]

For his next experiment Mr. Gilders selected a site in the eastern zillah, between the Subermuthy and the Myhee. The soil of the western district, where the previous failure had occurred, was considered unsuitable, "except near the surface being impregnated with salt, and not calculated to afford nourishment to plants whose roots strike deep into the ground." From this cause it was argued that "it must always prove detrimental to a plant, which, like the Bourbon, does not arrive at perfection for two or three years."

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[1] East India Company Reports, page 49. [2] East India Company Reports, page 56.
[3] East India Company Reports, pages 62—64.

The land of the new farm was a light, sandy loam. The seed was sown in rows, three feet apart, and an equal interval was left between each plant. The sowing commenced at the end of July, after the first heavy rains. Bajree was sown in drills between the rows. The after rains were scanty, and the plants remained apparently sickly and dwarfed until the monsoon of 1817, when they shot forth so luxuriantly that it became necessary to remove every alternate plant, leaving thus a space of six feet between each. They were still too crowded, and Mr. Gilders considered that a distance of eight feet between each shrub would be required. No irrigation was employed. The produce of 27 beegahs of land amounted to 44½ maunds of clean cotton. This parcel was most favourably received at Bombay, and was valued at 2*s.* 3*d.* a pound.[1] It was shipped to England in the *Albinia*, and was there sold for 1*s.* 3*d.* a pound, the range of Surats at the time being from 5¾*d.* to 14¼*d.* per lb. The London brokers reported upon the shipment as follows :—"Fine silky, even staple of fair length, good bright colour, remarkably clean, having a small portion of broken leaf and crushed seed ; the few yellow spots that appear are occasioned by oil from the crushed seed. This is deemed the best specimen that has been imported from Bombay raised from Bourbon seed.[2] The expense of cultivating this small crop was so great, that there was a loss of 28 per cent. on the transaction.

Small experiments with Bourbon seed at Malwan, in 1817-18, were reported by the president to have been "entirely satisfactory," and to have "established the fact of being able to produce it in the districts under the Residency to any extent, as far as natural impediments offer, though the prejudice of the natives was still far from being overcome."[3] He stated that "a luxuriant crop had been produced without the necessity of irrigating the plants." The quantity cultivated, however, was most trifling, and on being sent to London as a sample, it was reported to be "of fine, long, silky staple, but badly managed, being stained in a remarkable manner, probably with oil from the seeds."[4]

Encouraged by the result of the experiment in Kaira, the Bombay Government, in order to stimulate the ryots, authorised the Collector of the eastern zillah to offer premiums for successful cultivation in the following proportions :—

"1*st.*—The person who shall produce the greatest quantity of cotton of approved quality by a given period in the years 1819 and 1820, from a given quantity of ground, shall be entitled to a premium of Rs. 200.

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[1] East India Company Reports, pages 66 & 74.
[2] East India Company Reports, page 82.
[3] East India Company Reports, pages 76 & 77.
[4] East India Company Reports, p. 100.

"2*nd*.—To the person who produces the next greatest quantity, Rs. 150.

"3*rd*.—To the third successful candidate, Rs. 100.

"4*th*.—And to the fourth, Rs. 50."

As a further inducement to cultivate Bourbon cotton, the ryots were guaranteed a sale of all cotton of that description, of an approved quality, at the rate of Rs. 10 per maund, the price offered by the Ahmedabad weavers for Mr. Gilders' cotton.[1] Nothing seems to have resulted from this encouragement. Bourbon cotton, subsequently produced in small quantities at Kaira and Malwan, did not prove successful in the London market, where the dealers considered that, although tolerably good, it possessed little of the natural properties of its parent stock.[2]

In 1816 the Court of Directors sent out to Bombay two improved metal gins, made after wooden models received from Charleston. In the meantime this Government had obtained other two from Madras. On being tried, all these machines were reported to be unsuitable. An experiment made with them in contrast with the common Guzerat 'churka' gave the following comparative results:—The American gin, worked by twelve men for five hours, only cleaned 14 lbs. of cotton. The 'churka' worked by two men turned out 5 lbs. in four hours, a rate that, with equal hands, would yield 37½ lbs. in five hours, cleaned "in a superior manner, and without injury to the fibre." On a previous trial of the American machine, it had been found that five men were only able to clean two pounds of kuppas in a quarter of an hour, the staple being injured in the process.[3]

The cotton cleaned by these gins, although unfavourably reported of in Bombay, was declared by the dealers in London to be "fine, bright, uniform colour, the staple good, and without appearance of being injured by the machine. Although this cotton is remarkably clean," they added, "being nearly free from leaf, a considerable number of seeds are found in every handful throughout the bale; these have escaped the expected operation of the machine."[4] The sample sold for 1*s*. to 1*s*. 2*d*. per lb., the range of prices for Surats in Liverpool at the time being 7*d*. to 20½*d*. per lb. The Court desired that a 'churka' should be sent to Bengal with a view to ascertain whether the simple machine could not be improved. No conjecture was offered from Bombay as to these singular comparative performances of the American gin and the 'churka,' so much at variance with subsequent experience. The Government did not consider it requisite to apply for the instructions or observations of Mr.

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1 East India Company Reports, p. 68 & 69.

2 East India Company Reports, p. 65 & 66.

3 East India Company Reports, page 107.

4 East India Company Reports, p. 80—82.

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B. Metcalfe, the superintendent of cotton experiments in the Madras Presidency, as suggested by the Court, and no suspicion of defects in the machine was expressed. Mr. Metcalfe had been sent out to India in 1813. This gentleman had resided for several years in Georgia and New Orleans as "merchant and cleaner of cotton for hire." In 1816 the Madras Government requested that of Bombay to apply for his services if they appeared likely to be advantageous. The Government of Bombay declined them, however, having been "informed of the proceedings which had been adopted at Madras for the attainment of the objects for which he was sent to India, and of the little success with which they had been attended." [1] A short time after this Mr. Metcalfe gave up the employment and left India, "finding that his endeavours to induce the natives to use American machines were fruitless." [2]

The following table shows the course of the Cotton trade from 1812 to 1830, and the relative prices in Liverpool of Uplands and Surats:—

Years.	A Aggregate Imports into Great Britain.	B Imports from United States.	A Imports from East Indies.	A Exported of all growths.	C Prices. Uplands.	Surats.
	lbs.	lbs.	lbs.	lbs.	*d.*	*d.*
1812	63,025,936	26,000,000	915,950	1,740,912	13 to 23½	12 to 16
1813	50,966,000	War between	497,350	No official record	21 to 30	15½ to 20
1814	60,060,239	U.S. & England.	4,725,000	6,282,437	23 to 37	18 to 25
1815	99,306,343	45,666,000	8,505,000	6,780,392	18 to 25½	14½ to 21
1816	93,920,055	57,750,000	10,850,000	7,105,034	15 to 21	14 to 18½
1817	124,912,968	51,000,000	40,294,250	8,155,442	16¼ to 23¼	14½ to 20
1818	177,282,158	58,333,000	86,555,000	15,159,453	16½ to 22	7 to 20½
1819	149,739,820	57,750,000	62,405,000	16,622,969	10 to 19⅞	5⅜ to 14½
1820	151,672,655	89,999,174	20,294,400	6,024,038	8 to 13¾	6¾ to 12
1821	132,536,620	93,470,745	10,626,000	14,589,497	7 to 11½	6½ to 9¼
1822	142,837,628	101,031,766	6,742,050	18,269,776	5¾ to 11	5⅛ to 8½
1823	191,402,503	142,532,112	13,487,250	9,318,402	6¼ to 10¾	5¼ to 8¼
1824	149,380,122	92,187,662	17,796,100	13,299,505	7 to 10½	5½ to 8
1825	228,005,291	139,908,699	21,175,700	18,004,953	6 to 19½	5½ to 16
1826	177,607,401	130,858,203	22,644,300	24,474,920	5¼ to 8¾	4½ to 7
1827	272,448,909	216,924,812	25,742,150	18,134,170	4⅞ to 7¾	3⅞ to 6½
1828	227,760,642	151,752,289	29,670,200	17,396,776	5 to 7⅜	3½ to 5½
1829	222,767,411	157,187,396	28,147,700	30,289,115	4⅜ to 7	2⅞ to 5½
1830	263,961,452	210,885,358	12,324,200	8,534,976	5⅜ to 7⅞	3 to 6

A East India Company Reports, XVII.
B Porter; and Royle's Culture of Cotton, page 81.
C George Holt and Co.'s Circular. Burn's Glance.

[1] East India Company Reports, page 60. [2] East India Company Reports, page 124.

CHAPTER II.

EXPERIMENTAL CULTURE.

1830—1840.

Representation of Lord Ellenborough regarding the importance of improving Indian Cotton—Experimental Farms established in Guzerat and the Southern Maratha Country—Trials of Cotton-cleaning machines—Failure and abolition of the Experimental Farms—Subsequent measures for the encouragement of Cotton cultivation.

THE importance of improving the quality of Indian cotton began to be increasingly felt in England. During the first thirty years of the present century the consumption had about quintupled. The desirability of multiplying the sources of supply enhanced the advantage of diverting from the United States to our own colonies the daily augmenting flow of capital for the raw material. In 1828 Lord Ellenborough, Chairman of the India Board, addressed the East India Company on the subject. It was assumed that the inferiority of Indian to American cotton was chiefly owing to defective cultivation, which might be remedied by a judicious application of skill and capital. The Board represented that a slight encouragement was about to be extended to the Indian quality, on their part, by the reduction of the duty on it from 6 per cent. on the value to 4*d.* per cwt.; but they considered that this would not be sufficient, and they suggested that facilities should be extended to British subjects who might be prepared to settle in the cotton districts.[1]

The Court of Directors in reply stated that, though the province of Guzerat was equal in richness and fertility to any in the world, its cotton, being of short staple, was not suitable for British manufacturers. They added that, although many efforts had been made to improve its quality, "the attempts at

[1] East India Company Reports, page 113.

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improvement had been confined to the introduction of Bourbon cotton only, and had not been attended with success." [1]

Lord Ellenborough suggested "the expediency of attempting, on a small scale, the cultivation of all the finer sorts of foreign cotton in different and distant parts of India, under every different circumstance of soil and climate, and of transmitting to England, cleaned in the American manner, samples of the cotton so raised, for comparison with the cottons of other countries." [2]

In consequence of this representation, the Court of Directors wrote urgently on the subject to the Bombay Government on the 18th February 1829. They stated that at least three-fourths of the cotton used in the manufactures of Great Britain consisted of Georgia Upland and New Orleans; and that, while they understood that Surat and Broach cotton was little inferior to Georgia Upland, so little attention was bestowed on its production and cleanness, that their late consignments were represented to be deficient of every property esteemed by manufacturers, insomuch that those who had previously used these growths had discontinued their purchases, and they added, "nothing but great improvement could induce them to return to their use." They likewise pointed out the fact that, while American cotton cost 5*d.* per lb. delivered at New York, and realised 6*d.* to 6½*d.* per lb. at that moment in England, Surats, inferior to them in quality, cost at least 4*d.* per lb. in Bombay, and were then only worth 4½*d.* per lb. in London.[3] Upon such terms the Indian trade could not proceed.

The quantity of East Indian cotton imported into Great Britain from the three Presidencies in 1830 amounted to 12½ million pounds, and in 1831 to about 27 millions. The total consumption of cotton in the United Kingdom in 1831 was about 252 million pounds, of which only 13 millions, or about a twentieth part of the whole consumption, was Indian cotton.[4]

The Court being convinced, from past experience, that no mere theoretical or casual encouragement could effect any considerable improvement in India, resolved to establish an experimental plantation at the cost of the State, and they directed the Bombay Government to select about 200 acres for the purpose, to be placed under competent superintendence. They suggested, as the object of the first season, the careful cultivation of the finest indigenous kinds of India, such as the 'bairiti' of Bengal, and the best descriptions grown at Broach or Surat, and, meantime, a supply of Georgian and New Orleans seed was ordered.

They proposed, however, that, at the same time, experiments on a small

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[1] East India Company Reports, page 130.
[2] East India Company Reports, page 132.
[3] East India Company Reports, page 138.
[4] East India Company Reports, page 218.

scale with the finer sorts of exotic cotton should be made in various parts of the Presidency, and particularly in districts bordering on the sea-coast. They further recommended the distribution of good seeds to the ryots, and the award of premiums to those who might exhibit the most approved specimens, not less in quantity than five candies, either of indigenous or exotic cotton. With a view to encourage settlement in India, they authorised the grant of land on lease, at a low rent, for a term of years, as well as other facilities to all British subjects willing to enter upon the cultivation of the staple.[1]

For the immediate advancement of their object, the Court sent out an order for 500 bales of the growing crop (1829-30) of Broach or Surat cotton, "to be gathered and prepared with the greatest attention." The Resident at Broach was empowered to offer premiums, either in money or honorary dress, to the ryots for the clean picking of kuppas from the plant, and also to pay a small extra remuneration to the wackharias for care in separating the seed from the cotton. Fifty bales of the quantity ordered were desired to be packed to the density of only 900 lbs. to the ton of 50 cubic feet, or about 250 lbs. per bale, in order to ascertain whether, as suggested, part of the superiority of American cotton in England might not be due to lighter compression.[2]

A month later, a good supply of fresh Georgia Upland and New Orleans, as well as of Sea Island and Demerara cotton seeds, was forwarded to Bombay, with printed instructions for their culture. Two of Whitney's saw-gins were likewise sent, which, having been tried in the presence of the Directors, had "seemed entirely to establish the merit of the invention." Separate sets of the circular-saws were added as musters for the native smiths. The effect of these machines in expanding the cotton trade of the United States induced the sanguine hope that they might effect a similar revolution in India.[3]

The Bombay Government immediately established experimental farms in Guzerat and the Deccan. A plantation at Broach was placed under the superintendence of Mr. Finney, a gentleman chosen "from his knowledge and experience on an indigo plantation in Bengal." The experiments in the Deccan, at Khandeish, and Dharwar were conducted by Dr. Lush, the superintendent of the botanical garden at Dapoorie. A few plantations were ordered to be made in the Island of Salsette, regarding which site, in the commencement, the most favourable expectations were entertained.[4]

The sowing season being past, Mr. Finney was authorised to commence operations by purchasing a small quantity of the plant actually growing in

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[1] East India Company Reports, p. 138—143.
[2] East India Company Reports, p. 172.
[3] East India Company Reports, page 151.
[4] East India Company Reports, p. 176.

the Broach district, to be gathered and cleaned under his own superintendence. The cotton thus secured was cleaned by Mr. Finney at unusual expense, but on reaching England, the parcel was still considered a favourable remittance by the Court. The consignment consisted only of 25 bales, and the London dealers reported the cotton to be "perfect in colour and cleanness, but not superior in staple to good Surat." It was sold for 6¼*d.* per lb., at the same time that good toomil (first quality) cotton only realised 5¼*d.*[1]

Notwithstanding the efforts of the Bombay Government to execute the Court's order for 500 bales, only 300 bales of suitable quality were secured. The report on the shipment was that "although on account of its superior colour such cotton would be preferred for common purposes, yet owing to the shortness of its staple, it could not rank higher than the very ordinary descriptions of Upland Georgia cotton." The average price realised was 5¼*d.* per lb.

The cotton packed loosely by way of experiment was by some considered superior to that closely compressed, and it sold for ¼*d.* per lb. higher, but the increased freight rendered it unprofitable to continue the system.[2]

A few bales of this consignment were cleaned respectively by the Southern Maratha foot-roller, the native 'churka,' and the saw-gin, as a test of these machines. The process of cleaning by the foot-roller entailed an expense of Rs. 60 per candy, and the London dealers reported the cotton to be "a very fine specimen as to colour and cleanness; somewhat injured in the staple; would not be approved by manufacturers for general purposes."

The quantity cleaned by the 'churka' was considered to be "clean, bright cotton, of good staple, got up in a superior manner, and having very little waste."

That prepared by the American saw-gin was reported to be "clean, bright, handsome cotton, but very much injured in ginning, the staple being cut to pieces." And other brokers added, "not a desirable cotton, being spoiled by the process of cleaning." Part of this injury was attributed to the sharpness of new saws, but fear was expressed that "the fibre of the native Indian cotton did not possess sufficient strength and tenacity to resist the action of so powerful an instrument, and that the use of the American gin must be confined to cleaning cotton raised from American seed."

The following are the valuations placed upon this cotton:—

Cleaned by the Southern Maratha foot-roller		5¾*d.* to 6*d.* per lb.
Ditto	Churka	5½*d.* do.
Ditto	Saw-gin	5*d.* to 5½*d.* do.[3]

[1] East India Company Reports, p. 209. [2] East India Company Reports, p. 207 & 208.
[3] East India Company Reports, p. 195 & 211—215.

Government were suddenly deprived of the services of Mr. Finney, by the death of that gentleman, towards the end of the first season, "after a single night's illness, contracted, as it appears, from exposure to rain in the active discharge of his duty." Mr. Martin was appointed to succeed him.[1]

When these experiments were being arranged, an enterprising native merchant of Ahmednuggur, named Buswunt Sing, proposed to Government, in 1830, to cultivate and supply them with clean cotton, provided that an advance of money, free from interest, was made to assist him. The Collector of the district was authorised to advance Rs. 25,000 upon substantial security. Buswunt Sing the first season delivered about 50 bales of cotton at the rate of Rs. 115 per candy at Bombay. This cotton was considered by the London brokers to be "good staple, but tinged with brown bits, which are perished, clean for Indian cotton." It was valued at *5d* to *5¼d.* per lb.[2]

The sowing season being over when Dr. Lush arrived in the Southern Maratha Country to establish experimental farms there, he pursued the system which had been adopted in Guzerat, and purchased the produce of about 18 beegahs of growing cotton. The very unclean state of the cotton grown in the Dharwar districts, which was generally known as "Coompta cotton," had created a strong prejudice against it in the market, and permanently reduced its value. The measures which Dr. Lush proposed to adopt in order to overcome this prejudice were—

"*1st.*—To clean the cotton then grown in an economical way, so as to increase its value without adding too much to its cost.

"*2nd.*—To distribute the seeds of the best Guzerat, New Orleans, and other annual cottons, which would ripen in the course of the Southern Maratha season, so as to produce new varieties of the staple."

Acting on the belief that "the best state in which the fibre of cotton can be brought to market is as nearly as possible as it lay in the pod," he endeavoured to introduce the American mode of hand-picking. He engaged labourers, whom he instructed how to pick the cotton clean from the pods, separating the leafy and damaged portions from the clean, and putting them into separate bags. The produce was then cleared from seeds by the foot-roller. This instrument is simply an iron rod, thick in the centre, and tapering towards the extremities. It is rolled by the feet, to which wooden soles are attached, over a smooth, flat stone. The cotton comes in a continuous web from the stone, like a broad tape, leaving the seeds behind.[3]

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[1] East India Company Reports, p. 209. [2] East India Company Reports, p. 187 & 212.
[3] Dr. Lush's Report, 21st June 1830.

The clean cotton thus produced from the 18 beegahs amounted to six bales, which were sent to England, and were valued at 5¼*d.* to 5⅞*d.* per lb. The London brokers considered the cotton to be of "good, bright colour, with a yellowish tinge; quite clean, and remarkably well got up; firm and heavy in the hand; good, sound staple, but not fine."[1]

Dr. Lush recommended that pickers of cotton should be sent out before sunrise, and only allowed to pick till noon. "The reason for this," he explains, "is that the *pod-leaf*, the admixture of which is such a detriment to the cotton, and so difficult to exclude, is in the morning moist from the dew, and does not break up in the cotton, but in the after part of the day when touched it flies in little particles over all the open pods. This pod-leaf is the main thing to be guarded against in field picking; the leaf itself of the cotton shrub can only be mixed where the gathering is carried on with abundant carelessness."[2]

He failed entirely in persuading the ryots to adopt the system of cleaning which he thus introduced. As an inducement, they were allowed the option of paying their revenue in cotton, or of selling to Government any quantity of it, cleanly picked, at about 20 per cent. above the market price. The opposition of the native merchants of Dharwar, however, prevented this from being "attended with that success which might have been expected."[3]

Dr. Lush selected, in the village of Seegee Hullee, a site for a small "perennial cotton farm, most advantageously situated, as the greatest portion of the land was capable of being irrigated from a stream which never fails." He did not, however, subsequently find it necessary to have recourse to irrigation.

Dr. Lush represented that the impure state of Dharwar cotton was in a great measure attributable to the mode of packing and carriage. It was thrown loose into bags, and being carried on bullocks, which required to be daily loaded and unloaded, the cotton was subjected to a constant accumulation of dirt. He urged the improvement of the road from Hooblee and Dharwar to Sedashewghur, as an object of the first importance to the commercial interest of the Southern Maratha Country, and he recommended that all consignments should be sent to the latter port to be screwed and forwarded to market as rapidly as possible, to obviate the delay and expense of warehousing the cotton in the villages throughout the monsoon. As a step towards the removal of these objections, Government erected cotton packing screws at Dharwar, Nowlgoond, and Gudduck.[4]

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[1] East India Company Reports, page 212. [2] Dr. Lush's Report, 21st June 1830.
[3] East India Company Reports, page 261.
[4] Dr. Lush's Report, 1830; and East India Company Reports, page 261.

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The farm at Seegee Hullee was not prosperous. The seasons were unfavourable to cotton, it was said, but, at any rate, "the greater portion of the seed sown produced no crop whatever." Dr. Lush stated, "the soil appeared best adapted to the culture of the white-seeded perennial, the Pernambuco, and the Egyptian cotton, which last promises to succeed far better than the others." The entire crop available for shipment to England only amounted to four bales. These were thus reported upon in England: "Two bales white-seed very clean and showy, but some parts greatly injured in cleaning; mixed with small white knots (or useless fibre), which are very objectionable; value 7½*d.* to 8½*d.* per lb.

"One bale American Upland seed, grown as a perennial, much the same as the former two bales, valued at 8*d.* to 8½*d.* per lb.

"One bale New Orleans seed, Dharwar, clean, and of fine creamy colour; fair staple, but a little injured by cleaning; many small white knots (useless fibre), valued at 8*d.* per lb.

"The valuation affixed to the cotton which appears to have been injured in the cleaning cannot be given with much confidence, as these parcels may not find purchasers for spinning, but these moderate quantities of clean cotton would probably be taken for candle-wicks and jewellers' purposes at the prices stated." [1]

It soon became evident that no sufficient quantity of superior quality could, for some time, be produced, so as to improve the reputation of Dharwar cotton in the trade. An agency was consequently established in the districts eastwards of Dharwar, in order to present a ready market to those ryots who might adopt the American system of picking and cleaning. The inconsiderable quantity of cotton thus secured in the course of 1832 was consigned to China. [2]

The superintendent in Broach selected a farm at Danda, consisting of 3,000 beegahs of land, for the season 1831-32. He adopted the expedient of engaging the ryots to cultivate a part of this land by contract, under his directions, in the hope of inducing them gradually to introduce into their own farms any improvement which they might perceive to be advantageous in that of Government. Notwithstanding the greater expense and care bestowed upon this land, the superintendent reported that the crops reared upon it were not at all superior to those produced in the usual way by the ryots. He added, after an experience of eighteen months, that "he felt no hesitation in giving it as his decided opinion, that no improvement was to be expected from any alteration in the mode of cultivating cotton in Guzerat. The implements used are extremely well adapted to the purpose, and the small quantity of land cultivated by each individual enabled him to bestow upon it more care and attention than could

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[1] East India Company Reports, page 275.

[2] East India Company Reports, page 262.

possibly be expected from hired servants." He considered, however, that decided improvement might take place if more attention were given to clean picking. At his strong recommendation, he was allowed to adopt the following system during the succeeding season:—

"1*st*.—To let, at the same assessment as the neighbouring land, about 2,800 beegahs of the farm to ryots, who would cultivate under his own directions, the rent being payable in kuppas of the finest quality, which should be cleared of seed by the saw-gin.

"2*nd*.—To cultivate the remaining 200 beegahs entirely with foreign seed, in order to ascertain the species best suited to the soil and climate.

"3*rd*.—To purchase and clean with the saw-gin the best indigenous cotton of Guzerat, to the value of ten thousand rupees."

In order to carry out these plans, warehouses were built, small advances were granted to the ryots for current expenses, and an arrangement was made with them to furnish labour for the farm, on the understanding that, for every beegah so cultivated, an equal quantity of land should be given rent free.

Small subsidiary farms were established at Dundooka, Ranpore, Ochallee, Uwadur, and on the western side of the Gulf of Cambay, on which it was intended to plant Egyptian and Pernambuco cotton seed, to be cultivated by contract.[1]

In 1832 a small parcel of cotton, produced by the Guzerat farm, and cleaned by the saw-gin, was sent to Bombay. About 50 bales of this were sold there, and realised Rs. 152 to Rs. 156 per candy. Six bales were shipped to Canton as a sample; and the remaining 18 bales were shipped to London, where the following report upon them was given:—

"Four bales quite clean and bright cotton; four bales nearly the same, but with a little of the leaf remaining. The whole much injured in the staple by ginning. Present value 5¼*d*. to 5½*d*. per lb; nine bales very clean and bright cotton. The staple fair, but a little injured by the ginning; value about 6*d*. per lb.

"One bale marked 'New Orleans' very clean and bright cotton, but the staple very short, and rather coarse. Injured by the ginning."[2]

The progress of the experiments, generally, in Guzerat was most discouraging. The ryots showed great reluctance to sow the foreign seed offered to them. They said to the superintendent, "if it succeed with you, we will try, but we cannot waste our money in planting seed we are not acquainted with." Sir J. R. Carnac, then Governor of Bombay, adds, "the result justified their caution, for both in Guzerat and the Southern Maratha Country, where the ryots were

[1] East India Company Reports, pages 252—256.

[2] East India Company Reports, pages 272 and 273.

prevailed upon to try the foreign seed, under promise that the produce would be bought off them, this was returned 'blighted, damaged by the bug, and no better than common field cotton.' The crops were, moreover, scanty, so that the original prejudice against foreign seed was confirmed." [1]

The American cotton seed sown in Guzerat in 1831 "failed from an insect which deposits its eggs in the pods before it has arrived at maturity, producing a worm which destroys the cotton." The superintendent stated, regarding New Orleans seed cotton growing on the experimental farm, "the plants will require to be watered during the hot months of September and October, which will increase the expense of cultivation; but the pod is so much larger, and the cotton so much finer, that I think it will prove a more profitable crop than the present cotton of the country." No more than a garden sample of such cotton, however, was produced in Guzerat. A small quantity exhibited in Bombay to a committee of native merchants was reported to be "very superior, fine, thin staple, also fine coloured, and well cleaned." [2]

The Pernambuco cotton grown in Guzerat in 1832 promised well, but the seed "was joined together, and the cotton could not be separated from it either by the saw-gin or the churka." Of this species it was subsequently stated, however, it is by far the finest cotton we have upon the farm, "and as it grows without watering, there is every reason to hope that it will thrive well in this climate." A committee of European merchants reported on the second year's growth from acclimated Pernambuco seed, "Good staple; the length of some part is as good as Pernambuco staple, but it is not even, and it is not so fine as Pernambuco; such cotton would have a ready and extensive sale in Great Britain at a price equal to the best United States cotton, Sea Island excepted."

Some Bourbon cotton, the second year's growth, of seed raised in India on the Guzerat farms was examined by a committee of European merchants, who reported that it was not better than Broach cotton.

The superintendent having tried some Egyptian seed brought over by Lord Clare, considered it "better suited to the soil and climate of Guzerat than any exotic cottons he had yet tried." The following year (1832) he observed "I have very sanguine expectations that the Egyptian cotton plant will, be found to thrive and produce well in this climate."

He thus wrote of the whole of the operations with exotic seed when the Guzerat establishment was reduced in 1832:—"Our experiments hitherto have only proved that the foreign cotton will grow in this country, but not afford a

[1] Minute by Sir J. R. Carnac, paragraph 8, page 3.
[2] Summary on Introduction of Foreign Seed, paragraphs 2 & 14.

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reasonable profit to the cultivator." The whole, in fact, had been mere costly garden experiments, producing small results at large expense. When these experiments were finally abandoned, the report made regarding them was, "with the exception of the Pernambuco, the foreign seeds generally failed or yielded produce scarcely superior, as a merchantable article, to the indigenous Broach or Surat cottons. The produce of the seed raised from the original foreign seeds was also marred by a gradual deterioration in quality in the growth of each successive year." [1]

The following is a tabular statement of the progress made by Dr. Lush in experiments with exotic cotton seeds from 1829 to 1832 :—

Return of American and other Cotton Seed sent by Government to Poona, Dharwar, and the Concan for planting and distribution in 1829 *to* 1832.

Varieties of Cotton.	Where sown.	What success.	Produce.
Georgia, Sea Island.....	Tanna, Dapoorie, Byl Hongul.	None; does not appear adapted to our climate	Specimens merely.
Upland Georgia, Louisiana, New Orleans .. } North American annuals	Nowlgoond, Dharwar, Moorub, &c., distributed among the ryots.	Various. Apt to degenerate; the seed withers and puts on the appearance of a poor, black-seeded cotton.	The produce returned by the ryots very small in proportion to the seed given to them. They waited for the American saw-gin, as the foot-roller broke up the seeds. This cotton is now preparing, and will be sent to Bombay with the proceeds of the last harvest.
The above sown as perennial.	Seegee Hullee.....	Doubtful	Will be ready this season.
Barbadoes black seed, small quantity.	Byl Hongul.....	Seed dead; did not appear above ground.	None.
Nurmah, Guzerat	Ditto	Eaten by grubs at the roots.	Ditto.
Broach and Jumbooseer, small bags.	Given to a ryot at Nowlgoond.	Pods attacked by the field-bugs.	Not being so good as an equal quantity of country cotton, it was not forwarded by the ryot.
Pernambuco, 5 lbs.....	Seegee Hullee, 1831.	Grew well at first; afterwards blighted; now recovering.	None yet.
Bourbon, 1831	Ditto ditto ..	Did not come up	None.
White-seeded perennial, introduced from Dapoorie Garden.	Ditto ditto ..	Appears likely to become a fine silky cotton.	Now preparing; cleaned by the saw-gin.
Egyptian	Ditto 1832	Promises better than any of the above, notwithstanding the dry season.	None yet.

Darwar, 20th November 1832. (Signed) CHARLES LUSH.

[1] Summary on Introduction of Foreign Seed, paragraph 20.

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In 1833 he reported that "the American green seeded annuals (Georgia Upland and New Orleans) degenerate and produce thin crops and starved pods, with shrivelled seeds;" and he subsequently stated, "the white-seeded perennial appears about equally productive with the American annuals, some seed of which has been sent, as New Orleans and Upland Georgia, and which, although they have failed here as annuals, have produced well when left to the second year. The green-seeded American cotton sown here has put on the appearance of black seed, mixed with white and green. The Pernambuco or kidney cotton must, in this district, either be given up as a total failure, or some different method of cultivation adopted. In the black cotton soil it gives out resinous matter from the pods, as well as from other parts of the plant; the pods wither, and the wool rots. Yet the same plant in shallow, red, and manured soil produced abundantly, and is the longest fibre or staple (though rather coarse) of any variety I have seen here." [1]

Referring to the favourable reports on Pernambuco cotton in Guzerat, he remarked, in 1834, "I have not been able to get produce from Pernambuco seed in ordinary black cotton soil * * * * My present idea is, that it would succeed in a tolerably moist, red soil. Of this I am convinced that no cotton is so well worthy of attention, because it preserves its length of staple after being naturalised in this country." He observed further, "The common black soil, when unmixed, is poisonous to the Pernambuco seed, particularly if irrigated, but when the black soil is mixed with red sand, it succeeded very well. The same was observed at Broach." [2]

Dr. Lush reported of Egyptian seed in 1835, "It has borne a good crop the first year; the quantity of cotton by weight, in proportion to seed, is double that of ordinary cottons, and it promises to succeed as an annual." [3]

With regard to the perennial kinds, he stated also in 1835, "It is quite plain that the perennial cottons now grown at Seegee Hullee will not be extended throughout the Dharwar districts." [4]

Undaunted by failures or successes, which were still more expensive, Dr. Lush, in 1835, proposed adding to the Seegee Hullee farm, already consisting of 260 acres, about 1,000 more in the immediate vicinity. The Collector, Mr. Baber, who was referred to for his opinion, stated to Government that such an extent of land suited to cotton was not procurable near Seegee Hullee, and the small tract which might be cultivated was held by ryots, who

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1 Summary on Introduction of Foreign Seed, paragraphs 8 and 9.
2 Revenue Consultations, vol. xiv., 1834, page 188.
3 Summary on Introduction of Foreign Seed, paragraph 18.
4 Revenue Consultations, vol. xix., 1835, page 348.

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would not part from it; that, though in the fifth year of the experiment, no native, even in the vicinity of the farms, had been induced to cultivate any of the foreign cotton, nor in the slightest respect had altered or deviated from their own mode of cultivating, gathering, picking, or separating the seed from the cotton.[1]

The report of Dr. Lush, at the close of the same year, was not at variance with this statement. He writes, "With the exception of the naturalised Pernambuco, and a late trial with the Egyptian seed, all foreign cottons of long staple have become short. This I account for from the nature of the season. The pod is formed in hotter, drier weather than in America, and is hastened to maturity, instead of having intervals of damp weather to assist its development. No foreign cotton is capable of being cleaned by the foot-roller. This simple machine is alone adapted to the small crisp seed of the country cotton. The American saw-gin having failed, by cutting the staple and twisting a great part into knots, we have no means of separating the seed economically without beginning afresh, and adopting a new course." [2]

The position of the experimental farm at Broach was not more flourishing. Mr. Williamson, the Revenue Commissioner, Northern Division, wrote in 1836 regarding it, after it had been in progress for nearly seven years, "I am now forced to confess that I consider it a failure, and that to continue it any longer would be a useless expenditure of the public money." The principal Collector, Mr. Vibart, concurred in the same opinion, and said, "The farms have now been established since 1827, a period of seven years, and I much fear as yet little has been effected towards attaining the objects of Government. * * * Little has been done apparently in the introduction of the foreign plant; and I believe no progress has been made in inducing the cultivators to adopt a more careful method of picking their kuppas, and preparing it for market." [3]

Referring to the efforts made to improve the cleaning even of the cottons of Guzerat and Dharwar, Sir J. R. Carnac states that, while the immediate results seemed successful, the ultimate out-turn completely neutralised them by the expense which had been incurred, counterbalancing the improvement; "in other words, dirty cotton gave a better return to the ryots than clean." He instances this as follows:—"On the same vessel in which cotton was sent home, which was reported worth 8½*d.* per lb., there was also transmitted some cotton which was collected in the usual way, that is, common, dirty bazar

[1] Revenue Consultations, vol. xix., 1835, page 87.
[2] Revenue Consultations, vol. xix., 1835, page 346.
[3] Revenue Consultations, vol. xxiii., 1836, page 50.

cotton, which was valued at 6½*d.* to 7*d.* per lb. Now, this latter cost at the villages only Rs. 40 per candy, whereas the carefully-picked and carefully-cleaned cotton cost Rs. 75 per candy, without carriage or packing."

It was decided that the experimental farms in Guzerat and the Southern Maratha Country should be abolished. Sir Robert Grant, then Governor of Bombay, in the Minute in which he recommended this step, stated emphatically, "The experiment has been tried sufficiently, and has failed." [1] The experimental farms were consequently abandoned.

The example of Buswunt Sing at Ahmednuggur was followed by others to whom advances on similar terms were made. Some rather good, though small, parcels of cotton were delivered to Government, and consigned by them to China, but no material or permanent improvement was effected.[2]

With a view to encourage the preparation of superior cotton in Khandeish, the Collector was authorised, in 1831, to purchase cleanly-picked parcels to the extent of Rs. 20,000. The consignments of the first season were damaged on the way, and had to be sold by auction in Bombay. The next year's purchases arrived safely, but were merely "marketable," and were shipped for China. The high prices current at the time, however, considerably extended the cultivation of indigenous cotton in this province. The Collector pointed out, in a despatch dated 23rd March 1834, that "the great desideratum in the fiscal management of the Deccan is to throw the profits of labour into the pockets of the producers, instead of the Banians, or middlemen." [3]

As an encouragement to cultivation in the Deccan generally, the Bombay Government, in 1836, declared all lands on which cotton should be grown exempt from the land tax for five years, or till 30th April 1842. This measure was not approved of by the Court of Directors, and was cancelled on the 20th January 1838. No sooner was this done than the plant, cultivated under the influence of exemption from assessment, was abandoned on the re-imposition of the tax. The soil and climate of the Deccan were not considered genial for cotton. The qualities produced were much inferior to Broach, and proved a much less profitable object of cultivation to the ryots than grain and other produce.[4] Exotic cotton had no where been adopted or cultivated with success. Dr. Gibson, in 1840, stated his conviction that the exotic cottons which he had tried were, with the exception of the New Orleans, not suited to the

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[1] Revenue Consultations, vol. xxiii., 1836, page 229.
[2] East India Company Reports, page 267.
[3] Revenue Consultations, vol. xiv., 1834, page 7.
[4] Summary, Measures adopted since 1836, para. 8.

soil and climate of the Deccan. As to further experiments with the Pernambuco and Egyptian cottons, he said, "In inland situations, at least in the Deccan, I conclude that they will only prove a source of useless expenditure." [1]

Few private speculators were found to avail themselves of the facilities for establishing themselves, as cultivators, which Government held out, and those who were sufficiently enterprising to attempt it met with no success. Sir J. R. Carnac expressed his conviction that "cotton culture holds out no inducement for any private person, who knows what he is about, to engage his capital in any speculation on a large scale."

Only a few desultory measures for the improvement of cotton were adopted after the abandonment of the experimental farms in 1836. Cotton seed was distributed, and advances of money made to Buswunt Sing and others, to enable them to cultivate the staple. The Umjid Bagh at Broach, a spot cultivated as a garden, was granted rent free, in perpetuity, to Merwanjee Rustumjee, a person who engaged to establish screws and warehouses there, for packing and storing cotton. This person exerted himself rather successfully to secure greater care in the picking and cleaning of cotton. He stated, however, that after expending 40 or 50 per cent. to accomplish this, the first purchaser "frequently became a loser by the speculation." [2]

Churkas were, in several districts, distributed gratuitously to the ryots; and several attempts were made, but almost entirely without success, to improve that machine. An Egyptian instrument, which was procured as a specimen, proved no better than the 'churka.' Dr. Lush reported unfavourably of the Whitney gin. "Much time has been lost," he remarked, "by assuming that Whitney's saw-gin ought to answer here because it does in America. Of this there is now, I believe, little chance. We do require a machine to effect for our cotton what Whitney's saw-gin has done for America, but this machine is yet to be invented." A grant of £100 was made by the Court of Directors, through the East India Association of Glasgow, in order to stimulate mechanics to produce a serviceable machine, but the result entirely disappointed the expectations entertained.[3]

In 1836 Government repealed the "churka veera," a tax upon every 'churka,' or wheeled-machine, for separating the seed from cotton. The rate had been Rs. 2-12 on each, whether worked for a day or for a whole season, and the tax

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[1] Revenue Consultations, vol. xviii., 1840, page 155.
[2] Sir J. R. Carnac's Minute, para. 16; and Rev. Consul., vol. xliii., 1840, page 161.
[3] Sir J. R. Carnac's Minute, paragraph 19, page 6.

produced annually about Rs. 14,000. The year after its abolition 1,500 additional machines were brought into operation in the town of Broach.[1]

In 1839 the Bombay Government ordered the local authorities to adopt measures for abolishing the kullee system. It had been the practice in Guzerat to require the cotton crop to be deposited in the "kullee" or village farm yard, whence it was not allowed to be removed until the assessment was paid. The kuppas was generally stored in pits dug into the ground, and plastered inside with cow-dung. The kullee system had been abolished in Surat in 1833-34, but very slow progress was made in inducing the ryots to keep their cotton in covered bamboo enclosures.[2] The article, during the time it remained in their hands, was generally exposed to dust and damp, which added to its weight what was detracted from its quality.

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[1] Revenue Consultations, vol. xix., 1835, page 362.

[2] Sir J. R. Carnac's Minute.

CHAPTER III.

POSITION AND PROSPECTS OF INDIAN COTTON.

1840—1848.

Memorials praying for further measures for the improvement of Indian Cotton—American Planters engaged for India—Comparative imports, cost and value of American and Indian Cotton—Proceedings of the Committee appointed in Bombay to inquire into the causes of the decline of the Cotton Trade—Duty—Land Assessment—Remedial measures.

ANOTHER decade of years thus passed away without any material improvement in Indian cotton. The experimental farms had produced a few bales of rather better quality, but the mass of importations remained as bad as ever, and no impression whatever had been made upon the ryots. No encouragement which had been extended could avail with them against that one circumstance mentioned by Sir J. R. Carnac, that *dirty cotton gave a better return than clean.* The growing necessities of England, however, in 1838, again forced from public commercial bodies that periodical cry, which, ten years previously, had stimulated the Court of Directors to undertake the series of experiments, which had now unsuccessfully terminated. Urgent memorials were forwarded to the Court from the Chambers of Commerce of Manchester and Glasgow, and from the Liverpool and Glasgow East India Associations, praying them further to devise and adopt measures to improve the quality, and extend the cultivation, of Indian cotton.

The Court of Directors, which had ever evinced the will, but had failed in finding the way, to effect these objects, now resolved to secure the services of American planters for the purpose of instructing the natives in the cultivation, and proper mode of cleaning cotton. They deputed Captain Bayles, of the Madras Army, to engage experienced and competent men; and, after considerable difficulty, that gentleman arranged with twelve American planters to proceed to India to carry out this plan. Three of these gentlemen were allotted to the Bombay Presidency, where they arrived in September 1840.[1]

Before entering upon the more important experimental operations then commenced, it may be well briefly to review the position of Indian cotton in the English markets, and the course of the Indian trade. The necessity of improving the quality of the Indian staple, in order to render it suitable for the manufactures of Great Britain, was not exaggerated by the memorials to

[1] Revenue Consultations, vol. xxx., 1840, page 382.

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the Court. The Manchester Chamber represented that, during the first eleven months of 1838, there were imported into Great Britain 1,374,316 bales of cotton. The value of this raw material was about £14,000,000 sterling, and, being manufactured by the industry of upwards of 2,000,000 persons, its aggregate value increased to nearly £40,000,000. Of this quantity of cotton, however, only 96,116 bales, or 5 per cent., were received from the East Indies.

The following statement of the comparative importations and prices of American and East Indian cotton was presented by Mr. Bazley, the President of the Manchester Chamber of Commence, in evidence before the Select Committee of the House of Commons on the growth of Cotton in India :—

Table showing the GROSS IMPORT OF COTTON WOOL *into the United Kingdom; the portions received from the United States and the East Indies respectively; and the Per-centage of Indian supply taken triennially.*

Years.	Gross Import of Cotton.	From the United States.	From British Possessions in the East.	Per-centage of Indian supply taken triennially.	Average price of Boweds, 31st Dec. each year, Broker's List.	Yearly average price of Uplands and Surats., Geo. Holt & Co.'s List.		Average price of East India, 31st December.
	lbs.	lbs.	lbs.			Uplands.	Surats.	
1820	151,672,655	89,999,174	23,125 825	} 8 1/16	..	..	..	..
1821	132,536,620	93,470,745	8,827,107		9 1/2 d.	9 3/4 d.	7 7/8 d.	..
1822	142,837,628	101,031,766	4,554,225		8 5/8 d.	8 1/4 d.	6 5/8 d.	..
1823	191,402,503	142,532,112	14,839,117	} 9	8 1/4 d.	8 1/4 d.	6 3/8 d.	..
1824	149,380,122	92,187,662	16,420,005		8 1/2 d.	8 1/2 d.	6 3/8 d.	..
1825	228,005,291	139,908,699	20,294,262		12 1/4 d.	11 3/8 d.	8 3/4 d.	..
1826	177,607,401	130,858,203	21,187,900	} 10 9/16	6 3/4 d.	6 3/4 d.	5 1/2 d.	..
1827	272,448,909	216,924,812	20,984,916		6 1/2 d.	6 1/2 d.	5 1/8 d.	..
1828	227,760,642	151,752,289	32,246,187		6 1/2 d.	6 3/8 d.	4 7/8 d.	..
1829	222,767,411	157,187,396	24,908,399	} 8 1/16	6 1/2 d.	5 3/4 d.	4 d.	4 1/4 d.
1830	263,961,452	210,885,358	12,483,217		6 3/4 d.	6 7/8 d.	5 d.	5 d.
1831	288,674,853	219,333,628	25,805,153		6 d.	6 d.	4 3/8 d.	4 1/4 d.
1832	286,832,525	219,756,753	35,178,625	} 10 9/16	7 1/4 d.	6 3/8 d.	5 d.	4 3/4 d.
1833	303,656,837	237,506,758	32,755,164		8 3/4 d.	8 1/4 d.	6 1/2 d.	6 d.
1834	326,875,425	269,203,075	32,920,865		9 3/4 d.	8 3/8 d.	6 3/8 d.	7 1/4 d.
1835	363,702,963	284,455,812	41,474,909	} 14 3/16	9 d.	10 1/4 d.	7 1/2 d.	6 1/2 d.
1836	406,959,057	289,615,692	75,746,926		9 d.	9 3/8 d.	6 3/4 d.	5 d.
1837	407,286,783	320,351,716	51,577,141		8 d.	7 d.	4 1/2 d.	4 3/4 d.
1838	507,850,577	431,437,888	40,229,495	} 11	8 d.	7 d.	5 d.	5 3/4 d.
1839	389,396,559	311,597,798	47,170,640		6 3/4 d.	7 1/8 d.	5 3/4 d.	5 d.
1840	592,488,010	487,856,504	*77,010,917		6 1/2 d.	6 d.	4 5/8 d.	4 1/4 d.
1841	487,992,355	358,214,964	*97,368,312	} 15 1/16	6 d.	6 1/4 d.	4 5/8 d.	3 3/4 d.
1842	531,750,128	405,325,600	*96,555,186		5 1/4 d.	5 3/8 d.	4 d.	3 3/4 d.
1843	674,196,992	558,735,600	68,820,576		5 1/2 d.	4 5/8 d.	3 5/8 d.	3 3/4 d.
1844	646,111,304	517,218,622	88,639,608	} 11 1/16	4 1/2 d.	4 1/4 d.	3 3/8 d.	3 d.
1845	721,979,953	626,650,412	58,437,426		4 1/2 d.	4 3/8 d.	3 d.	3 d.
*1846	480,543,000	382,526,000	34,270,800		7 d.	4 7/8 d.	3 3/8 d.	5 d.
†1847	444,243,600	349,252,000	81,106,480		5 d.	..	..	3 3/4 d.

* The supply of Indian cotton to Great Britain fortuitously increased in 1840, 1841, and 1842 by the Chinese war.

† These items are calculated from "packages," the official accounts in lbs. not having been seen.

The consumption of cotton in Great Britain from 1820 to 1846 increased about four-fold. The value of the article during the same period diminished 50 per cent. The demand for the Indian growth rose or fell according to the value of American. It was really a mere *pis aller*. When the price of Georgia Upland rose, spinners reluctantly fell back upon Surats, and abandoned their use again when Upland declined.[1] America held in her hand the balance of the cotton market, and settled the measure of the Indian supply.

Mr. J. Aspinall Turner, Chairman of the Manchester Commercial Association, and probably the largest consumer of the Indian cotton at the period, stated before the same Committee that, when American cotton was selling at a low rate, its superior quality would induce most spinners to use it, and avoid the Indian growth, except at so low a price as would render it impossible for the Indian grower or the India merchant to send it profitably to market, and consequently the supply at such times fell off. Mr. Turner said that he felt satisfied, and had been so for years, that the demand for Indian cotton never would be regular until it assumed something like the quality of American cotton.[2] He considered that the best Surats, if sent in a clean state, unmixed with leaf, and not cut by the saw-gin, would be worth about 1*d.* per lb. less than Georgia Upland. In 1848 they were 30 per cent. per lb. lower in Liverpool than common American.[3]

Mr. John Peel confirmed Mr. Turner's statements. He mentioned, at a public meeting in Manchester in 1848, that "he could say, from his own experience for several years, that it had not been possible to import native East Indian cotton into that market in more than one year out of five without heavy loss: the spinners would not take the native cotton when they could help it."[4]

In 1847, when the consumption of Indian cotton was greater than in any previous year, Messrs. Hollinshead and Tetly remarked, in their circular for that year, that this circumstance was "a sure indication of a bad trade."[5]

Mr. Bazley stated (answer 633), "It is found by experience that the average of waste that is usually made in using Surat cotton is 25 per cent., whilst from American the loss is only 12½ per cent. For every 100 lbs. of Surat cotton the spinner produces 75 lbs. of yarn, and from 100 lbs. of American cotton he produces 87½ lbs. of yarn, but the same machinery produces a larger quantity of yarn from American than from Surat, from the former requiring

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[1] House of Commons Report, 1848. Evidence, Dr. F. Royle, Answers 322—334.
[2] Ditto, Answers 787 and 788.
[3] Ditto, Answers 331, 332, and 334.
[4] *Manchester Guardian*, 13th May 1848. Royle.
[5] Royle, Culture of Cotton, page 26.

fewer turns of the spindle, and less twist per inch." He subsequently said (answer 735), " An improvement in quality of 10 to 25 per cent. would vastly increase the consumption of Indian cotton"; and (answer 745), " I am satisfied that the quality of the cotton must be greatly improved before we can use it to advantage."

Regarding the waste from Indian cotton, Mr. Aspinall Turner stated the following fact:—" In the spinning establishments of which I am at the head, we are in the habit of throwing upon the waste lands, or upon the dunghill in fact, an amount of dirt, chiefly consisting of soil, sand, dust, and various extraneous matters, which have been introduced, I suppose, or have never been cleaned out of the cotton, for which we have paid £7,000 per annum. In consuming the same quantity of American cotton, there would be very little refuse thrown way; most of what we technically call 'waste,' would be disposed of, in the case of American cotton, for the purpose of inferior spinning." [1]

The difference in quality and out-turn was not compensated by difference in the cost of production. The relative prices of Americans and Surats left a profit on the former, whilst the latter sustained a loss. Mr. Bazley calculated " that an American planter could not grow cotton at a less cost than 3*d.* a pound." [2] Dr. Forbes Watson, reporter on the products of India, states that " the expenses on India cotton may thus be summed up: Taking the cost of raising the cotton at 1½*d.* per lb., adding another 1½*d.* per lb. before it gets to Bombay, and setting down the transit to England, &c. at another 1*d.*, the cotton cannot be sold under 4*d.* per lb." [3] Mr. A. Mackay calculated the relative cost of Indian and American cotton, at the ports of shipment, as respectively 3¼*d.* and 3½*d.* per lb. Taking freight to England, in both cases, at ½*d.*, and adding ¼*d.* per lb. for the charges there, he found that, " *merely to cover expenses,*" the selling price, in Liverpool, of American cotton was 4¼*d.* per lb., and of Indian 4*d.* per lb. This difference of cost amounts to but about 6 per cent., whilst the difference between their relative values was generally about 25 per cent. Mr. Mackay made this calculation distinctly applicable to the period of 18 years commencing in 1834.[4]

The following figures, collected by Mr. W. Laird for the East India Company, from Messrs. George Holt & Co.'s circular for 1841, show the average prices of Upland and Surats from 1821 to 1841 :—

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1 Evidence, House of Commons, 1848, Answers 789 and 790.
2 Evidence, House of Commons, 1848, Answers 769.
3 Growth of Cotton in India.
4 Mackay's Western India, pages 164—166.

Period.	Average prices of Upland.	Average prices of Surat.
4 years, ending 1825	6¼*d.* to 8¾*d.*, 10½*d.* to 13*d.*	5½*d.* to 7¼*d.*, 7¾*d.* to 10¼*d.*
4 ditto 1829	5*d.* to 6½*d.*, 6⅛*d.* to 7¾*d.*	3¾*d.* to 5¼*d.*, 4½*d.* to 6¼*d.*
4 ditto 1833	5½*d.* to 7¼*d.*, 7⅛*d.* to 8⅞*d.*	3½*d.* to 5¼*d.*, 5*d.* to 6½*d.*
4 ditto 1837	6⅜*d.* to 9¼*d.*, 8¾*d.* to 11¾*d.*	4¼*d.* to 7¼*d.*, 6*d.* to 8½*d.*
4 ditto 1841	4⅞*d.* to 7¼*d.*, 6⅜*d.* to 8¾*d.*	3½*d.* to 5⅜*d.*, 5*d.* to 5¾*d.*

From about the year 1825, the attention of spinners was more devoted to the production of the coarser counts of yarn, and fine spinning considerably diminished. This was probably owing, in great part, to the reduction in the value of cotton, which enabled the spinner more liberally to consume the raw material, and the result was favourable to the more ordinary qualities. In the memoranda prepared by Mr. W. Laird for the East India Company, he points out that the imports of American cotton into Great Britain, from 1825 to 1841, increased 175 per cent., whilst the quantity of East Indian imported in 1841 amounted to 350 per cent. more than in 1825, or an increase in double the ratio of American. The following table, prepared by Mr. Laird from the Circular of Messrs. Hollinshead & Tetly, and Marriott & Co., shows the imports and exports of both kinds from 1827 to 1841. The imports are calculated at a quinquennial average :—

Years.	Imports of American Cotton.	Imports of East Indian Cotton.	Exports of American Cotton.	Average of 5 years' Exports, American.	Exports of East Indian Cotton.	Average of 5 years' Export, Surat.
	Bales.	Bales.	Bales.	Bales.	Bales.	Bales.
1827	438,882	57,363	16,000		42,650	
1828	437,886	66,613	17,400		39,700	
1829	473,580	72,522	22,200	18,060	55,000	39,830
1830	512,664	67,685	9,700		22,300	
1831	555,364	70,083	25,000		39,500	
1832	551,554	77,231	24,400		35,550	
1833	594,190	79,251	23,450		35,000	
1834	648,568	80,801	45,500	33,030	33,100	47,110
1835	677,568	97,401	49,000		50,500	
1836	708,965	125,879	22,800		81,400	
1837	752,277	132,374	46,500		73,850	
1838	845,549	135,122	45,800		50,600	
1839	861,858	144,061	*70,700	52,340	35,100	57,360
1840	956,025	163,723	52,350		61,150	
1841	983,536	174,911	46,350		66,150	

* Limited direct shipments to the Continent in 1839, supplies taken chiefly from Liverpool.

Small as were the imports of East Indian in comparison with American cotton, it will be observed that Great Britain did not even retain one-half of that quantity for her own consumption.

The attention of the Bombay Government, in 1844, was called, by some mercantile firms, to the state of the Cotton trade of the Presidency, which did not then seem in a flourishing state, and some relief, in the shape of a modification of the system of collecting duty, was immediately afforded. A second appeal was made by the four firms, Messrs. Remington & Co., Forbes & Co., Jamsetjee Jejeebhoy, Sons, & Co., and W. Nicol & Co., in 1846, in which they represented the state of decline into which the trade appeared to be falling, and requested that a committee might be appointed for the purpose of investigating and reporting upon the causes of the falling off. They appended the following statement, which they asserted "will abundantly show that our apprehensions were not unfounded, and that the causes which then appeared to exercise so very prejudicial an influence on the cotton trade have not lost their force, but, on the contrary, are still in full and active operation":—

Statement showing the quantity of Cotton exported from Bombay to China and Singapore, and to Great Britain and the Continent, respectively, in the first eight months of the years 1844, 1845, *and* 1846; *the number of Ships and the amount of Tonnage employed in its transport, and the Vessels loading for those quarters on the* 31*st August in each year.*[1]

	Bales.	Ships. Tonnage.	Ships 31st August.	Tonnage.
China and Singapore ..	1844.. 155,070	in 63 of 37,903	7	3,078
	1845.. 174,065	,, 70 ,, 44,257	3	1,479
	1846.. 146,686	,, 67 ,, 39,350	4	2,080
Great Britain and the Continent.....	1844.. 197,831	,, 94 ,, 33,347	13	7 564
	1845.. 88,639	,, 62 ,, 32,129	9	4,589
	1846.. 45,144	,, 37 ,, 20,666	1	556

Government acceded to the request, and the following gentlemen were appointed to act upon the Committee:—Messrs. H. H. Glass, Richard Spooner, J. D. Inverarity, J. Bowman, R. W. Crawford, J. Smith, S. D. Murray, Cursetjee Jamsetjee, and Cursetjee Cowasjee, to whom were subsequently added Mr. (now Sir) H. B. E. Frere. It will only be necessary here to give such portions of their proceedings as concern the general interests of the cotton trade of the Presidency.

[1] Return, East India Cotton, 1857, page 4.

The following table exhibits the quantities of cotton exported from Bombay, in screwed bales (average weight per bale 3 cwt. 1 qr. 7 lbs.), during the years 1834 to 1846 inclusive [1]:—

Years.	Great Britain	Foreign Europe.	China.	Singapore.	Calcutta	Elsewhere.	Total.
1834	82,079	102	117,873	....	...	.....	200,054
1835	103,577	1,176	51,543	....	...	235	156,531
1836	166,170	1,402	120,373	372	100	702	289,119
1837	95,550	120	149,321	300	110	2,806	248,207
1838	103,426	981	176,609	354	88	613	282,071
1839	133,588	738	106,743	627	...	895	242,591
1840	191,150	1,223	102,261	2,775	100	1,207	298,716
1841	302,407	637	117,243	3,222	345	.....	423,854
1842	140,268	330	255,755	6,451	...	688	403,492
1843	174,193	.....	243,523	8,611	...	1,734	428,061
1844	241,062	61	173,555	1,014	895	202	416,789
1845	125,440	2,843	197,794	5,135	3,619	820	335,651
1846	92,568	.....	158,547	4,672	1,075	529	257,391
Total .	1,951,478	9,613	1,971,140	33,533	6,332	10,431	3,982,527
Annual average	150,114	740	151,625	2,580	487	802	306,348

This cotton was supplied from the various producing districts to Bombay in the following proportions [2]:—

Period.	Guzerat.	Concan.	Malabar and Canara.	Cutch and Sind.	All other quarters.	Grand Total.	Total in	Average value.
1st Jan. to 30th Apr. 1834	lbs. 22,851,444	lbs. 5,477,612	lbs. 1,620,528	lbs. 47,870	lbs. 60,368	lbs. 30,057,822	Candies. 38,339	Rs. Per Candy. 98·10
1834-35	27,457,052	18,377,548	76 530,016	112,308	..	53,599,924	68,367	97·68
1835-36	37,729,804	23,314,396	13,060,264	808,108	535,080	75,447,652	96,234	111·42
1836-37	74,912,837	31,477,257	11,416,142	4,434,216	625,580	122,866,032	156,717	101·71
1837-38	73,383,298	18,818,491	1,163,471	5,675.168	13,093	99.053,521	126,344	109·
1838-39	60,518,623	37,053,185	8,495,333	2,242,343	47,576	108,3 6,060	138,209	118·45
1839-40	26,056,519	26,004,490	5,592,362	1,969,316	4,126	59,626,813	76,055	106·
1840-41	96,640,094	43,511,949	15,177,977	10,271.883	22,760	165,624,663	211,256	110·86
1841-42	58,540,590	51,345,164	17,109,675	3,462,725	..	130,458,154	166,401	98·76
1842-43	66,884.516	46,076,711	17,283,861	4,921,112	88,312	135,254,512	172,519	91·85
1843-44	71,829,407	40,115,810	20,582,284	15,307,742	37,246	147,872,489	188,613	97·73
1844-45	64,846,753	27,006,450	13,050,611	11,065,626	1,616	115,971,056	147,922	92·36
1845-46	71,157,204	22,928,212	13,042,662	6,760,525	..	113,888,603	145,266	80·22
1st May to 31st Dec. 1846	25,541,167	8,419,661	6,651,396	3,087,763	..	43,699,987	55,739	79·48

[1] Return, East India Cotton, 1857, page 23.

[2] Return, East India Cotton, 1857, page 24.

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The Committee confirmed the assertion that the trade had undergone a great decline both in quantity and value, and they stated that the actual exports of 1846 stood in the following proportion to preceding years as far back as 1834 :—

15·96	per cent.	*less*	than the annual average of the whole period.
33·04	ditto	*less*	than the average of last six years of the series.
8·86	ditto	*more*	than the average of the first six years of the series.
23·31	ditto	*less*	than the exports of 1845.
38·14	ditto	ditto	1844.
39·37	ditto	ditto	1843.
36·21	ditto	ditto	1842.
39·27	ditto	ditto	1841.
13·84	ditto	ditto	1840.

They attributed this decline to "the inability of the exporter from this country to compete with the cheaper produce of the United States in the markets of Europe, and the representatives of that cheaper produce, in the form of yarns and goods, in the markets of China." The Committee did not support this statement by actual statistics, but contented themselves with asserting, as a patent fact, "the gradually increasing ability of the importer from America to undersell the importer from India, and supply the manufacturer, whether in Lancashire or Germany, with a better article at a cheaper price," and, in China, they added, "we encounter the competition of yarns and goods manufactured from the very same cotton which has already driven us out of the field in Europe, and at a rate of cost which the Chinese manufacturer of similar yarns and goods, from the cotton of India, can never expect to emulate." [1]

They considered that the remedy for this supersession was to reduce the first cost here by the following means :—

"1*st*.—By the entire abolition of the onerous customs duties levied on the export of unmanufactured cotton.

"2*nd*.—By a revision of the land assessment in the collectorates of Surat, Broach, and Khandeish.

"3*rd*.—By permanently improving the communication between the Southern Maratha Country and the ports on the sea-coast.

"4*th*.—By the introduction of a system of railway communication between Bombay and the interior, as proposed by the Great Indian Peninsula Railway Company, and thereby opening up the fertile districts of Berar and the Deccan to the sea." [2]

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[1] Return, East India Cotton, 1857, page 8.
[2] Return, East India Cotton, 1857, page 17.

The Committee did not make any suggestion in regard to the actual cultivation of cotton, although they pressed the importance of introducing finer descriptions of cotton, and a better method of cleaning and pressing. They adopted the opinion of the American planters, that little change or improvement remained to be desired in the system of Indian agriculture; "that, in fact," they said, "the system pursued in the chief agricultural districts of this part of India for generations past is as well adapted to the circumstances of the country, and of the climate, as can reasonably be expected; that the land is made to yield as large an annual increase as it is capable of doing, unassisted by chemical, mechanical, and other scientific appliances." [1]

The duty on cotton at that period was a fixed rate of 9 annas per maund, or Rs. 5-5-9 per candy. The gradual decline in the value of cotton, while the rate of duty remained unaltered, rendered the per-centage of charge increasingly onerous. The following statement shows the gradual advance up to the date of the report:—

"The duty of 9 annas per Indian maund is equal to—

3	per cent.	upon	a value of	Rs. 178	per candy.
4	ditto	ditto	„	133	ditto.
5	ditto	ditto	„	107	ditto.
6	ditto	ditto	„	89	ditto.
7	ditto	ditto	„	76	ditto.
8	ditto	ditto	„	67	ditto.
9	ditto	ditto	„	59	ditto.
10	ditto	ditto	„	53	ditto." [2]

In regard to the question of land assessment, the Committee felt the difficulty of instituting a comparison between America and India. In the former, the newly-reclaimed land could not for years pass into the possession of a class deriving rent from it, yet not directly engaged in its cultivation. India, on the contrary, had long passed into the state inevitable where the produce of land continues for a length of time more than sufficient to repay interest on capital and the cost of cultivation,—it is tilled by one class who pay to another, as lords of the soil, a rent derived from the surplus profits of its cultivation.[3]

The Committee considered land assessment in India to be perfectly ana-

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[1] Return, East India Cotton, 1857, page 10.
[2] Return, East India Cotton, 1857, page 11.
[3] Return, East India Cotton, 1857, page 12.

logous to landlord's rent in Europe, and subject to the same laws. Rent was taken as the amount which remains after paying all the expenses of cultivation and the legitimate profits of capital; when the landlord, therefore, demands less than this surplus, the wages of labour and the profits of capital are increased; and when, on the other hand, his demands exceed the surplus, there will be a reduction of the profits of capital, and wages of labour, that must ultimately tend to throw land out of cultivation. Government, therefore, in the great majority of cases, being the real landlord in this country, and the "land-tax" practically but another term for rent, the Committee considered that, supposing the assessment to be fixed at an equitable rate, the surrender of the claim altogether "would not cheapen the cost of production, unless means could be found for preventing the occupant of the land from appropriating to himself the amount of produce surrendered, which is clearly impossible." The abolition of the "land-tax," in a long settled country like India, would have the inevitable tendency, they concluded, "to raise up a class of landlords to fill the place now occupied by Government." They quoted the opinion of Mr. Trevelyan, in his evidence before the Committee of the House of Commons, that its remission here would lead "to a certain sacrifice of revenue, with only a doubtful prospect of increasing or improving the growth of cotton." In the course of his evidence, however, he asserted that the effect of a continued remission of assessment on cotton lands "would have been to turn the whole of the Bombay Presidency into one great cotton field." As this, however, could only have been effected by drawing our supplies of grain, and other articles of consumption, from districts where otherwise cotton would have been produced, he argued that increased production, here, would have been neutralised by diminished cultivation elsewhere. Holding such views, therefore, the Committee deemed that the chief point for consideration was, whether assessment, or rent, in the cotton districts, were levied on an equitable scale or not.[1] As the subject of land tenure and assessment, as well as the cost of cultivation, will be more fully treated in another part of this work, it will only be necessary, here, briefly to state the result of the inquiries of the Committee.

In Broach the system of assessment upon an annual estimate of the standing crop had been abolished, and replaced by a fixed rate according to the supposed capabilities of the land, and the nature of the crop cultivated. It was, of course, intended that the rate should be one fairly applicable to all ordinary

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[1] Return, East India Cotton, 1857, pages 12 and 13.

seasons, but with the usual uncertainty of fixed taxes upon fluctuating values, the decline in the price of cotton had destroyed the original equitable balance, and rendered perpetual remissions necessary. Mr. Davies, the Collector of Broach, in his able and elaborate report, stated that "it required a full third of the produce of his cotton land to reimburse the ryots' expenses, but more than this was necessary to enable him to keep up his stock." He estimated the average assessment on the quantity of land required to yield a candy of clean cotton (16 to 18 beegahs) at Rs. 48-10-4. The value of the candy in Bombay had declined as low as Rs. 67, and the average price of the year had been about Rs. 75. It appeared, therefore, that, at current prices, the assessment was "far above the amount which could be considered as an ordinary rent." The following statement,[1] prepared by Mr. Davies, gives the items which formed the cost of a candy of 784 lbs. in Bombay:—

Assessment of land producing a Candy of clean Cotton.	Ryot's expenses estimated one-third of the crop.	Wakharia's profit.	Broach Broker's profit, two per cent.	Shipment (average) to Bombay, and insurance.	Craneage and other trifling expenses.	Cost of the Candy landed in Bombay.
Rs. a. p.	*Rs. a. p.*	*Rs. a. p.*	*Rs. a. p.*	*Rs. a. p.*	*Rs. a. p.*	*Rs. a. p.*
48 10 4	16 3 5	5 0 0	1 8 0	Freight. 3 0 0 Insurance. 1 0 0	0 8 0	75 13 9

As Mr. Davies observed, "It may easily be gathered from this statement that, when the price of cotton is at Rs. 76 per candy, it but barely pays its expenses; when it falls below that price, some parties must inevitably suffer; those parties are the Government, the ryots, and wakharia. If the price be below Rs. 30 the "bhar," the assessment being Rs. 20, the ryot does not get his expenses reimbursed him; on the other hand, as Rs. 30 per "bhar" is equivalent to Rs. 70 per candy, it is clear that when cotton is quoted at Rs. 72 to Rs. 74 in Bombay, (as it was last season,) no broker will buy from the wakharia at a rate sufficient to leave the latter any legitimate profit *plus* brokerage, insurance, and freight. The last party (the Government) is but too frequently made to bear a portion of the ryot's loss, either in a large remission, or a heavy outstanding balance at the close of the year." [2]

Mr. Davies laid before the Committee the following statement, showing the value of 1 lb. of *cleaned* cotton in English money on the spot, at the actual

[1] Return, East India Cotton, 1857, pages 29—32.
[2] Return, East India Cotton, 1857, page 32.

prices of the years 1834 to 1847; also the produce and the assessment of a beegah, in the same currency, at exchange 1*s.* 10*d.* per rupee:—

Years.	Price of the "Bhar" of Kuppas of 960 seers, equal to 312 lbs. of cleaned Cotton.	Corresponding value of a pound of Cotton in English money.	Corresponding value of the produce of a Beegah, say 39·199 lbs. of Cotton.	Corresponding assessment in English money on a Beegah.	Remarks.
	Rs.	*d.*	*s.* *d.*		
1834-35	56	3¾	12 2¾	.....	It is thought needless to show the proportion of assessment to produce in these years, as the former varied with every season.
1835-36	47	3¼	10 7¼	.....	
1836-37	52	3½	11 5	.....	
1837-38	36	2⅓	8 1¾	.....	
1838-39	48	3¼	11 5	.....	
1839-40	33	2¼	7 4	.....	
1840-41	43	3	9 9½	Average begotee 4*s.* 5½*d.*, or more than 1¼*d.* per lb.	
1841-42	28	1¾	5 8½		
1842-43	30	2	6 6¼		
1843-44	33	2¼	7 4		
1844-45	30	2	6 6¼		
1845-46	30	2	6 6¼		
1846-47	30	2	6 6¼		

The Collector of Surat calculated that 13 beegahs of land produced one candy of cotton. The average assessment was about Rs. 3 per beegah, so that the amount per candy was about Rs. 39. The cost of the candy in Surat was estimated at Rs. 79. The Collector remarked that a great reduction had already been made in the rate of assessment throughout the zillah, and he said that he could not recommend any further concession, as "the description of land, when not cultivated in cotton, readily paid the assessment from the grain it produced." The Committee, however, maintained that "it could be no matter of indifference to Government whether lands capable of producing cotton were cultivated with it, or with less valuable grain crops, or that it is a proof of the satisfactory condition of the assessment, when the cultivator is content with a grain crop, and the land is not actually thrown out of cultivation."[1]

In the Sholapore Collectorate the new system of assessment had been recently introduced, and was moderate, not exceeding, as the Committee observed, "a very reasonable rent,—more reasonable probably than would content any private landlord." The rate varied from 2 to 14 annas an acre. It was fixed on the understanding that it was to be paid without remission on all

[1] Return, East India Cotton, 1857, page 39.

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ordinary seasons. A candy of clean cotton, it was stated, was the produce of 19½ acres, which made the average assessment per candy Rs. 12-3.[1]

No precise information had been obtained regarding Khandeish, but no systematic revision of the assessment had been effected there since the country first came into the hands of Government.

The rate in Belgaum was stated to be about Rs. 5 to Rs. 7 per acre, but the records do not seem to be sufficiently accurate or explicit to enable a reliable calculation to be based upon them. The Committee, however, assumed, from some details given, that the assessment amounted to about 28 per cent. of the gross produce, or somewhat higher than the rates of Sholapore, and less than those of Broach.[2]

The returns from the Southern Maratha Country were "meagre and unsatisfactory." By the new system of assessment, however, the rate per acre had been reduced to Rs. 1-2 to Rs. 2-4. Taking 13 acres as the quantity of land required to yield a candy of clean cotton, the average assessment per candy amounted to Rs. 20-10.[3]

These rates of assessment per candy may be summed up as under; but it will have been remarked that there is considerable variation in the different estimates of the extent of land required to produce that quantity of cotton, the amount assumed for Sholapore being probably excessive :—

Broach	Rs.	48-10-4 per candy.
Surat	„	39- 0-0 ditto.
Sholapore	„	12- 3-0 ditto.
Dharwar	„	21-10-0 ditto.

As the subject of roads and the means and expense of transit will be treated in another part of this work, it is not necessary to enter upon it here. In pointing out the desirability of affording additional facilities in order to avoid injury to the cotton and undue enhancement of its cost, the Committee stated no new point of existing evils, which, although generally admitted and deplored, were but slowly remedied.

The Bombay Government did not coincide with the Committee in their view that the cotton trade of the Presidency was gradually or permanently declining, but, in order to afford any relief in their power, they abolished the duty upon cotton,—they directed a temporary reduction of the rates of assessment in Broach and where requisite, till a systematic revision could be effected, and they at once directed that the roads from Dharwar to the port of Compta should be made practicable for carts throughout its whole length. [4]

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[1] Return, East India Cotton, 1857, p. 47. [2] Return, East India Cotton, 1857, p. 15.
[3] Return, East India Cotton, 1857, pages 15, 48, and 49.
[4] Return, East India Cotton, 1857, pages 1—4, and 62, 63.

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CHAPTER IV.

EXPERIMENTAL CULTURE AT BROACH.

Experiments under the superintendence of three American Planters—Their resignation and report of results—Experiments continued by Dr. Burn—Results—Experimental Farm abolished by Mr. Mercer—His plan of operations—Yield of Indigenous Cotton—Experiments conducted by Mr. Landon—Experimental Establishment abolished—*Resumé.*

THE three American planters first deputed to the Bombay Presidency were Messrs. H. and J. McCullough and T. B. Woulfe. They arrived in September 1840, and shortly after proceeded to Broach, where it was decided that the first experiments should be made.[1]

By their advice, the "Umjid Bagh" was rented as a factory. This place possessed large godowns and other accommodation, as well as ample space for the erection of a ginning shed; and attached to it were about 30 acres of excellent land, well adapted for the experimental culture of exotic cotton. These premises had been granted in perpetuity to Merwanjee Hormusjee, in 1834, for the purpose of erecting presses and prosecuting operations calculated to improve the quality of cotton.[2]

The planters were placed under the general superintendence of Dr. Peart, and subsequently of Dr. Burn. Arriving too late to undertake the actual cultivation of cotton during the first season, they were authorised to purchase kuppas to the extent of Rs. 10,000, to be picked and cleaned under their own directions, as they stated that the deterioration of Indian cotton was chiefly owing to want of care in these operations, and to the length of time the wool was allowed to remain in the pod.[3] They erected a gin house on the American model, but the machinery sent out by the Court did not arrive till the following season.[4]

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[1] Territorial Department, Revenue, vol. lii., 1840, page 360.
[2] Revenue Consultations, vol. xliv. 1840, page 169.
[3] Revenue Consultations, vol. xliv. 1840, page 187.
[4] Revenue Consultations, vol. xxxvii. 1842, page 96.

Only the crop of a few beegahs, however, was actually picked under the eye of the planters, partly owing to the unwillingness of the ryots to sell their produce in the field, and partly because it was found that the kuppas, thus gathered, was neither cleaner nor better in quality than what was delivered, ready picked, for a small advance of price. It was admitted that the natives had nothing to learn from the Americans in this particular, and that nothing but the stimulus of a small additional price, for cleaner kuppas, was required to induce them to produce it.[1] In order to test the effect of cleaning by the American saw-gin, kuppas of the indigenous plant, sufficient for about 100 bales, was purchased, but from the delay of the machinery it had to be stored until 1842.

For the season of 1841-42 about 350 beegahs of land, approved by the planters, were secured for experimental farming. About 250 beegahs of this quantity were of light-coloured soil, situated at the villages of Ulderwa and Ussooria, and 100 beegahs consisted of the best and most productive black soil near Broach at Kokurwarra, which the Americans considered similar to the cotton lands in the Mississippi valley.[2] They endeavoured to plough the land at once, but were obliged to desist until the first rain had fallen, and they resorted to the native method of cleaning and preparing it.

Almost the whole of these farms was sown with New Orleans seed, of which a supply had just been received. Dr. Peart reported, "It vegetated in a most luxuriant manner, growing strong and healthy, showing abundance of blossoms, but no sooner had the first rain ceased than it became blighted and stunted, from which state it never after recovered. This was the case both in the black and light soils, immediately contiguous to which, however, the native cotton is now growing luxuriantly. Some of the same seed which was sown in the gardens belonging to the Umjid Bagh, (about 15 or 20 beegahs,) and a small quantity in my own garden, succeeded rather better, and the plants grew strong and healthy where they were shaded, but the cotton produced is small in quantity, and of inferior description to that produced from the same seed in America, and will altogether barely yield a bale of cotton." [3]

From the healthy appearance of a small plot of Sea Island cotton growing in the garden of the Umjid Bagh, and which was once irrigated, Dr. Peart was led to hope that these species might be successfully cultivated on a sandy soil with a moist sub-soil, but he remarked, "should it require irriga-

[1] Revenue Consultations, vol. xxxi. 1841, page 169.
[2] Revenue Consultations, vol. xxxvii. 1842, page 99.
[3] Revenue Consultations, vol. xxxvii. 1842, pages 101—103.

tion, the experiment fails in a practical point of view, as I do not conceive the ryots can ever be induced to adopt this mode of cultivating cotton." The crop, however, was subsequently entirely destroyed by insects.

An experiment was made at Kokurwarra with a small quantity of indigenous cotton, cultivated in the American manner. High and broad ridges were thrown up with the plough, upon which the cotton seed was thickly sown. When the plants had grown about six inches from the ground, they were thinned out, and only the strongest allowed to remain, at about a foot and a-half apart. The cotton produced, however, was not superior to that grown by the ryots, either in quantity or quality.[1]

Dr. Burn subsequently stated that the drought of the months of September and October, during which only about three or four inches of rain fell, was one cause of this failure of the New Orleans seed. He found that, in most cases, the roots of the plants were distorted, and thrown out laterally, instead of striking down in the usual healthy manner.

The American planters recorded their opinion, formed from these experiments, that the American cotton plant could not be cultivated "so as to yield a profitable return, or equal the quality and quantity of the same plant in America." They added, "We have tried to grow it in the black clayey soil of Guzerat, but met with a complete failure, which we attribute to the unsuitableness of the soil, and the violence of the seasons in this country. We likewise tried it in a garden soil, which was lighter both in colour and quality. In this soil the cotton succeeded better, but even here it did not mature, and the produce was scanty and inferior." They, however, on the other hand, expressed their belief that the quality of the indigenous cotton might be improved.[2]

Although these experiments were so inconclusive, the three American planters entertained so little hope of success, and were so discontented with their engagement, that they resigned their appointments, and shortly after left the country. The abandonment of the experimental farms was at first contemplated, and the limitation of operations simply to the introduction of the American saw-gin, and the working of the gin factory under Dr. Burn, (who had now assumed the superintendence,) and an engineer attached to the establishment. In consequence of a memorial from the Bombay Chamber of Commerce, however, with which the Court of Directors cordially coincided, it was determined that these experiments should be further prosecuted.

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[1] Revenue Consultations, vol. xxxvii. 1842, pages 101—103.

[2] Revenue Consultations, vol. xxxvii. 1842, pages 113 and 114.

Mr. Hawley, one of the American planters who had been deputed to the Madras Presidency, volunteered to serve in Bombay, and was transferred to Broach, in July 1842, where he undertook the management of the experimental farms. He was at first greatly struck by the native drill husbandry of Broach, which he stated to be superior to anything he had seen in the Madras Presidency.

At the commencement of these experiments, the Court of Directors had ordered 1,000 bales of superior cotton to be sent to them, in one consignment, in order that the attention of manufacturers might be drawn to the article in a manner which no mere garden samples could effect. They were under the impression that this quantity might be grown by the American planters. They desired to prove "whether the quality of cotton raised from American seed does, or does not, degenerate in India," and "whether good, short staple cotton, equal to the same quality of American, and at an equally remunerating price, can, with proper attention to its cultivation, be raised in India, and can also be cleaned on the American plan, with as little injury to the staple." [1]

The cotton previously purchased by the planters was now ginned, under the superintendence of Dr. Burn, who stated that, spite of its deterioration from having been stored, it had been better prepared by the saw-gin than it could have been by the 'churka.' This cotton was forwarded to Bombay in November 1842,[2] and thence shipped, per *Mary Anne*, to England, where it was sold at losing prices. It was found that the saw-gins at the Broach factory required the working days of a whole year to clean the quantity required by the Court; and although Dr. Burn purchased kuppas for about 250 candies, he was only able to forward 71 bales before the commencement of the monsoon. These were shipped, per *Lady Lilford*, to Liverpool. The remainder of the purchase, with the exception of 50 candies ceded to two mercantile firms, was subsequently shipped per *Mertoun* and *Catherine*. [3]

The shipment per *Lady Lilford* was sold at 4¼*d.* to 4¾*d.* per lb., the range of prices for Surats at the time being 4⅜*d.* to 6*d.* The Liverpool brokers reported it to be "of good colour, well cleaned, but not quite free from leaf; rather uneven in staple, and cut in ginning." [4]

Three spinners, however, to whom the greater part was sold, did not report so favourably. They said that "the staple was so much cut, that it made a

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[1] Revenue Consultations, vol. xxxi. 1843, pages 11—28.
[2] Revenue Consultations, vol. xxxv. 1842, pages 31—59.
[3] Revenue Consultations, vol. xxxv. 1842, pages 383—409.
[4] Revenue Consultations, vol. xli. 1843, page 23.

great deal of waste, and they would not buy again at a similar price in proportion."[1] The tendency of opinion amongst Liverpool brokers, however, was that, although cut by the gin, the improvement in cleanliness more than counterbalanced the injury to the staple, and that it would generally fetch a better price than cotton prepared in the native manner.[2] The cotton per *Mertoun* realised an average price of 4*d.*, and that per *Catherine* 3½*d.* per lb., the range of current prices of Surats being from 2¼*d.* to 5*d.* per lb. All these shipments left a loss.[3]

In the season 1842-43, Dr. Burn was only able to prepare for cultivation five small plots of land, in various parts of the zillah, aggregating about 40 acres. These were sown with New Orleans, Sea Island, and Bourbon seed, but the produce actually gathered from the whole only amounted to 457 lbs., or 11¼ lbs. per acre.[4]

No detailed report is given of these experiments, and, indeed, during the whole of this period, from 1842 to 1847, there is so much confusion and want of precision in the reports, that it is almost impossible clearly to state what was done.

The exotic cotton planted during the season of 1843-44 failed, and only produced a single bale of Bourbon cotton. The accepted result was, that "the fact of the climate and soil of Broach being unfitted to the cultivation of the American cotton was fully established," and the efforts of Dr. Burn and Mr. Hawley were directed to the improvement and cleaning of the indigenous kind. Speaking of the experiment with New Orleans cotton, Mr. Hawley, in 1844, stated, "it has proved a total failure here."[5]

In order to ascertain the effect of superior tillage upon the production of the indigenous Broach cotton, Dr. Burn cultivated five beegahs of nearly pure black soil, in which the planters had previously failed to produce New Orleans cotton, but which was noted for yielding the best native kind round Broach. The ryots planted their cotton in the adjoining fields, as usual, in drills two and a-half feet apart, and with a distance of 14½ inches between each plant, or 322 plants to every 399 feet. The number of plants amounted to about 13,910 per acre. Dr. Burn, on the contrary, allowed greater space, and only planted 6,688 per acre, which was rather less than half the number. The seed was sown on the 8th June, and picking commenced on the 20th January, and

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1 Revenue Consultations, vol xlii. 1844, pages 73 and 74.
2 Return, East India Cotton, 1847, pages 500 and 501.
3 Revenue Consultations, vol. li. 1846, pages 40—42.
4 Revenue Consultations, vol. xxxi. 1843, pages 1 and 327.
5 Revenue Consultations, vol. xli. 1844, page 93.

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continued till the 1st April. The yield of kuppas amounted to 478 lbs., and of clean cotton 157½ lbs. per acre. Although this experiment had been made expressly for the purpose of comparison with the productiveness of cotton cultivated in the usual way by the ryots, Dr. Burn did not ascertain the yield of the adjoining fields, and in answer to a reference from Government on so singular an omission, he stated his inability to supply this information. [1] The cost of cultivation upon his system, however, he admitted to be double that of the ryots, and indeed, including the expense of the establishment, it was considerably more than double.

Regarding the ultimate results of the season, notwithstanding an amount of care and expense which no native cultivator could bestow on his land, Dr. Burn could only report, "The crop, although in appearance equal at least to any round Broach, on the whole is below what I expected it would be." [2] Mr. Hawley, still more decidedly stated, "The crop now standing on the Kokurwarra farm will not be better, in any respect, than some of the adjoining fields belonging to the ryots, which have not cost them half the labour that has been bestowed on the Government farms." [3]

A small trial was, during the same season, made with Sea Island cotton, but half of the crop was destroyed by the monsoon. Dr. Burn stated, "It requires the attention in weeding, hoeing, &c. of a garden vegetable, so that its produce may not degenerate." In the month of December 1844, he gathered a small sample of fine quality of this species from a few bushes which he had cultivated in "a little bit of black soil," to which lime was applied as manure, and no irrigation used. The plants grew vigorously to the height of six feet, and yielded a fair quantity of produce; but, as Dr. Burn observes, "nothing can be argued very favourable to the extended culture of this plant from this experiment, unless a locality could be found where the heat of the sun during October is less than at Broach." [4]

The whole crop of indigenous cotton, in 1843-44, from the experimental farms, amounted to 103 bales only, of which the greater part was cleaned by the saw-gin, and the remainder by the native 'churka,' worked by cattle-power. This cotton was shipped to Liverpool by the *Princess Charlotte*, and a small portion by the *Adam Lodge*.[5]

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[1] Revenue Consultations, vol. xlii. 1844, pages 3—13.
[2] Revenue Consultations, vol. xliii. 1844, page 279.
[3] Revenue Consultations, vol. xli. 1844, page 93.
[4] Revenue Consultations, vol. xliii. 1844, page 280.
[5] Revenue Consultations, vol. xl. 1844, pages 141—167.

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The cotton per *Princess Charlotte* was sold in Liverpool at 3¾*d.* to 4*d.* per lb., and that per *Adam Lodge* at 3⅝*d.* per lb., the range of prices for ordinary Surats, during the same year, having been 2¼*d.* to 3¾*d.* per lb. Although the rates realised were considered creditable, they left a loss upon both consignments. The brokers' report upon the 79 bales by the *Princess Charlotte* was as follows:—"Nos. 1 to 70 are fair staple, though a little wild and irregular in length, from the severe process of the saw-gin upon a naturally rather tender staple; the colour, however, is good, being more perfectly developed by this process of cleaning; they are, however, still not quite free from leaf; their intrinsic value is 3¾*d.* per lb., though, being a fancy article, we may probably obtain something more for them. The nine bales cleaned by the 'churka' are also good cotton, more especially, however, in staple, which is closer and more even in length than the 70 bales, but they are not so good in colour, nor so clean. Their value is 3½*d.* to 3⅝*d.* per lb. You will thus see that ¼*d.* per lb. is the utmost advantage gained by the saw-gin; at least, as exhibited by a comparison of the two lots." The actual consumers of part of this cotton reported favourably of the saw-ginned portion, as compared with common Surats, but did not consider it materially superior to that cleaned by the 'churka.' Other large consumers gave a decided preference to the latter over the saw-ginned. Messrs. Worthington & Cunningham, the Liverpool brokers, concluded by saying, "We are disposed, ourselves, to think that the common opinion would run in favour of roller-cleaned cotton (churkaed) if the process be well done."[1] It will be observed that the relative merit attributed to these cottons was superiority of staple to that prepared by the 'churka,' and superiority of colour and cleanness to the saw-ginned. The peculiarity of part of this distinction leaves a question whether the colour, at least, of both parcels was originally equal or not. The Bombay Chamber of Commerce reported upon samples of the crop of 1844-45, cleaned by the saw-gin and 'churka,' and forwarded by Dr. Burn for an opinion, that the former appeared to have suffered in the process, and was consequently "very much inferior to the other."[2]

The crop of 1844-45, from the experimental farms, amounted only to about 35 candies of indigenous, and 2 bales of Bourbon cotton. This was all cleaned by the saw-gin, and shipped to Liverpool by the *Eglintoun*.[3] It "ranked in the Liverpool market as fully equal to American *of the same price*," but its sale left a loss upon the transaction. The Court, however, desired to have

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1 Returns, East India Cotton, 1847, pages 506 and 507.
2 Revenue Consultations, vol. xliv. 1845, page 177.
3 Revenue Consultations, vol. xliv. 1845, page 162.

5,000 or 6,000 bales of the cotton grown on the different experimental farms, so as "to arrive at a conclusive result regarding East Indian saw-ginned cotton." [1] They stated that "the experimental cotton was admitted to be greatly superior to the general character of Surat"; and of the cotton cleaned by the 'churka' worked by cattle-power, they reported that it was "of superior staple, but stained and leafy." [2] Regarding exotic cotton, of which so insignificant a quantity was produced this season, Dr. Burn wrote, in February 1845, "From several experiments during a series of years, I had satisfied myself, by 1840, that there was very little chance of American cotton being raised in this country." [3]

In 1845-46 about 161 beegahs of land were cultivated with native cotton, which yielded kuppas equal to about 70½ lbs. per beegah, or barely one-half of what Dr. Burn had considered the probable average.[4] This was cleaned by the saw-gin, packed in 45½ bales, and shipped for Liverpool in the *Camillus*. The Broach sold at 4¾*d.* to 5⅛*d.* per lb., and a sample of Bourbon cotton fetched 6½*d.* per lb., but these prices left a loss upon the consignment.[5]

Dr. Burn relinquished the land at Kurode in 1845, and desired to obtain a considerable quantity in exchange near the Kokurwarra farm. Government, however, did not consider that the experiment was sufficiently successful to warrant such a step.[6] No demand existed, either from the ryots or from merchants, for the use of the saw-gins, which were only used for cleaning the cotton grown on the farms. Dr. Burn stated that there was "abundance of machinery lying rusting from want of work." He had made many alterations, and, it was said, improvements, in the larger gins, but Government were particularly solicitous to introduce amongst the ryots the hand-gins, which were becoming popular in the Southern Maratha Country. Dr. Burn, however, "saw no probability of their preferring it to the common churka," and considered that it would have "no chance" in Broach.[7] Under his influence, however, a Joint Stock Ginning Company was organised, of which he held nearly one-fourth of the shares; but on his ceasing to be connected with the cotton experiments, the Company made little or no progress.

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[1] Revenue Consultations, vol. li. 1846, page 53, and vol. li. 1848, page 59.
[2] Revenue Consultations, vol. li. 1846, pages 40—42.
[3] Revenue Consultations, vol. xliv. 1845, page 162.
[4] Revenue Consultations, vol. l. 1846, page 85.
[5] Revenue Consultations, vol. li. 1848, page 50.
[6] Returns, East India Cotton, 1847, page 508.
[7] Returns, East India Cotton, 1847, pages 509 and 513.

In 1846 Government removed Dr. Burn from the superintendence of the experiments in Guzerat, and placed them under the charge of Mr. Mercer, one of the American planters who had achieved considerable success in the Southern Maratha Country. Taking as a basis Dr. Burn's often-repeated maxim, that the question of the profit and loss on the cotton must, in a great measure, determine the advantage of the new mode of cultivation, and "be the best test of success in all the other points on which knowledge is desiderated,"[1] the experiments had been most unprofitable. No consignment of cotton grown or purchased by the superintendent had been disposed of without loss. The total expenditure in Broach, up to the close of the season 1843-44, was Rs. 1,21,462, and the known and estimated value of cotton shipped only amounted to Rs. 55,000, leaving a loss of about Rs. 67,000, during the four years only embraced in the statement, "independent of all charges for machinery from England."[2]

The Bombay Government stated, in writing to the Court of Directors, "The experiments at Broach appear to have produced no effect beyond the precincts of the farm. The ryots have neither adopted the mode of cultivation followed in the farm, nor the saw-gin as machinery for cleaning their cotton. In vain do we sow the finest cotton, pick it in the cleanest manner, clear it of all impurities, and throw a few bales into the market, so long as the people of the country evince no interest in the undertaking, and continue satisfied with producing a dirty and inferior staple. At Dharwar, however, under the management of the American planters, we are carrying the ryots and merchants with us,—new cotton is cultivated, and the gins are getting into use* * * * If, under this expenditure, any effects had been produced on the staple of the country, this sum might have been well laid out; but, as we have already noticed, not the slightest effect has been produced beyond the limits of the Government farms."[3]

The cotton produced on the Kokurwarra farm in the season 1846-47 amounted to about 37 candies. It was all cleaned by the saw-gin, but being too late for transmission to Bombay before the setting in of the monsoon, the Collector of Broach adopted the expedient of selling it, conditionally, by auction, on the spot. It realised Rs. 98 per candy, or about 5 to 7 per cent. more than ordinary cotton at the time. When the ratification of Government was

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1 Revenue Consultations, vol. xlii. 1845, page 136.
2 Returns, East India Cotton, page 510.
3 Returns, East India Cotton, 1847, pages 509 and 510.
4 Revenue Consultations, vol. lvi. 1847, pages 149 and 150.

received, however, the buyer refused to complete his bargain, and the parcel was consequently forwarded to Bombay next season, and there sold by auction, in February 1848, at Rs. 92 per candy of 784 lbs. This price was stated by the Collector of Customs to be below its value, and, at the same period, some saw-ginned cotton from Dharwar realised Rs. 109 per candy.[1]

Mr. Mercer assumed charge of the experiments at Broach in January 1847. His first measure was to abandon altogether the farm at Kokurwarra, the only land then cultivated for Government. His reasons for this step, which were fully concurred in by Mr. Davies, the Collector of Broach, were, that the cotton cultivated upon it, the mode of cultivation, and the implements employed, were precisely the same as those used by the ryots, and consequently that it had no utility as a model farm, although Mr. Mercer considered the mode of cultivation and the species of cotton to be actually those best suited to the soil and climate. Mr. Davies stated that the term "model farm," as applied to it, was a misnomer, unless by it "the failure of every object proposed by its establishment" could be expressed. Mr. Mercer quite objected to large establishments with cattle-power machinery, like the Umjid Bagh, as means of advancing the general improvement of cotton in the country, but he did not think it right immediately to abolish it. He relied chiefly on the introduction of the small hand-gins, which were so successful in Dharwar, and which he calculated could be worked 15 to 20 per cent. cheaper than the Guzerat 'churka.' He at once set up two additional gins, for which there already existed stations and running gear, and he hoped that the establishment might be enabled to pay its own expenses. The manufacture of small hand-gins was commenced under Mr. Laidlaw, the engineer, which cost somewhat under Rs. 200 each.[2]

Mr. Mercer having thus arranged the proceedings of the establishment, quitted the country on leave, and Mr. Simpson, an American planter superintending in Khandeish, succeeded him, but not long after resigned.

In abolishing the experimental farm at Kokurwarra, Mr. Davies endeavoured to obtain certain statistics of the farming operations carried on, "with unrestricted expenditure of time, capital, and labour," as contrasted with the results to the "comparatively unassisted ryot." Although there was some certainty in arriving at the returns from the farm, the yield from the ryots' land could only be estimated from the yearly 'jumabundee' returns and other data, but,

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[1] Revenue Consultations, vol. lvii. 1848, pages 233—239.

[2] Revenue Consultations, vol. lvi. 1847, pages 231—250.

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checked in various ways, the assumed result appeared to be correct, and may be received with some confidence. In 1844 Dr. Burn had estimated the probable comparative yield as follows :—

Experimental farms..250 lbs. kuppas, or 83 lbs. clean cotton per beegah.
Ryots' land .....170 „ ditto „ 55 „ ditto ditto.

Mr. Davies found that the actual average out-turn of the four seasons, 1843-44 to 1846-47 inclusive, was as follows :—

Experimental farms..163 lbs. kuppas, or 54 lbs. clean cotton per beegah,
Ryots' land .....120 „ ditto „ 40 „ ditto ditto,

or a yield of one-fourth more than the ryot produced at more than double the cost of cultivation.[1]

In 1848 Mr. Landon, "a gentleman well acquainted with the cotton cultivation of the Southern States of America," applied for the use of the machinery at Broach, together with an advance in money, free of interest, to the extent of £10,000, in order to establish himself there for the purpose of ginning cotton by steam-power, on rather a large scale, for his own account. Government granted the free use of the machinery, to encourage private enterprise, but declined to advance the money. As Mr. Landon was not otherwise prepared to enter upon this undertaking, without acquiring further experience, he applied for, and was temporarily appointed to, the superintendence of the cotton experiments. He erected a screwing-press on the American model, and he set up ten small hand saw-gins which had been completed. Both with the view of making their working known, and of facilitating the procuring of labourers to work the gins, they were distributed over the district, two being set up at Jumbooseer, two at Ahmode, and four sent to Broach. These gins required 99 able-bodied men per diem to work them.

Indeed, the most serious obstacle to the introduction of the saw-gin in Broach was the fact that it did not, like the 'churka,' admit of a mixture of strong and weak—men, women, and children, in its working, but, beyond one woman to feed the machine, that it required strong men alone. Notwithstanding this distribution over the district, labourers to work the gins could only be obtained by paying higher than the ordinary wages. The actual cost of cleaning a candy of cotton at the different stations, by the hand-gins, was found to be as follows :—

At Surat..... Rs. 3-2-0 per bhar = Rs. 8- 0-0 per candy.
„ Jumbooseer and Ahmode „ 3-6-8 ditto = „ 8-12-8 ditto.
„ Broach ..... „ 3-4-9 ditto = „ 8- 6-0 ditto.

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[1] Revenue Consultations, vol. lvii. 1848, pages 49—53.

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The charge which had previously been made for cleaning cotton by the cattle-power gins had been only Rs. 2-8 per bhar, so that it became necessary to raise the rate to prevent the establishment from continuing to work at a positive loss. In 1847-48 the cost of working these gins was Rs. 1,723-0-6, and the seed cleaned from the cotton realised Rs. 3,082-4-11, leaving a profit of Rs. 1,359-4-5. The cost of cleaning by the 'churka' was stated as Rs. 4 per bhar. But, notwithstanding this advantage, which was everywhere published, Mr. Davies reported that "not an offer had been made to obtain the use of the Broach hand-gins on private account," and even the power-gins were but slightly patronised.[1]

To give employment to the gins and solve the problem of their effect on staple, about 200 candies of cotton were purchased in 1848, and about 300 candies in 1849, and after being cleaned by this machinery, were shipped to England. Both consignments were sold with loss.

The Court of Directors wrote to Bombay that most of the saw-ginned cotton, of which they had received samples, was reported to have had the staple much cut by the gin, and they suggested that this might be owing to too great velocity in the revolutions of the saw.[2] The velocity had been increased under Mr. Landon, and two machines made to do the work of three at the former ratio, but the speed did not exceed 200 revolutions a minute.[3]

The Bombay Government, in 1849, resolved to abandon further experiments at Broach, as a useless expenditure. Mr. Landon, notwithstanding the utmost personal exertion, could not obtain sufficient kuppas to keep two gins at the Umjid Bagh in constant work. He despaired of the hand-gins ever becoming popular. "All attempts to work those set up by Mr. Simpson at Jumbooseer and Ahmode, as well as at Broach, had been relinquished as either impracticable or unprofitable, and no native of the district had expressed any wish to possess one of those machines."[4] All of them, "with a partial exception at Surat, had lain idle and unnoticed," and were "pronounced utterly useless and unprofitable."[5]

Mr. A. N. Shaw, the Revenue Commissioner, Northern Division, under whose care the experiments in the Southern Maratha Country had been so successful, recommended their abolishment in Broach. He stated, "I cannot observe the object of continuing so large an expenditure, to be lavished on cotton experiments in a district where every attempt to grow exotic cotton,

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[1] Revenue Consultations, vol. lvii. 1848, pages 139—172.
[2] Revenue Consultations, vol. lxxiii. 1849, page 235.
[3] Revenue Consultations, vol. lxxvi. 1849, page 124.
[4] Territorial Department, Revenue, vol. iii. 1849, page 501.
[5] Revenue Consultations, vol. lxxvi. 1849, pages 87 and 114.

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and introduce the saw-gin amongst the natives, has lamentably and utterly failed."[1] Mr. Davies reported, "The united efforts of two former superintendents (Messrs. Mercer and Simpson) to extend ginning on the American principle have unfortunately resulted in nothing, and the present superintendent, Mr. Landon, appears to entertain no hope of the hand-gins becoming popular in Broach, unless some power, other than manual labour, can be successfully employed in working them."[2]

The Bombay Government thus stated their reasons for abandoning further attempts at Broach :—"It appearing evident, from these statements, that little success has attended the attempts to introduce the saw-gin into use in the Broach Collectorate, and as past experience has proved that the American varieties of cotton are not adapted to this district, we were of opinion that it would be a waste of public money any longer to continue the expensive experiments in that collectorate." The establishment was accordingly broken up, and the free use of the machinery, implements, cattle, and buildings was granted to Mr. Landon until April 1850, when it was anticipated that he would be prepared to establish on his own account.[3]

An attempt was made, in 1849, to resume the experiments with exotic cotton in Broach. Fresh Georgian seed and New Orleans seed acclimated at Dharwar, was distributed. These kinds were sown in several of the villages of the Broach Zillah, in June, and, when visited by Mr. Landon at the end of July, they had vegetated, and were looking well. Mr. Landon had planted a beegah in the garden at Umjid Bagh with the Dharwar New Orleans seed, which, he reported, was "growing as vigourously as ever he saw any, at the same age, on the best lands in America, and promised to yield a large crop, unless affected by some unforeseen casualty." The monsoon was a heavy one, and injured the indigenous crop for a time. At the close of the season, however, Mr. Davies reported, "The recovery of the native plant was highly satisfactory and general, and, barring that a considerable quantity was washed away in the villages towards the coast, as well as elsewhere in low lands, the prospects of the year's cotton crop were good." The exotic cotton "had suffered incomparably more than the native from the excess of rain," and it "totally failed, with the exception of the small patch which was sown in the private garden, well raised and drained." This small crop, the only part which survived the monsoon, and which was "the produce of a small favoured patch of ground," yielded 110 lbs. of kuppas, or 33 lbs. of clean New Orleans

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1 Revenue Consultations, vol. lxxvii. 1849, pages 19 and 20.
2 Revenue Consultations, vol. lxxvii. 1849, pages 24 and 25.
3 Revenue Consultations, vol. lxxvii. 1849, page 217.

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cotton to about half a beegah.[1] Trifling trials have been made with New Orleans seed since that period, but without any success. The following table [2] exhibits the extent to which the cultivation of New Orleans cotton has been carried with the estimated yield up to 1852-53, when all attempts ceased:—

	1841-42.	1842-43.	1843-44.	1848-49.	1849-50.	1850-51.	1851-52.	1852-53.
	A. R. P.	A. R. P.	A. R. P.	A. R. P.	A. R. P.	A. R. P.	A. R. P.	A. R. P.
Broach		...	...	...	9 2 34	21 3 13	...	2 0 8
Wagra		3 1 9	...	...	1 3 17	4 3 15	...	0 2 2
Unklesur ...	150 0 0	...	...	...	...	1 0 4	6 2 26	...
Hansole ...		...	...	...	...	2 1 9	...	...
Jumbooseer		2 3 37	2 2 25	4 1 11	2 2 19	4 2 21	...	2 0 8
Ahmode ...		...	...	...	3 0 12	0 2 2	...	1 0 30
Total Acres.	150 0 0	6 1 6	2 2 25	4 1 11	17 1 2	35 0 24	6 2 26	5 3 8
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Estimated yield of New Orleans in whole Collectorate .	854	196	42	...	15	114	392	...
Yield per Acre	5¾	32	20	...	¾	3	65	...

The results of the whole series of experiments at Broach seem to be briefly these:—Some kinds of exotic cotton, such as the New Orleans and Bourbon, yielded occasionally a small crop, when cultivated as garden plants, with great care and great expense, but they never escaped partial damage from the effects of the seasons. When the same kinds were cultivated on a larger scale, even with the greater skill, labour, and care of the experimental establishments, the crop invariably failed. The possibility of raising garden samples of any kind of cotton, anywhere, by unlimited care and expenditure, is scarcely doubted, but the feasibility of doing so upon terms within the reach of the ryot, and within the actual market value of the article, has not been demonstrated at Broach. It was proved that, by double the care and attention, and more than double the expense of the native cultivation, a larger yield, and

[1] Revenue Consultations, vol. li. 1850, pages 163—170.
[2] Revenue Consultations, vol. lviii. 1855, page 52.

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better and cleaner quality, might be obtained from the indigenous cotton than the ryots can produce, but not sufficiently so to repay the additional outlay; and, finally, that the native cotton, when cleaned by the American saw-gin, was generally injured in its staple.

Statement of the total area of land under cultivation, and the quantity cultivated with Cotton in the BROACH *Collectorate during the years* 1841-42 *to* 1861-62 *inclusive.*

YEARS.	Total Acres under Cultivation.	Total Acres of land Cultivated with Cotton.	Total Acres capable of producing Cotton.
1841-42	292,248	103,720	
1842-43	306,118	108,804	
1843-44	286,667	100,839	
1844-45	282,453	103,525	
1845-46	273,903	105,221	
1846-47	279,124	68,449	
1847-48	298,434	98,908	
1848-49	295,130	87,095	
1849-50	298,839	67,217	
1850-51	301,659	120,850	
1851-52	303,734	103,087	400,855
1852-53	301,380	100,198	
1853-54	297,749	112,815	
1854-55	308,036	95,809	
1855-56	313,271	114,926	
1856-57	311,837	95,044	
1857-58	314,952	101,566	
1858-59	319,161	107,748	
1859-60	321,881	110,262	
1860-61	321,591	100,198	
1861-62	....	226,962	

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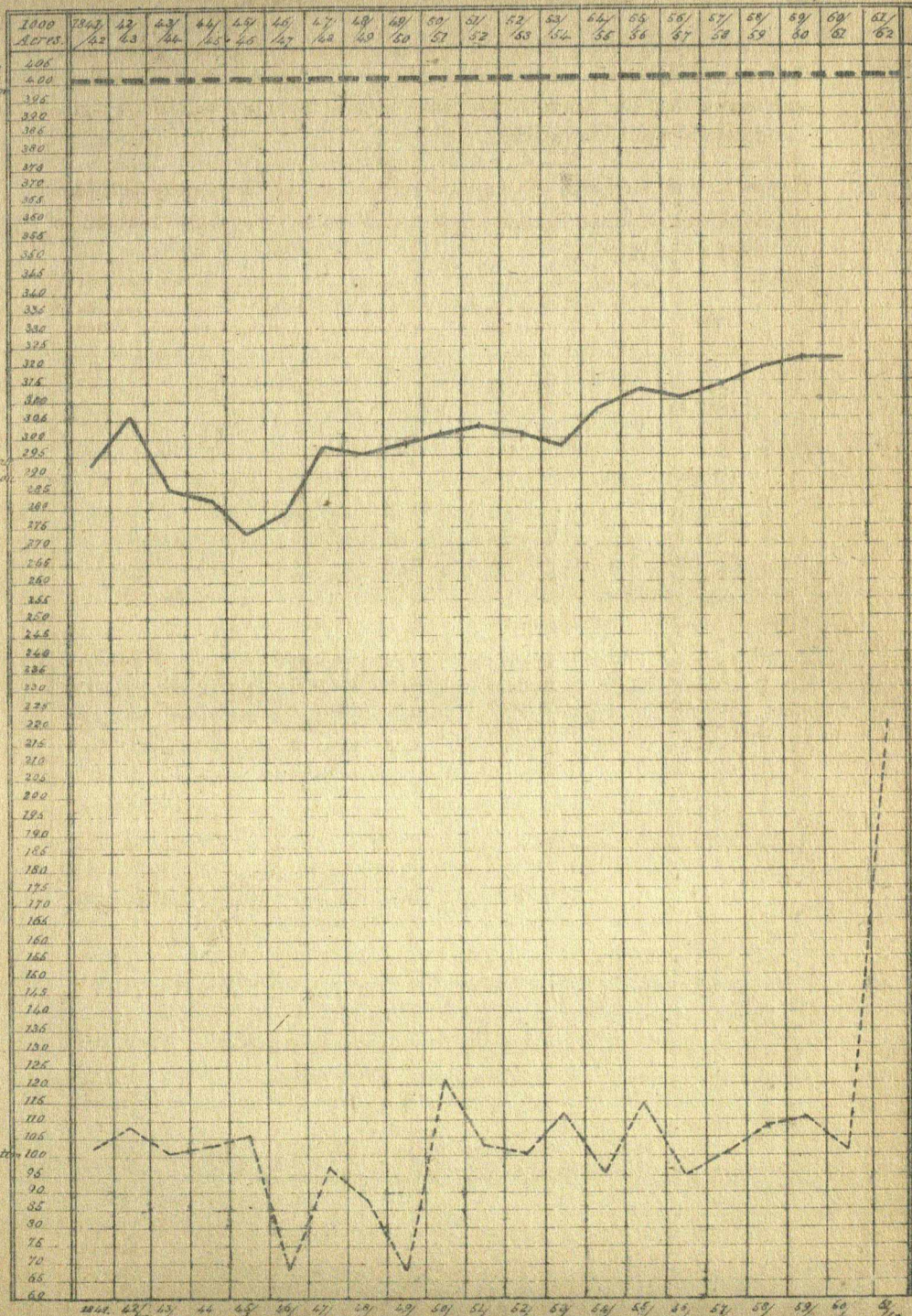
Diagram showing the total area of cultivation _____, the extent of cotton cultivation _____, and the land capable of cultivation _____ in the Collectorate from 1841-42 to 1861-62.

Prepared by W. R.



CHAPTER V.

EXPERIMENTAL CULTURE AT SURAT.

Experiments made by Mr. Fawcett—Mr. Daley appointed by Government to continue them—Failure of exotic Cotton—Experiments abolished.

In 1849 Mr. E. G. Fawcett, the Collector of Surat, having obtained a small supply of Georgia and New Orleans cotton seed, induced the ryots to cultivate it in some of the localities, in the zillah, which were considered most suitable for cotton. The seed was sown in black soil, in the same manner as the indigenous, during the months of June and July. The plants sprang up well, and continued strong and healthy until August, when the rain either injured or altogether destroyed them. Those which survived grew to about 2½ to 3 feet in height, but threw out very few branches. About the end of September they blossomed, and in the following month the pods were formed, but most of them fell off before coming to maturity. A few put forth new blossoms, but others altogether withered. The few plants of Georgian cotton, which escaped the effects of the monsoon, produced rather a greater quantity of wool, in comparison with seed, than the indigenous, the former yielding 15 seers of clean cotton to 25 seers of seed, whilst the native produced 13 seers of wool to 27 seers of seed. The New Orleans kind entirely failed on account of the heavy rain. A fresh quantity was sown in rice lands, after the rains, and irrigated, but the result was equally unfavourable.[1]

The attention of Government was directed to these experiments by Mr. Shaw, the Revenue Commissioner, Northern Division, and as they could not be considered conclusive, it was decided that they should be further prosecuted. At Mr. Shaw's recommendation, Mr. Charles Daley was appointed to superintend them.[2] Six saw-gins were obtained from Khandeish and set up at Surat, and a further supply was shortly after received from Belgaum, two of which were sold to native merchants. Mr. Daley was allowed to purchase some

[1] Revenue Consultations, vol. lxi. 1850, pages 260—272.
[2] Revenue Consultations, vol. lxi. 1850, pages 291—299.

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indigenous kuppas with the view of testing their operation, which he did to a small extent. [1]

A quantity of New Orleans and Sea Island cotton seed having been procured from Belgaum, Mr. Daley selected about 296 beegahs of choice land in various talookas, and induced the ryots to cultivate these exotics. 292 beegahs were sown with New Orleans, and the remaining 4 beegahs with Sea Island seed. The native system of sowing was adopted in preference to the American ridge principle. The plants came up vigorously and blossomed freely, but a considerable portion of the crop was subsequently destroyed by the rain, and that which survived did not thrive. The total yield only amounted to 2 candies and 181 lbs., part of which was stained and worm-eaten. The sound portion was purchased and despatched to Bombay, together with the small quantity of indigenous bought for testing the saw-gins, and there sold. The following statement shows in detail the experiments of the first season :—

Talookas.	[2] Number of Beegahs cultivated.			[2] Beegahs destroyed by the monsoon.	[2] Beegahs which yielded a crop.	[3] Yield of sound clean Cotton.		[3] Actual cost per Candy.			[3] Prices realised at Bombay per Candy.		
	New Orleans.	Sea Island.	Total.			New Orleans.	Sea Island.	New Orleans.	Sea Island.	Native.	New Orleans.	Sea Island.	Native.
						lbs.	lbs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Chowrasee ...	142	3	145	15	130								
Oolpar	50¼	...	50¼	14	36								
Koorsud	60	1	61	45	16	1313	43	100	100	...	105	112	102
Parchole	8	...	8	3	5								
Bugwarra.....	32	...	32	32	...								
Indigenous cotton bought.	...	...	...	...	...	lbs. 1692		...	...	115	...	...	..
Total ..	292¼	4	296¼	109	187								

Yield of New Orleans per beegah 4½ lbs. Yield of Sea Island 10¾ lbs.

These parcels were reported upon in Bombay as follows :—"*Sea Island Cotton.*—Colour creamy white; staple tender; rather irregular and short for the quality; cotton very good and clean. *New Orleans Cotton.*—Colour good, and clean; staple strong and even. *Indigenous Cotton.*—Colour not good;

[1] Revenue Consultations, vol. lxxxiv. 1851, page 94.
[2] Revenue Consultations, vol. lxii. 1852, page 57, & vol. lxxxiv. 1851, page 6.
[3] Revenue Consultations, vol. lxii. 1852, page 36.

staple very tender, but fair; a good deal of small particles of leaf; and appears to be cotton from second crop." [1]

The ensuing year, Mr. Daley stated that a few maunds only of New Orleans seed were sown, after the first shower of rain, on the 12th June, "but they were soon after destroyed by the incessant rains that followed." [2]

The cultivation of New Orleans cotton was temporarily increased, but Mr. Daley's information as to the progress of the experiments was, as Government stated, "most meagre and unsatisfactory." His reports were so systematically long in arrears, that, finally, it became necessary to suspend his salary until they should be furnished, and it was only after this had been done for nearly twelve months that they were prepared. This delay was partly attributable to ill health, but when ultimately furnished, the reports were so erroneous that they had to be cancelled and others substituted.[3] It is necessary to mention these facts, for even the amended statements are so contradictory and irregular, that they appear to be quite untrustworthy. The most elaborate experiments are mere labour lost when their results are not carefully and clearly recorded. As this was the case with the proceedings at Surat, no detailed account of them can here be given. It would only mislead to quote the estimated yield of cotton obtained from the exotic seed sown, and even the extent of land in which it was cultivated is not ascertainable with any degree of certainty. The following are the contradictory statements on this head furnished by Mr. Liddell, the Collector of Surat, and by Mr. Daley, the Superintendent:—

	Mr. Liddell's Report.[4] Beegahs w. w.	Mr. Daley's Reports. Beegahs.
1851-52	210 0 0	[5] 296¼ / [6] 214 thus variously stated by him.
1852-53	430 12 15	[7] 776
1853-54	67 18 0	[8] 76¼
1854-55	5 2 15	[9] 6¼

The following extract from the Collector's final report, recommending the

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[1] Revenue Consultations, vol. lxii. 1852, page 30.
[2] Returns, East India Cotton, 1857, page 664.
[3] Revenue Consultations, vol. lvii. 1856, page 87.
[4] Revenue Consultations, vol. lviii. 1855, page 60.
[5] Revenue Consultations, vol. lxii. 1852, page 57.
[6] Revenue Consultations, vol. liv. 1853, page 166.
[7] Revenue Consultations, vol. lvii. 1856, page 20.
[8] Revenue Consultations, vol. lvii. 1856, page 48.
[9] Revenue Consultations, vol. lvii. 1856, page 76.

discontinuance of the experiments, is a brief chronicle of their progress, and of their failure :—

" In 1849-50 some Georgian and New Orleans cotton seeds were distributed amongst the ryots, and sown in some selected places, but the result is no wise favourable. These trials, however, not having been considered fair ones, the present experiments commenced in 1851-52. In the first year of the experiment, patches of land, selected by the superintendent, and considered to be of the first class, were placed at his disposal, but the crops of the New Orleans cotton yielded by them were so scanty, as to lead to the conclusion that neither the soil nor climate of this zillah was suitable for the growth of that kind of cotton ; but, in order to form a decisive opinion, they have continued, but they have met with ill success in almost every instance, and remissions were granted on account of failure of crops in 1852-53. The crop raised in Muzoora, a village close to Surat, the soil of which was considered to be suitable, was inspected by me in 1853, and found to be a total failure. The late First Assistant Collector, Mr. Reid, with a view to the eventual introduction of the New Orleans cotton into this collectorate, selected some of the villages of the Bulsar Talooka, both the soil and climate of which are considered favourable, and there, at his own expense, had sown some New Orleans cotton seeds, which, however, proved a failure. The experience in the details of our revenue system of one of the best mamlutdars of this zillah, as well as the opinions of some of the intelligent farmers and cultivators, show that, since the commencement of the experiments under this superintendent, almost all the attempts made for raisng the New Orleans have proved failures, and they all state that the New Orleans cotton plant is not likely to thrive well in this collectorate, on account of the unsuitableness of its climate and soil to it. The only partial success in raising this cotton was obtained where it was sown on light soil, or what is called ' ghorat' ; the rich alluvial or black cotton soil of Guzerat seems wholly unsuitable to the plant ; perhaps also failure may be attributable to old or inferior seed. The opinion generally entertained being as stated above, and the result of the experiments carried on for upwards of four years, do not speak favourably ; and, notwithstanding the repeated calls made to Mr. Daley, I have not as yet received the several periodical returns, &c. overdue by him ; and, at the same time, he does not appear to have kept any diary of his proceedings, and register of effects of irrigation, as well as of growth, which facts, in my opinion, are strongly indicative that the superin-

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[1] Revenue Consultations, vol. lviii. 1855, pages 71—75.

tendent had nothing to say about the success of the experiments, or undoubtedly he would have done so." [1]

No saw-gins were disposed of, with the exception of the two taken at the commencement of the trials, and all of those set up remained almost idle during the whole period. The experiments were considered a failure, and were consequently abandoned. The ryots had not voluntarily cultivated the exotic cotton; "in nine cases out of ten they demanded remissions of assessment on account of the failure of the experiment," and no sooner was the Government influence withdrawn, than the cultivation of foreign cottons entirely ceased.

On the 5th of August 1861, Mr. Rogers, the Acting Collector, gave the following report of the position and prospects of cultivation in the Surat Zillah :—

"The only districts in the principal division of this collectorate in which an increase in cotton cultivation appears to have taken place in the current season (1861-62) are Unkleshwar (including Hansote) to the north, and Burdolee (including Kurrode, Walore, and Surbhone), to the east.

"In Oolpar and Koorsud, where the greatest breadth of land is devoted to this staple, the area is reported to be about equal to that of last year, and in Chorassee, the district immediately surrounding Surat, it is said to be less, in consequence of the unfavourableness of the season, from too heavy rain having fallen at its commencement.

"In the southern districts, Soopa (including Parchole), Chicklee, and Bulsar (including Parnera and Bugwara), cotton cultivation is carried out to a very limited extent, and the soil being apparently unsuited for it, high prices can never have any appreciable effect upon the production of the staple in them.

"Cotton being a crop which cannot be remuneratively produced in Guzerat, except in rotation with other crops, the effect of high prices for the former will never appreciably affect the area cropped with it, except as a consequence of the general extension of cultivation. Whenever, without such general extension, the proportionate area of cotton were increased, the effect of high prices of the staple would be counteracted by a simultaneous rise in those of cerials and other products, owing to the smaller area devoted to them."

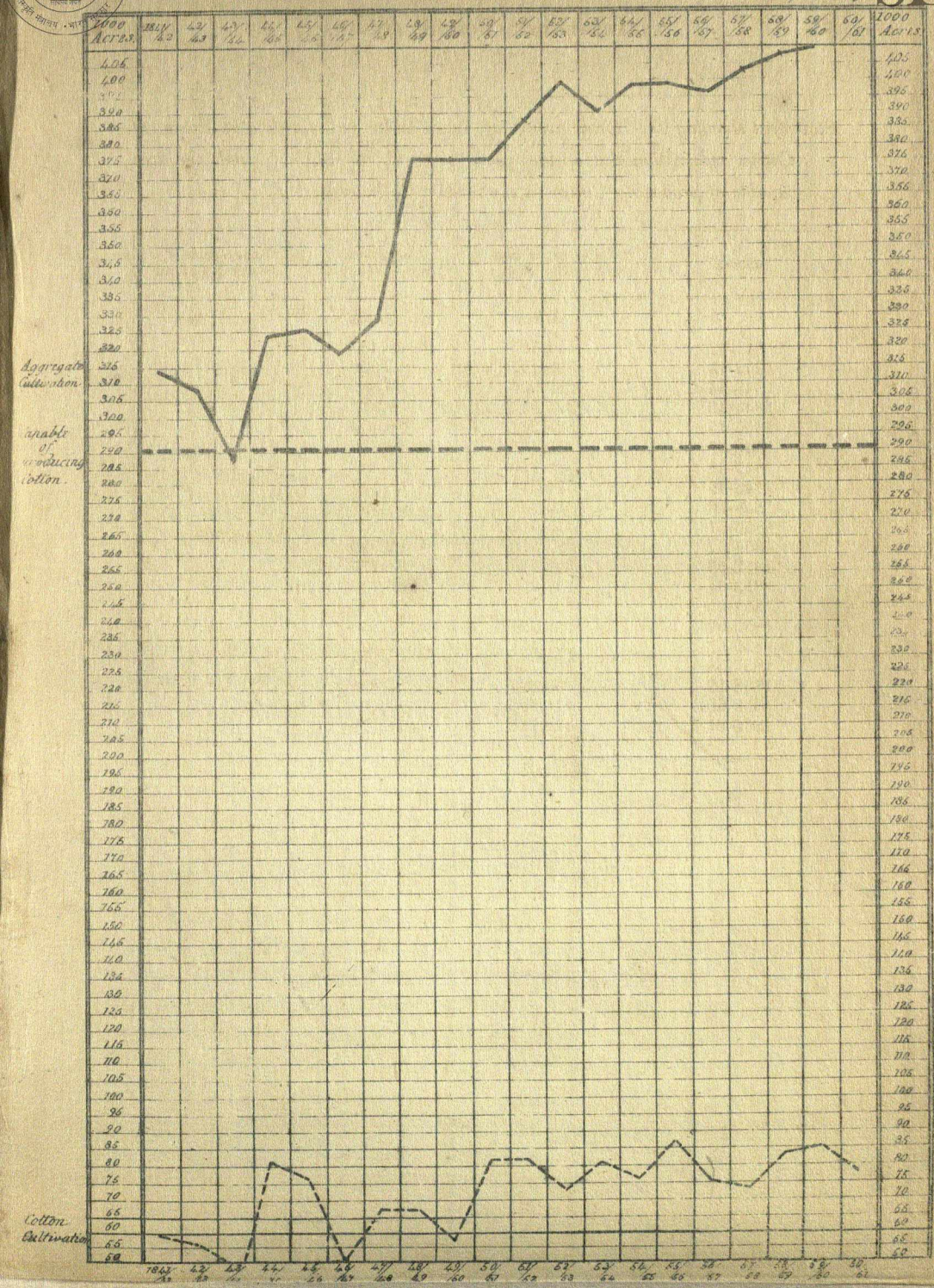
[*Statement*

Statement showing the total extent of land under cultivation, the extent of Cotton cultivation during the years 1841-42 *to* 1860-61, *and the area capable of producing Cotton in the* SURAT *Collectorate.*

YEARS.	Total extent of land under cultivation.	Land under Cotton cultivation.	Land capable of producing Cotton.
	Acres	Acres	Acres
1841-42	314,187	59,487	
1842-43	308,195	55,626	
1843-44	287,930	39,881	
1844-45	324,912	81,357	
1845-46	325,211	76,494	
1846-47	319,446	50,336	
1847-48	328,955	68,497	
1848-49	375,671	68,542	
1849-50	375,351	59,797	
1850-51	375,611	82,100	
1851-52	387,370	82,590	291,529
1852-53	399,624	74,277	
1853-54	391,259	80,177	
1854-55	397,235	76,793	
1855-56	398,724	87,353	
1856-57	397,151	75,526	
1857-58	403,753	74,813	
1858-59	408,897	83,820	
1859-60	415,692	85,104	
1860-61	424,760	78,079	

Diagram showing the aggregate cultivation ——— and the extent of land capable of producing Cotton in the collectorate of SURAT ———

Prepared by W. B. C.



CHAPTER VI.

EXPERIMENTAL CULTURE AT AHMEDABAD.

Experiments commenced under Mr. T. Price in 1851—Brokers' report on ginned indigenous Cotton—Experimental culture and its results—Mr. Daley's report—Experiments under his superintendence—Irrigation and Manuring tested—Indigenous saw-ginned Cotton at a discount—Failure and abolition of Experiments—Experiments by Assistant Collector with New Orleans Cotton Seed—Representation of the Chamber of Commerce—Report of Dr. Forbes—Report of the Revenue Commissioner—Experiment made at Dholka by Mr. E. P. Robertson—Summary of Results.

In January 1851 Mr. T. Price was appointed to superintend a series of experiments with exotic cotton in the collectorate of Ahmedabad, and to introduce the American saw-gin for cleaning both exotic and indigenous cotton.

He was authorised to distribute New Orleans seed *gratis* to those ryots who were willing to cultivate it; to purchase the produce at five per cent. above the market price of native cotton; and to promise a remission of assessment in every case where the crop might fail. Although the chief feature of his plan was to endeavour to induce the ryots themselves to cultivate under his directions, he was allowed, at his suggestion, to plant 100 beegahs of land in the Dholka and Dundooka talookas with exotic cotton, in order, more correctly, to test the suitability of the climate and soil.[1]

He erected ginning sheds in various parts of the zillah, and as the native merchants required to see the performance of the machine before employing it themselves, he was permitted to purchase a small quantity of the indigenous *kuppas*, which he cleaned in their presence with the saw-gin. This cotton (15 bales) was sent to Bombay, and thence was shipped to England, part being forwarded through the Chairman of the Chamber of Commerce, in the *Tinto*.[2]

[1] Revenue Consultations, vol. lxxvi. 1851, pages 211—219 and 223.
[2] Revenue Consultations, vol. lxxvii. 1851, pages 91—101.

This cotton was described by the London brokers as "ginned, whitish in colour, but the staple cut and spoiled for spinning; foul with broken leaf, which is difficult to be detached, and with dirt from the machine; value uncertain." Messrs. Gray & Coles, to whom the shipment was consigned, remarked, "You will observe that the principal objection is the injury to the staple by the description of gin made use of. The cotton, originally not free from leaf, is, in this respect, deteriorated in value by ginning, for the broken particles of leaf cannot easily be detached." The cotton was sold for 3½*d.* per lb.[1]

The natives evinced considerable willingness to use the saw-gin, and the Political Agent at Kattywar applied for several of these machines on account of the native chiefs. The scarcity of labourers, and the difficulty of inducing them to undertake the laborious work of the gin, rendered it desirable to adapt the machine to cattle-power, which Mr. Price succeeded in doing, and he set up a gin, with this addition, for the Thakoor of Bhownuggur.[2]

About 214 beegahs (128 acres) of land were sown with New Orleans seed in the Dundooka and Dholka talookas. The crop suffered from the monsoon rain, and many fields entirely failed to come to maturity. The total produce was estimated at about 2 candies and 737 lbs., but only about 2,000 lbs. of sound cotton could be forwarded to Bombay, or a yield of about 15½ lbs. of wool to the acre.[3]

The total quantity of kuppas ginned for Government, and for the ryots, during this season, amounted to 71 candies and 56 lbs. Sixteen hand-gins were completed, and four were sold. One of the native merchants, however, who had purchased one of them, was disagreeably surprised by being unable to sell the cotton cleaned by it, except at a reduction on the price of cotton prepared by the 'churka.' The unfavourable report on the parcel by the *Tinto*, and doubt as to the real market value of ginned cotton, prejudicially affected the article. Three other merchants who had applied for gins immediately withdrew their indents.[4]

In the season 1852-53 about 670 beegahs (402 acres) were planted with New Orleans cotton. The fall of rain being rather irregular, somewhat injured both the indigenous and exotic crops, but the latter suffered

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[1] Revenue Consultations, vol. lviii. 1852, pages 9 and 10.
[2] Revenue Consultations, vol. lxxvii. 1851, pages 140—144 and 157.
[3] Revenue Consultations, vol. lviii. 1852, pages 56—67.
[4] Revenue Consultations, vol. lviii. 1852, pages 87—118.

greatly more than the indigenous, and, in the Dholka Talooka, it altogether failed. The entire produce was estimated at 2 candies and 558 lbs., or a yield of 5¼ lbs. per acre. The following is a detailed statement of the experiment[1]:—

Talookas.	Number of Beegahs cultivated.			Yield of New Orleans Cotton in Candies.	
	Beegahs.	G.	P.	Cds.	lbs.
Dundooka	501	14	8	2	33
Gogo	36	0	0	0	55
Dholka	104	16	19	Entirely failed.	
Duskrohie	27	14	3	0	470
Total...	670	6	0	2	558

This cotton was shipped to England in the *Loch Lomond*, and left a loss of nearly fifty per cent.[2]

In 1853 Mr. Price left the Ahmedabad establishment, and was succeeded, for a few months, by Mr. Edwards.

In 1853-54 it was variously estimated that from 77 to 86 beegahs (46 to 51 acres) of land were sown with exotic seed, part of which was a complete failure; and the yield of the whole amounted, by the same estimates, to 183 and to 223 lbs. of clean cotton, or about an average of 4½ lbs. per acre.[3]

Mr. Daley was deputed from Surat to make a tour of inspection through the Ahmedabad Collectorate, and to report upon the state of the experiments. His report, very long delayed, represented in no favourable light the state of the experiments during the season 1853-54. He attributed the failure of the crop of exotic cotton, in great part, to an injudicious selection of localities, and also to scanty sowing. The following tabular statement[4] contains his information in a condensed form:—

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[1] Revenue Consultations, vol. xxxvii. 1854, page 136.
[2] Revenue Consultations, vol. xxxvi. 1854, page 57.
[3] Revenue Consultations, vol. xxxvi. 1854, page 137, and vol. lix. 1855, page 84.
[4] Returns, East India Cotton, 1857, page 669.

Names of Villages.	No. of Beegahs sown.	Exotic Seed		Names of Exotic Cotton Seed sown.	Remarks.
		Seers.	Tolas.		
1. Ranpoor	4	27	...	Mastadon, New Orleans	One piece, containing 4 beegahs, swamped; sown broadcast.
2. Bhangut	1	4	...	Ditto ...	Swamped; broadcast.
3. Rah Tulao	1	4	...	Ditto ...	A few straggling plants; broadcast.
4. Gogleh	1	4	...	Ditto ..	Swamped; broadcast.
5. Koon	1	4	...	Ditto ...	Ditto ditto.
6. Amlee	2	4	...	Ditto ...	One beegah swamped, and 1 fair; probable yield half a maund; too little seed; broadcast.
7. Gulsana	1	6	...	Ditto ...	One beegah; probable yield one maund; broadcast.
8. Juskah	2	10	...	Ditto ...	Sown on swampy corners of two fields; probable yield half a maund; broadcast.
9. Unovallee	4	10	...	Ditto ...	Sown on good soil, but where it is flooded during the rains; the seed too little for four beegahs; probable yield one maund; broadcast.
10. Khus	12	31	...	Sea Island.	In six pieces; probable yield five seers each beegah; the yield of the indigenous the same; too little seed, and sown too far inland; broadcast.
11. Nowlee	7	17	...	Bourbon ...	In four pieces; fair; too little seed; probable yield similar to the indigenous; five seers each beegah; sown too far inland; broadcast.
12. Dhar Peepla ..	4½	17	25	Ditto ...	In three pieces; fair; ditto; broadcast.
13. Kumyalla	4	10	...	Hybrid. ...	In two pieces; probable yield 10 seers per beegah; the indigenous 15 seers; half the usual quantity of seed sown; broadcast.
14. Anundpoor	2	5	...	Ditto ...	Ditto; ditto; ditto; broadcast.
15. Kassundra	3	8	...	Ditto ...	Swamped; broadcast.
16. Gaumf	5	12	...	Ditto ...	In five pieces—one piece fair, the remainder stunted in growth; probable yield 10 seers per beegah; indigenous the same; too little seed; broadcast.
17. Burriad	1¾	14	...	Ditto ...	In six pieces—one piece good; ditto, ditto, ditto; too much seed; broadcast.
Carried over...	56¼				

TABLE (*continued*)—

NAMES OF VILLAGES.	No. of Beegahs sown.	Exotic Seed		Names of Exotic Cotton Seed sown.	REMARKS.
		Seers.	Tolas.		
Brought forward ...	56¼				
18. Kurrud	½	2	10	Hybrid ...	Indifferent.
19. Udwad	3	7½	...	Ditto ...	Ditto; too little seed.
20. Panvee	2½	13	...	Ditto ...	Destroyed by cattle.
21. Nowra	1½	14	...	Ditto ...	Indifferent.
22. Kummeedana ...	3	13	...	Ditto ..	Ditto; too little seed.
23. Oomralla	3	13½	...	Ditto ...	Ditto; in three pieces.
24. Rajekah	5	30	...	Ditto ...	Ditto ditto.
25. Puddanah	6	30	...	Ditto ...	Two beegahs good; probable yield five maunds in both; four beegahs swamped; the yield of the indigenous 1½ maund per beegah.
26. Dundooka	5¾	40	...	New Orleans	Two and a quarter beegahs properly sown; good yield, probably three maunds per beegah; the remainder broadcast and stunted in growth; the probable yield of the latter 10 seers per beegah; the yield of the indigenous 2½ maunds.
Total Beegahs...	86½				

Mr. Daley stated the probable total yield at 27 maunds and 22 seers of kuppas, equal to about 340 lbs. of clean cotton, or rather less than 4 lbs. a beegah. It may here be remarked that, small as is the yield of cotton, here and hereafter estimated, there is reason to believe that it generally exceeded the actual result. On the abolition of the Surat experiments, Mr. Daley was appointed to superintend those which were being prosecuted at Ahmedabad.

In 1854-55 the cultivation of exotic cotton increased to about 626 beegahs (376 acres), but, owing to the injury occasioned to the crops by heavy rain, the yield of wool was estimated only at 3 candies and 487 lbs., or about 7½ lbs. per acre.[1]

In 1855-56 the extent of land cultivated with New Orleans cotton amounted to about 57 acres (95 beegahs), and the yield was estimated at 494 lbs. of clean cotton, or about 8¾ lbs. per acre.[2]

No foreign cotton was cultivated in the Ahmedabad Zillah in 1856-57, as no good seed had been procurable.

[1] Revenue Consultations, vol. lix. 1855, pages 121 and 138.
[2] Revenue Consultations, vol. lv. 1856, page 32, and vol. lvii. 1857, page 22.

The extent of land planted with New Orleans and exotic cotton in the season of 1857-58 was stated by Mr. Hadow, the Collector, to be acres 186-15-10 (about 310 beegahs), and by Mr. Daley as 737 beegahs (about 440 acres) in one report, and as 698 beegahs in another. The Collector estimated the yield as 3 candies and 97 lbs., and Mr. Daley as 25 maunds. This eccentricity is almost the rule, and not the exception, in these records. The discrepancy, in the extent of land planted, between the Collector and the Superintendent, arises from the former stating the actual measurement of the standing crops, whilst the latter estimated it according to the quantity of seed distributed for sowing.

The following is a *resumé* of Mr. Daley's second report, which, being the latest in date, may, perhaps, be considered his more deliberate statement [1]:—

TALOOKAS.	Beegahs sown.	Yield of Seed Cotton in Maunds.	REMARKS.
Duskrohie	...	...	The ryots objected to sow exotic cotton seed.
Jeytulpoor	134	...	Destroyed by excessive rain.
Dholka	70	...	Ditto ditto.
Dundooka	415	13	The seed was sown in 10 villages, in 5 of which it was destroyed by excessive rain.
Gogo	49	...	The seed was sown after the first rain, but the whole was subsequently destroyed by drought.
Ditto	30	12	Sea Island cotton, to be presently referred to. This produce was not obtained until the following season.

Mr. Daley planted the 30 beegahs, just mentioned, with Sea Island cotton seed in drills, on the 11th September. The seed came up well, but, from careless watching, nearly the whole was destroyed by cattle. Four beegahs, however, escaped, which, being kept up through the season of 1858, gave a yield of 12 maunds of kuppas, or about 37 lbs. of clean cotton the beegah on the four which produced. Mr. Daley stated the out-turn of the experiment as follows:—

Assessment on 30 beegahs for 1st year	Rs.	12	8 0
Ditto on 4 ditto for 2nd year....	„	1	14 0
Ploughing	„	12	0 0
Weeding	„	12	0 0
Seed	„	2	0 0
Carried over..	Rs.	40	6 0

[1] Rev. Cons., vol. liv. 1858, pp. 393—406; vol. xl. 1860, pp. 6 & 7; & vol. liii. 1858, p. 32.

Brought forward..	Rs.	40	6	0		
Picking 4 beegahs	„	2	0	0		
Watchman	„	10	0	0		
Hedging	„	6	0	0		
					58	6	0
Produce of 4 beegahs, 4 maunds of cotton, at Rs. 6 a maund	„	24	0	0		
Realised from seed 8 maunds, at 2 maunds per rupee	„	4	0	0		
					28	0	0
Loss....	Rs.				30	6	0

He consoled himself by calculating that, had the rest of the seed produced in proportion, there would have been a profit on the transaction. [1]

In 1858-59 Mr. Daley does not seem to have succeeded in planting any foreign cotton. He states that the ryots refused to receive the exotic seed *gratis*, but offered to buy some at the market value. "When asked, why not receive the seed *gratis*, they said that, as the Revenue Survey was only lately completed, they did not like to receive anything *gratis*, for fear of being hereafter troubled by tullatees and peons." Mr. Daley adds, "I endeavoured to explain this fear away, but they would not listen." The season was stated to have been "a most propitious one, and the yield per beegah of cotton much greater than it had been for ten years." [2]

Mr. Daley tried experiments on a small scale with indigenous Waguria cotton, in order to compare the result of ordinary cultivation with that produced by means of irrigation and manure. The following is a condensed account of the out-turn. Half a beegah of red garden soil, irrigated and manured, produced 5 maunds of khalla (cotton in the pod), or 1 maund 10 seers of clean cotton :—

Cost of cultivation	Rs.	12	9	0
Realised for cotton and seed	„	8	0	10
Loss....	Rs.	4	8	2

Half a beegah of red soil manured, and partly irrigated by percolation when the former field was flooded, produced 4 maunds of khalla, or 1 maund clean cotton :—

Cost of cultivation	Rs.	5	7	0
Realised for cotton and seed.....	„	7	9	0
Profit....	Rs.	1	9	0

[1] Revenue Consultations, vol. xl. 1860, pages 3 and 4.
[2] Revenue Consultations, vol. liii. 1859, page 18, and vol. xl. 1860, page 55.

Half a beegah of white (*sic*) soil, unirrigated and unmanured, produced 3 maunds of khalla, or 30 seers of clean cotton:—

Cost of cultivation	Rs.	3	1	0
Realised for cotton and seed	„	5	4	0
Profit....	Rs.	2	3	0

Half a beegah of black soil, unirrigated and unmanured, produced 3½ maunds of khalla, or 35 seers of clean cotton:—

Cost of cultivation	Rs.	3	1	0
Realised for cotton and seed	„	6	2	0
Profit....	Rs.	3	1	0

Mr. Daley remarks, "The yield by irrigation would have been greater, but as the experiment was the first of its kind in this collectorate, I did not top the plants; the consequence was, the plants became woody—that they ran more into branches and leaves than they ought." [1]

The native dealers at one time showed a disposition to have their kuppas cleaned by the saw-gin, ginned cotton fetching Rs. 3 to Rs. 5 a candy more than churka-cleaned. The mercantile community of Bombay, however, having condemned the ginned native cotton, it fell at once in Dhollerah to Rs. 10 below the price of the churkaed, and, in consequence, the Banians and ryots immediately withdrew their cotton from the gins, and their working was stopped.[2]

In 1859-60 about 70 acres of land were cultivated with exotic cotton, the estimated produce of which amounted to about 3 candies and 316 lbs., or 38 lbs. per acre.[3] Some exotic seed, placed at the disposal of Government by the Bombay Chamber of Commerce, was despatched to Ahmedabad, with instructions that experiments should be carefully tried, to test the comparative advantages of the early and late sowing of American cotton, but Mr. Daley does not appear to have carried them out. Part of this seed was in barrels, the rest in bags. Of the latter, only a very small quantity germinated, the seed having, it is supposed, suffered in transit. The seed in barrels came up well, and looked healthy, but no subsequent report of the result was made.

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[1] Revenue Consultations, vol. xl. 1860, pages 4—11.

[2] Revenue Consultations, vol. xl. 1860, pages 52—54.

[3] Revenue Compilations, No. 527, 1861, page 10.

Mr. Mansfield, the Revenue Commissioner, Northern Division, reported, in December 1859, "In the gin factory there were, during the whole period of four years (of Mr. Daley's superintendence), some 5,500 maunds of cotton cleaned, in round numbers; 6 gins are reported to have been made, and 2 sold." [1]

The repeated censure of Government upon the meagreness, inaccuracy, and irregularity of Mr. Daley's reports, did not render those documents a whit more regular or satisfactory. Practical success, in the shape of an extension of the cultivation of exotic cotton, might have rendered details unimportant, but, in this instance, failure, which is apparent in the extinction of the variety in Ahmedabad, has lost part of its certainty by the disorder and utter want of system in the records of the establishment. Success would, doubtless, have been chronicled by the superintendent; failure has been left in convenient obscurity.

The Revenue Commissioner recommended the abolition of the experiments, and Government saw no inducement to continue them. Mr. Daley was, consequently, removed from his appointment at the beginning of 1860.[2]

Some experiments were tried with New Orleans seed, placed at the disposal of Government by the Bombay Chamber of Commerce, by the Assistant Collectors of the Ahmedabad Zillah, independent of Mr. Daley, but uniformly without success.

Mr. Weeding, the First Assistant Collector, reported, on the 12th January 1860, that, from "the insurmountable objection of cultivators to try any of the seed as a matter of speculation," he had been obliged to defray the expense of cultivation. He stated, "The experiments have been carried out at a cost of Rs. 29-15-6, and, I regret to state, the result has been most unsatisfactory. Either from defects in the seed, or some other cause, no plants sprung up, except a few delicate ones in the garden of the Assistant's bungalow at Dholka. In this exceptional instance the ground was occasionally watered, and the plants tended with the same care as garden produce; but, notwithstanding this, they soon died off, thus affording rather negative proof as to the possibility of a general cultivation of this cotton with any advantage. I should state that these few plants were of the later sowing in October, while seed thrown into the same ground early in the rains did not come up at all. To show that this was not owing to defects in the soil, some country seed, sown in rows side by side with the New Orleans, sprung up and grew healthily."

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[1] Revenue Consultations, vol. xl. 1860, page 117.

[2] Revenue Consultations, vol. xl. 1860, pages 121—125.

"The New Orleans seed was sown at three different villages in each of the talookas, and in soils differing in quality. The fact of its only having sprung up in the Dholka garden seems to class it with those foreign vegetables and flowers which can, with great care, be induced to spring up, but, from being unsuited to the climate, seldom or never attain to any perfection. If the seed had been materially injured, it appears obvious that it would not have sprung up at all."

Mr. Percival, the Third Assistant Collector, reported, on the 9th December 1859, "The experiments with the New Orleans cotton seed have failed, owing to the heavy rains which fell after the seed was sown. The seed was distributed by the mamlutdars of Veerumgaum, Mandul, Detroji, Seetapore, and Ogan on 23rd August. In the first four places it was then sown, but the heavy rain which followed made the ground swampy, and nothing came up. At Ogan the seed was kept till a break in the rains, and was sown on the 24th September, but rain fell at the end of the month, and the result was the same as at the other places. The season is not a favourable one for cotton, as there has been more rain than usual in this district, and the cultivators have, in many places, had to sow a second time. The New Orleans seed has, therefore, hardly had a fair trial, but, as far as it has gone, the result is not satisfactory, for country cotton sown at the same time and place, at Detroji, came up, whilst the New Orleans seed produced nothing at all." He further gave the following details of the experiment:—"A portion (of the seed) was sown in Veerumgaum, in one acre of black soil, on the 25th August 1859. In Organ, in one acre of black soil, on the 24th September. In Mandul, in one acre, on the 4th September. In Detroji, in three acres of light, sandy (goraroo) soil, on the 31st August. In Seetapore, in five acres of black soil, in August."

The Second Assistant Collector entirely concurred with Mr. Weeding in the opinion that the seed appeared unsuited to the climate, and "could only be induced to spring up by the greatest care and attention being paid to it."[1]

The Bombay Chamber of Commerce addressed Government on the subject of these experiments, on the 10th April 1860, as follows:—"The Chamber has observed that the Government have closed the last of the establishments for the experimental cultivation of cotton, lately conducted by Mr. Daley. It certainly would appear that the trials at Dholka and Gogo have been complete failures; but as that at Dundooka seems to have been moderately successful,

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[1] Revenue Department, Compilations, No. 214 of 1860.

and as Dr. Forbes will have an opportunity of expressing his opinion on the prospects of further experiments, the Chamber would, in the event of a favourable report, be prepared (on behalf of the Cotton Supply Association) to contribute, to a moderate extent, to the salary required by the Manager of the Government establishment there, in order that the seed saved should be sown again this season." As Dr. Forbes, the superintendent of the cotton gin factory at Dharwar, was on the point of visiting the cotton districts of Guzerat, he was desired to report on the expediency of maintaining any portion of the establishment at Ahmedabad.[1]

Dr. Forbes considered the establishment useless so far as the introduction of the saw-gin was concerned, the unsuitability of that machine to the cleaning of the indigenous cotton being fully proved. He believed, however, that an implement on the roller 'churka' principle might be obtained, which might successfully operate on Guzerat cotton, and until such a machine could be prepared, he recommended that the establishment should not be altogether abolished, on account of the inconvenience and expense of resuming it.[2]

Regarding experiments with exotic cotton, Dr. Forbes reported that he had visited a field at Gogo, where sixty beegahs had been planted with the New Orleans cotton. He could not at first discover any appearance of produce, "nor was it quite apparent that the land had been at all prepared in the manner required for cotton cultivation. On further search, however, about two dozen plants were discovered in one spot, varying in height from one to two inches. A small space round each (made for the purpose) showed that water had been supplied, and that the seeds from which the plants had sprung must have been sown within six or eight days of the period of his visit. The locality was not a good selection for New Orleans cotton, but he thought the 'Sea Island' variety would be found to answer in it."

At Dundooka Dr. Forbes inspected a field of about 70 beegahs, in which American cotton had been sown in the August previous to his visit, the produce of which, reaped in January following, only amounted to 160 lbs. of seed cotton (kuppas). "Only a very small proportion of the seeds appeared to have grown," he stated, "and the plants which were thinly scattered over the whole field might, if confined to one spot, have been sufficient for about four-fifths of an acre. Their appearance, as far as an opinion could be formed of them at that season, bore testimony of the suitability both of the soil and climate to this variety of cotton, aud taking also into consideration the evident

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[1] Revenue Department, Compilations, No. 110, 1861, page 42.
[2] Revenue Department, Compilations, No. 110, 1861, pages 19—24.

want of care that had been bestowed upon the cultivation, as evinced by the condition of the land, the return (in proportion to the number of plants), both as regards quantity and quality, would tend to strengthen this conclusion."

"In the close vicinity of this field," he continues, "there was another patch of land, of about four acres in extent, sown with Egyptian cotton, to which the above remarks are also applicable, except that, owing to the seed having been sown much too late, viz. in the end of November, none of the produce had as yet ripened. A large proportion of the plants, however, were strong, luxuriant, and healthy-looking, and they bore young pods in a great abundance, but, owing to the excessive heat of the sun at that season, the latter appeared as if they were being forced to ripen and open prematurely. For this reason, the cotton, when it is procured, will afford no criterion of the quality of staple that might have been expected from better and more seasonable cultivation."

Dr. Forbes thus expressed his impressions with regard to the suitability of these cottons to the district, "From my own observations, and what I could otherwise ascertain with regard to soil and climate, I believe that the above-mentioned descriptions of cotton might be cultivated with advantage in the country to the west and north of the Gulf of Cambay, though they have not been found to answer upon the opposite sides of its shores." [1]

Mr. Mansfield, the Revenue Commissioner, Northern Division, entirely differed from this opinion. Referring to the passages of Dr. Forbes' report which have just been extracted, he stated, "From the above description, and from my own personal knowledge of the Guzerat experiments, I scarcely think that the experiments at Dundooka can be said to have been moderately successful; nor do I place much confidence in the opinions expressed by Dr. Forbes, who is quite unacquainted with the soil and climate of Guzerat, and formed his conclusions after a hasty visit of a very few days to the spot." He therefore "could not recommend Government to waste any more money in continuing the experiments at Dundooka." If the Chamber of Commerce, however, thought it desirable to ascertain further whether exotic cotton could be profitably cultivated there, he suggested "that the seed be sent to the Collector of Ahmedabad, with directions to engage ryots to plant it, paying them liberally for their labour, and the use of their land, and also giving them a bonus, if they are successful in raising good crops. I would pay Rs. 7 an acre for all land so cultivated, and Rs. 3 more if the crop was a good one. The former sum would not be more than sufficient to enable the ryot to pay the assessment and reimburse himself for his labour, and if the crop turned out

[1] Revenue Department, Compilations, No. 110, 1861, pages 8—11.

a good one, the whole expense would be repaid. I think Rs. 5,000 might be not unprofitably expended on such an experiment." [1]

Government agreed with the Revenue Commissioner, and considered the trials at Ahmedabad to be "like so many former experiments—a costly failure." They were not, therefore, disposed to unite with the Chamber for their further prosecution, but they offered, should the Chamber desire to continue such investigations, to instruct the Collector of Ahmedabad to afford every assistance in the way suggested by the Revenue Commissioner. [2]

In 1860-61 the cultivation of exotic cotton fell to about acres 31-18 (51 beegahs), the produce of which was estimated at 267 lbs. of wool, or about 8½ lbs. per acre. [3] In 1861-62 it is reported to have ceased altogether.

Mr. E. P. Robertson states that he found growing in the garden at Dholka cotton plants (probably Egyptian) which had been planted by Mr. Daley two years before. At the end of May 1860, he cut down the plants to within six inches of the ground; they were growing near a bed of lucerne grass, and with it received a little water every third or fourth day. "As soon as the rain came," Mr. Robertson writes, "the plants grew wonderfully; they attained a height of 8 to 10 feet, and were so loaded with cotton pods that I was obliged to prop them up." During the cold season, however, a worm and a small red fly attacked the crop and destroyed more than half of the cotton in the pods. Mr. Robertson, therefore, resorted, with perfect success, to the expedient of plucking the pods as soon as they looked full and ready to burst, and by this means he saved the remainder of the crop, which he had completely gathered by the middle of January 1861. "I then cut down the long straggling branches," he continues, "and by the end of February there was a heavier crop on the plants than at first. I collected a quantity of the pods when ripe and full; they would not dry properly, however, but withered up, and I lost all the cotton. I repeated the experiment again, but with the same bad success. I then stopped the water, which before had been given to the plants every three days, after which I plucked some of the pods, and obtained good cotton. I left Dholka at the end of March, and was, therefore, unable to carry out the experiment further. The year before, however, I was at Dholka in the month of May, and the cotton plants were then bearing well, and no insect had attacked the pods. This was, doubtless, owing to the heat of the weather, and to there being little or no dew at night, so that the pods, as soon as they were

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[1] Revenue Department, Compilations, No. 110, 1861, pages 13—17.

[2] Revenue Department, Compilations, No. 110, 1861, pages 41—55.

[3] Revenue Department, Compilations, No. 527, 1861, page 10.

full rapidly burst, and the cotton dried at once. The soil in the garden at Dholka is *goorarоo*."

Samples of this cotton were forwarded to England by Sir George Clerk, and the following report was given upon them by Mr. Serjeantson, the Liverpool broker, in June 1861 :—

No. 1. *Cotton allowed to ripen and burst in the pod.*—"Good, fine, and strong staple, rather mixed with leaf, and yellow over ripe bits; worth 8*d.* per lb."

No. 2. *Cotton from pods plucked when ripe and full, and allowed to dry and burst in the sun.*—"Much cleaner, and good in colour, but not fine in staple as No. 1 ; worth 7¾*d.* to 8*d.* per lb. ; both of these classes would be very saleable."

No. 3. *The same as No.* 2, *but separated, as the pods appeared to have worm holes in them.*—"Not so good in colour, uneven in staple, and leafy ; value 6¼*d.* to 6½*d.*"

No. 4. *Part of the second crop gathered in the same as way No.* 2.—"*Much better cleaned,* but soft and uneven in staple; value 6½*d.* to 6¾*d.*"

"Nos. 3 and 4 rank with the best Broach." Nos. 1 and 2 were said to be readily saleable in any quantity.

The following tabular statement exhibits the extent of the experiments in each year with exotic cotton—chiefly New Orleans,—and the amount produced. Where the returns have differed, an average has been taken :—

Seasons.	Beegahs cultivated.	Acres cultivated.	Total produce of clean Cotton.	Yield per Acre.
			lbs.	lbs.
1851-1852	214	128	2,000	15½
1852-1853	670	402	2,126	5¼
1853-1854	81	48	303	4¼
1854-1855	626	376	2,839	7½
1855-1856	95	57	494	8¾
1856-1857	...	...	...	...
1857-1858	698	419 A	950 A	2¼
	310	186 B	2,449 B	13
1858-1859	20	12	...	...
1859-1860	116	70	2,368	38
Mr. Weeding.	Not stated.	Not stated.	Total failure.	Total failure.
Mr. Percival.	20	11	Do.	Do.
1860-1861	51	31	267	8½

A Superintendent's statement. B Collector's statement.

MINISTRY OF CULTURE GOVERNMENT OF INDIA

Collectorate of **AHMEDABAD**, from 1841-42 to 1861-62 inclusive.

Prepared by [illegible]

1000 Acres	1841 42	1842 43	1843 44	1844 45	1845 46	1846 47	1847 48	1848 49	1849 50	1850 51	1851 52	1852 53	1853 54	1854 55	1855 56	1856 57	1857 58	1858 59	1859 60	1860 61	1861 62	1000 Acres
150																						150
148																						148
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Statement showing the total area under cultivation, the area under Cotton cultivation, and the area capable of producing Cotton in the AHMEDABAD *Collectorate from* 1841-42 *to* 1861-62.

YEARS.	Total area under any cultivation.			Area cultivated with Cotton.			Area capable of producing Cotton.		
	Acres.	Goontas.	A.	Acres.	Goontas.	A.	Acres.	Goontas.	A.
1841-42	615,867	27	6	66,607	18	8	337,520	12	8
1842-43	610,632	16	7	74,591	6	12	337,547	13	12
1843-44	620,031	7	4	48,720	38	11	338,949	22	11
1844-45	616,188	15	0	139,041	22	8	336,799	8	8
1845-46	618,191	17	13	65,832	28	3	336,085	7	3
1846-47	627,312	36	9	45,967	13	0	336,577	3	0
1847-48	613,666	30	8	15,094	39	0	335,401	28	0
1848-49	601,799	8	2	30,344	11	8	335,989	15	8
1849-50	625,237	1	7	13,801	30	0	335,401	28	0
1850-51	633,205	1	4	119,386	33	3	336,825	31	3
1851-52	637,209	23	0	66,152	38	4	337,458	24	4
1852-53	636,217	29	4	71,816	35	5	336,548	9	6
1853-54	626,777	13	2	116,513	16	15	334,867	14	15
1854-55	632,395	26	11	71,309	31	14	333,826	26	14
1855-56	645,063	1	0	100,098	16	7	334,115	13	7
1856-57	659,896	19	3	78,328	14	8	333,463	13	8
1857-58	661,650	6	3	65,380	33	1	222,701	22	12
1858-59	675,723	36	15	129,536	19	9	332,267	28	9
1859-60	698,036	24	15	88,649	16	1	334,575	32	1
1860-61	743,716	25	15	124,965	5	11	216,252	32	11
1861-62	.....			139,284	0	0	.....		

CHAPTER VII.

EXPERIMENTAL CULTURE AT KAIRA, AHMEDNUGGUR, SATTARA, SHOLAPORE, POONA, AND TANNA.

Experiment with exotic Cotton by Dr. Thatcher—Experiment with Seed distributed by Mr. Kirkland—Report on Samples by Chamber of Commerce—Cotton cultivation in the district. *Ahmednuggur.*—Failure to extend Cotton cultivation, and introduce exotic varieties—Statement of Cultivation. *Sattara.*—Experiments organised at the suggestion of Sir H. Bartle E. Frere—First experiments conducted by Mr. Vary—Failure—Objection to Saw-gins—Purchase of Native kuppas—Abolition of Establishment—Statement of Cultivation. *Sholapore.*—Attempt and failure to produce New Orleans Cotton—Statement of Cultivation. *Poona.*—Statement of Cultivation. *Tanna.*—Failure of experiments with new Orleans Cotton—Cost and out-turn.

KAIRA.

A PORTION of the American cotton seed sent out by the Court of Directors, in 1840, was forwarded to the Collector of Kaira for trial in his district.

Some of this seed was sown by Dr. Thatcher in the Government experimental garden, in a light and rather sandy soil, and every care and attention was bestowed upon its cultivation. The plants, at first, promised well, until they had attained the height of about a foot, when the greater number "withered, and died off as if blighted." A few recovered, however, during the cold weather, and gave hopes of a better second crop, but the first gathering was very small.

A small quantity of Egyptian cotton, in the same garden, almost entirely perished, and some of this species, grown as a perennial, looked very unhealthy, and yielded very imperfect pods.

Dr. Thatcher was inclined to attribute the failure of the American cotton chiefly to the climate, as indigenous cotton was thriving well in the same soil.[1]

The same American seed, together with Guzerathee instructions for its cultivation, was given to the ryots by Mr. Kirkland, the Collector. It was sown in several pergunnas of the collectorate, to the extent of 12 beegahs. From its first germination up to the close of the monsoon, about the middle of September, the plants had a most promising appearance, and shortly after flowered, and formed very large pods. During the heat of October, however, a visible change took place, and the leaves and more tender branches appeared burnt up. They continued in this withered state until the setting in of the cold weather, when the dews somewhat revived them. It was supposed that the vegetation had been too rapid at first to allow the tap root to penetrate sufficiently into the soil. Of the 12 beegahs cultivated, 4½ did not arrive at maturity. In the remaining 7½ beegahs the plants partially thrived, and the crop amounted to 13 Surat maunds of kuppas, or about 162 lbs. of clean cotton, a yield of 21⅔ lbs. per beegah upon the 7½ which survived.

The following is an account of the out-turn of the 7½ beegahs which produced this quantity:—

Rent of 7½ beegahs	Rs.	32	11	8
Expense of cultivating 7½ beegahs	„	24	9	3
	Rs.	57	4	11
Value of the cotton produced	„	19	0	2
Loss....	Rs.	38	4	9

or a loss of nearly 67 per cent. upon the out-lay for the 7½ beegahs. Of course, had the expenses incurred upon the 4½ beegahs which failed been added, the result would have been still more unsatisfactory.[2]

Samples of the cotton were laid before the Bombay Chamber of Commerce, and the following report was given:—"The quality of the specimen is tolerably good, and it has been very well cleaned, but it is far inferior to the samples of American cotton produced at Rutnagherry by Mr. Elphinston. It seems to have failed in growth in the same manner as the exotic cotton attempted to be cultivated by the American planters, lately employed at Broach."[3]

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[1] Revenue Department, Compilation No. 47, 1842.
[2] Revenue Consultations, vol. xxxiv. 1842, pages 21—24.
[3] Revenue Consultations, vol. xxxiv. 1842, page 29.

One or two trifling experiments have since been made with equal want of success, but their details are not recorded. No exotic cotton is now cultivated in this collectorate.

The latest report from Kaira, in 1861, states that the only cotton grown is a particular species commonly called *tullubda*, or indigenous,—a perennial, lasting from three to five years. It is rarely ever seen growing alone, but is almost invariably sown along with the early dry monsoon crops. None of it is exported, and that its cultivation is unprofitable, may be deduced from the fact, that the quantity produced is not even sufficient for local consumption, and the balance is imported from Kattywar and Broach, although there is no want of available land, were cotton cultivation remunerative.

Mr. Hadow, the Collector, states that this is chiefly attributable to the very heavy transit duties levied by the Guicowar, and by the Nawab, on the lines of traffic roads. He reports that the expense of exporting 15 Indian maunds of cotton from each of the chief towns to Cambay, and thence to Bombay, would vary from Rs. 20 to Rs. 26, of which nearly Rs. 16 consist of transit duties. [1]

Statement of the total area under cultivation, and the extent of Cotton cultivation in the KAIRA *Collectorate.*

Years.	Total Area under Cultivation.	Area of Cotton Cultivation.
	Beegahs.	Beegahs.
1841-42	914,362	20,295
1842-43	917,578	21,757
1843-44	909,177	18,417
1844-45	906,997	18,220
1845-46	906,690	9,688
1846-47	932,102	10,901
1847-48	925,892	6,964
1848-49	897,598	5,668
1849-50	933,056	9,901
1850-51	943,399	9,603
1851-52	951,029	11,172
1852-53	952,773	12,251
1853-54	954,507	11,963
1854-55	923,687	12,722
1855-56	922,099	13,755
1856-57	973,689	13,246
1857-58	932,795	12,288
1858-59	960,777	15,653
1859-60	972,463	15,935
1860-61	994,578	16,482

[1] Revenue Consultations, No. 348, 1861.

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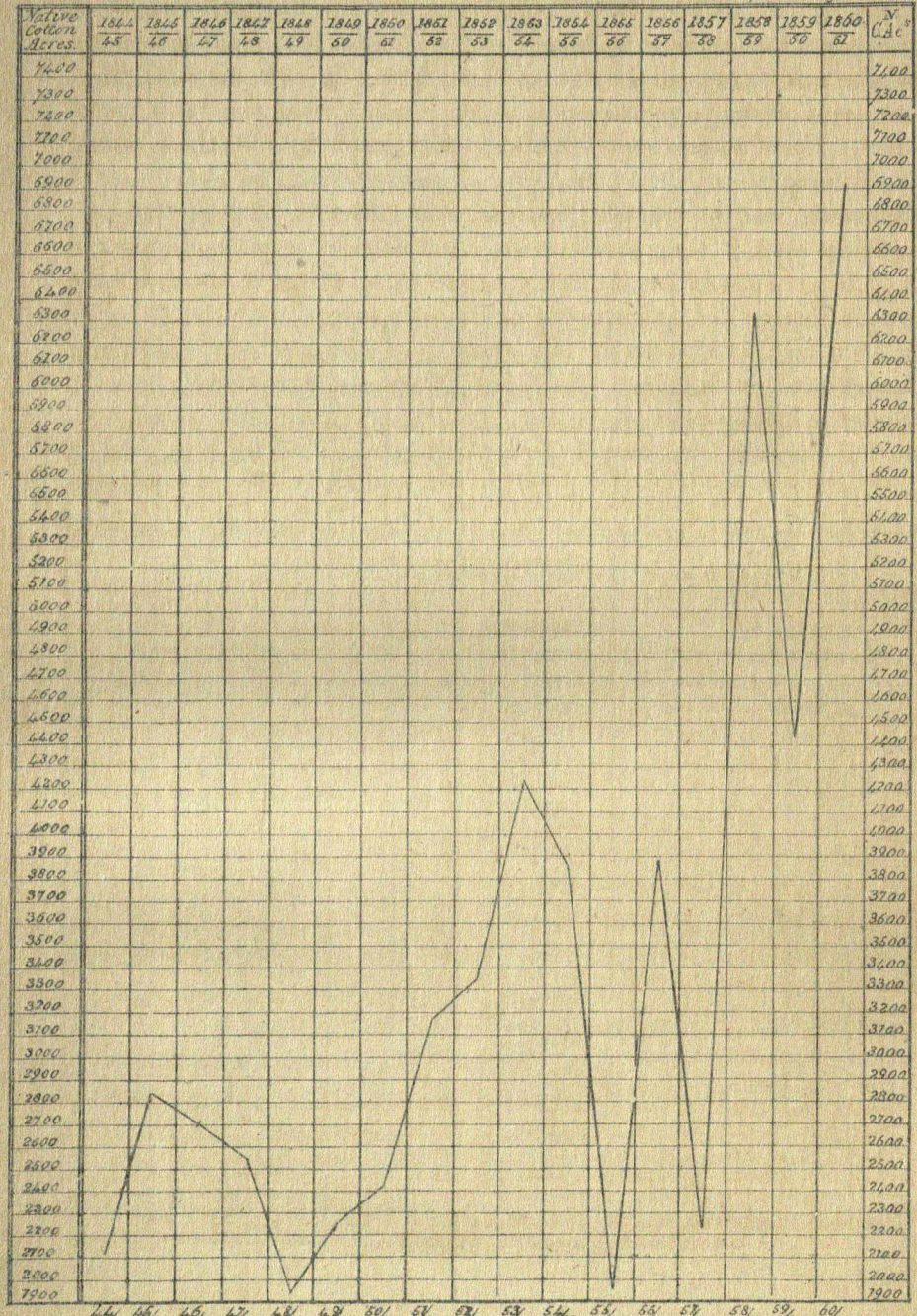
Diagram showing the Area under Cotton Cultivation in AHMEDNUGGUR, from 1844-45 to 1861-62.

Prepared by W.R.C.



AHMEDNUGGUR.

It has already been stated in this volume that, with a view to extend and improve cotton cultivation in the collectorate of Ahmednuggur, advances of money, free of interest, were made to several persons in 1830. Various facilities were afterwards accorded for the encouragement of private enterprise, and Government offered to purchase any superior cotton which the ryots might produce. New Orleans cotton seed, when introduced in 1835, totally failed in the district.

Regarding these efforts, Mr. Spooner, then Collector of Ahmednuggur, reported, in 1848, " It appears that the result of these experiments was the ruin of the persons to whom the money was advanced by Government, and the loss to Government of the interest of the amounts so lent." [1]

In 1848 only 2,638 acres of this zillah were cultivated with indigenous cotton, and none with exotic.[2] In 1859-60 the land under cotton cultivation amounted to 4,655 acres.[3]

Return showing the total Acres under cultivation during the last twenty years; the quantity cultivated with Cotton, indigenous and exotic; also the total Acres capable of producing Cotton in the AHMEDNUGGUR *Collectorate.*

YEARS.	Total Acres under cultivation for the twenty years.			Quantity cultivated with Cotton.						Total Acres capable of producing Cotton.
				Indigenous.			Exotic.			
	A.	G.	A.	A.	G.	A.	A.	G.	A.	
1841-42	16,22,826	7	8¾	Not known.			.....			
1842-43	16,03,016	24	9	Do.			.....			
1843-44	15,20,847	16	13	Do.			.....			
1844-45	15,29,524	18	10	2,106	15	0	.....			
1845-46	15,93,011	35	12	2,866	17	0	.....			
1846-47	18,09,693	36	4¾	2,711	5	8	.....			
1847-48	18,72,259	13	5¼	2,581	13	0	.....			
1848-49	18,09,127	39	15¾	1,955	1	8	.....			
1849-50	16,28,240	1	14¼	2,251	7	10	.....			
1850-51	16,44,106	34	7	2,410	31	12½	.....			98,509
1851-52	17,98,262	21	10½	3,180	13	6	.....			
1852-53	19,92,349	12	6	3,354	34	4½	.....			
1853-54	22,14,836	38	4	4,232	25	8	.....			
1854-55	23,16,667	23	10	3,845	10	12	.....			
1855-56	25,62,127	12	0	1,946	30	0	.....			
1856-57	27,20,868	5	4	3,828	38	0	.....			
1857-58	28,19,005	3	10	2,220	9	12	.....			
1858-59	28,75,125	11	4	6,334	13	12	.....			
1859-60	30,18,493	3	4	4,455	0	0	.....			
1860-61	29,32,794	26	12	6,909	14	0	.....			

[1] Revenue Consultations, vol. lxxi. 1849, page 108. [2] Ibid, vol. lxxi. 1849, page 107.
[3] Revenue Consultations, No. 1457, 1861.

SATTARA.

In 1848 Sir H. E. Bartle Frere, then Resident at Sattara, represented to Government "that a very favourable opening existed for introducing the cultivation of New Orleans cotton, and the use of the hand saw-gin into that part of the Deccan, by means of His Highness the Raja of Sattara's Mamlutdars and the Jagheerdars of Juth and Akulcote."

He stated that many of the people of the district had heard of the success obtained at Dharwar, and that "there was a great willingness, on the part of the Mamlutdars and Jagheerdars mentioned, to do their best in the matter. They had many facilities for so doing, especially the Jagheerdars, who had a considerable extent of land under cultivation on their own private account, and should they succeed, the benefit would not be confined to their own territories, but extend to the Honourable Company's districts, with which the eastern Sattara territories are everywhere intermixed, and where the cultivation of cotton is also considerable." [1]

Mr. Vary was subsequently transferred to Sattara from the Southern Maratha Country, for the purpose of setting up gins; and New Orleans cotton seed was supplied for distribution. [2]

In 1850-51 about 60,000 lbs. of this seed, received from Dharwar, were given to the ryots, and the Resident stated his belief that as much would be sown in the districts, during that season, as in Belgaum or Khandeish. Actually, however, about 4,000 beegahs were planted with New Orleans cotton, in consequence of great exertions on the part of Mr. Vary. The season was unfavourable, even for the indigenous, and the exotic crop almost entirely failed. The rain was at first abundant, and the plants looked well, until September, when they were destroyed by drought, except in a few places, where they had been artificially irrigated. [3]

At the commencement of the season, Mr. Vary had distributed 35 saw-gins amongst the villages most likely to keep them in work, and the people had seemed so well pleased, and willing to use them, that it was hoped they would eventually purchase them. Mr. Vary, however, found that those persons who had been most ready to use them in 1850, were precisely the most averse to them in 1851. He ascertained that the reason of this was that, doing their work effectually, the gins cleansed the cotton from too much dirt, and lightened its weight. In order to test the gins and further their introduction,

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[1] Revenue Consultations, vol. lv. 1848, pages 3 and 4. [2] Ibid, vol. lxxxiii. 1849, page 63.
[3] Ibid vol. lxxxii. 1851, pp. 236—260, & vol. xxxviii. 1854, pp. 235—238.

he was authorised to purchase kuppas to the extent of Rs. 10,000, to be cleaned by them. The moment not being favourable for buying, he only secured a small quantity, which yielded 5,717 lbs. of clean cotton of the indigenous kind, and 689 lbs. of New Orleans. [1]

These parcels were forwarded to Bombay, and the Chamber of Commerce expressed the following opinion of their merits :—" They are both very inferior parcels, being bad both in staple and colour. They are valued, the New Orleans at Rs. 85, and the Native at Rs. 78 to Rs. 80 per candy of 784 lbs.; but such quotations are nominal for the present, and could only be obtained, *if at all*, from shippers to China." They were subsequently sold to a native at Rs. 90 and Rs. 95 per candy. [2]

An experiment was likewise tried in various parts with "sugar-loaf cotton seed." It vegetated well until the middle of September, and then the plants were destroyed by drought. This species was not considered so hardy as the New Orleans. [3]

Discouraged by this failure, the ryots could only be induced to plant 1,349 beegahs in 1851-52, which did not yield a much better result, and, consequently, the succeeding season (1852-53) the cultivation fell to 370 beegahs, and rapidly became extinct, the result never having been such as to awaken interest or repay cultivation. Some attempts to introduce the Broach variety were not attended with better success.

Although a few ryots were at first induced to use the gin to a small extent, it was stated that they did so more from curiosity than as a commercial speculation, and they eventually exhibited a decided prejudice against the machine. It appeared doubtful whether the soil and climate of the district were well adapted to the cultivation of any kind of cotton, the indigenous even being only sown to a very limited extent, and almost entirely for local consumption, and there existed little or no demand for any superior quality. The extent of land in the whole province capable of producing cotton was estimated at 40,000 beegahs.

These experiments, although commenced under very favourable circumstances, both as regards the introduction of New Orleans cotton and of the saw-gin, had, as the Commissioner reported, " proved altogether unsuccessful." [4] They were consequently abolished.

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[1] Revenue Consultations, vol. lxxxii. 1851, pages 171—191.
[2] Revenue Consultations, vol. lxxxii. 1851, pages 236—241.
[3] Revenue Consultations, vol. lxxxii. 1851, page 260.
[4] Revenue Consultations, vol. xxxviii. 1854, pages 235—278.

The following is a statement of the land under cotton cultivation in the Sattara districts in 1859-60 and 1860-61[1]:—

Years.	Total Area of land cultivated.	Area of Cotton Cultivation.	Area capable of producing Cotton.
	Acres.	Acres.	Acres.
1859-60	1,946,447	35,183	106,994
1860-61	1,994,425	40,516	

The Collector states, "There is no reason to suppose that a larger breadth of land will be sown with cotton in this province during the current year (1861-62) than usual. Cotton does not form a great staple in the province; out of nearly two millions of cultivated acres and beegahs," only the above quantity being devoted to the article.[2]

SHOLAPORE.

In 1851 Mr. Vary's assistance was requested by the Collector of Sholapore to direct the cultivation of a small quantity of New Orleans cotton seed about to be sown, as an experiment, in several parts of the collectorate, and to rectify some gins which have been set up there. In this season of 1851-52 about 318 beegahs were sown with this seed, but apparently without much success.

The natives refused to buy cotton cleaned by the gin, the staple being so much cut, that thread spun from it was found to lose all the usual strength.

By great exertion on the part of Mr. Vary and the Collector, the cultivation of New Orleans cotton the following season (1852-53) was increased to 2,319 beegahs, but the crops failed, and the ryots were so discouraged, that in the succeeding year (1853-54) only 9 beegahs were cultivated with this seed, and, subsequently, its culture was altogether abandoned.[3]

Both on account of these failures, and the slight prospect of successfully prosecuting the experiment, it was considered useless to continue the superintendence, which was consequently abolished.

The extent of cotton cultivation in the Sholapore Collectorate during the last three years has been as follows[4]:—

Years.	Area of Cotton Cultivation.		Total.
	Government Land.	Enam Land.	
	Acres.	Acres.	Acres.
1859-60	130,588	52,390	182,978
1860-61	133,849	39,172	173,021
1861-62	...	...	180,600

[1] Revenue Department, Compilation No. 1526 of 1861. [2] Ibid, No. 1826 of 1861.
[3] Revenue Consultations, vol. lxxxii. 1851, p. 217, and vol. xxxviii. 1854, p. 249—258.
[4] Revenue Department, No. 1526 of 1861.

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Diagram showing the Area of Cotton cultivation in the SHOLAPORE Collectorate from 1841-42 to 1860-61 inclusive.

Prepared by W.R.C.

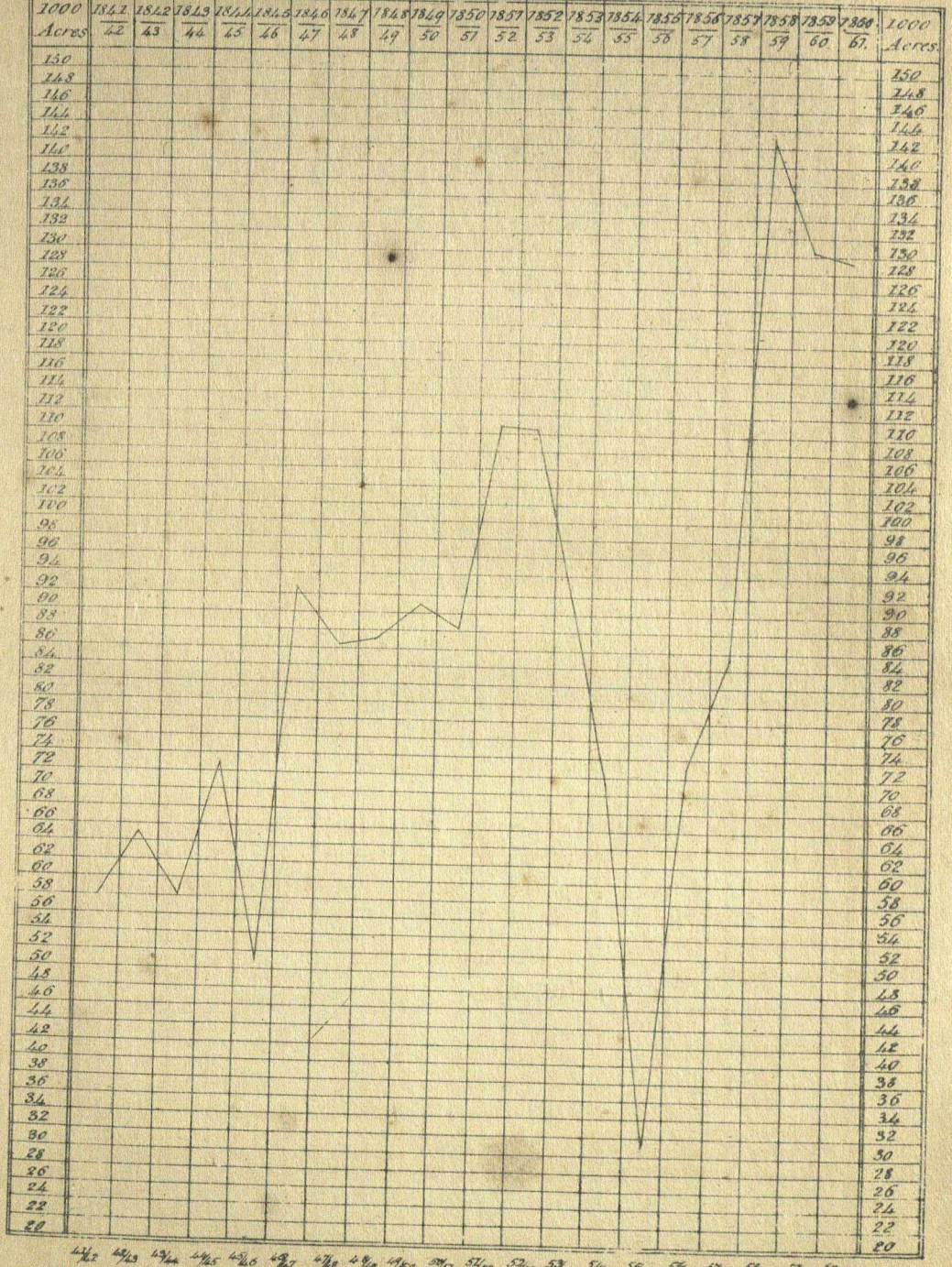

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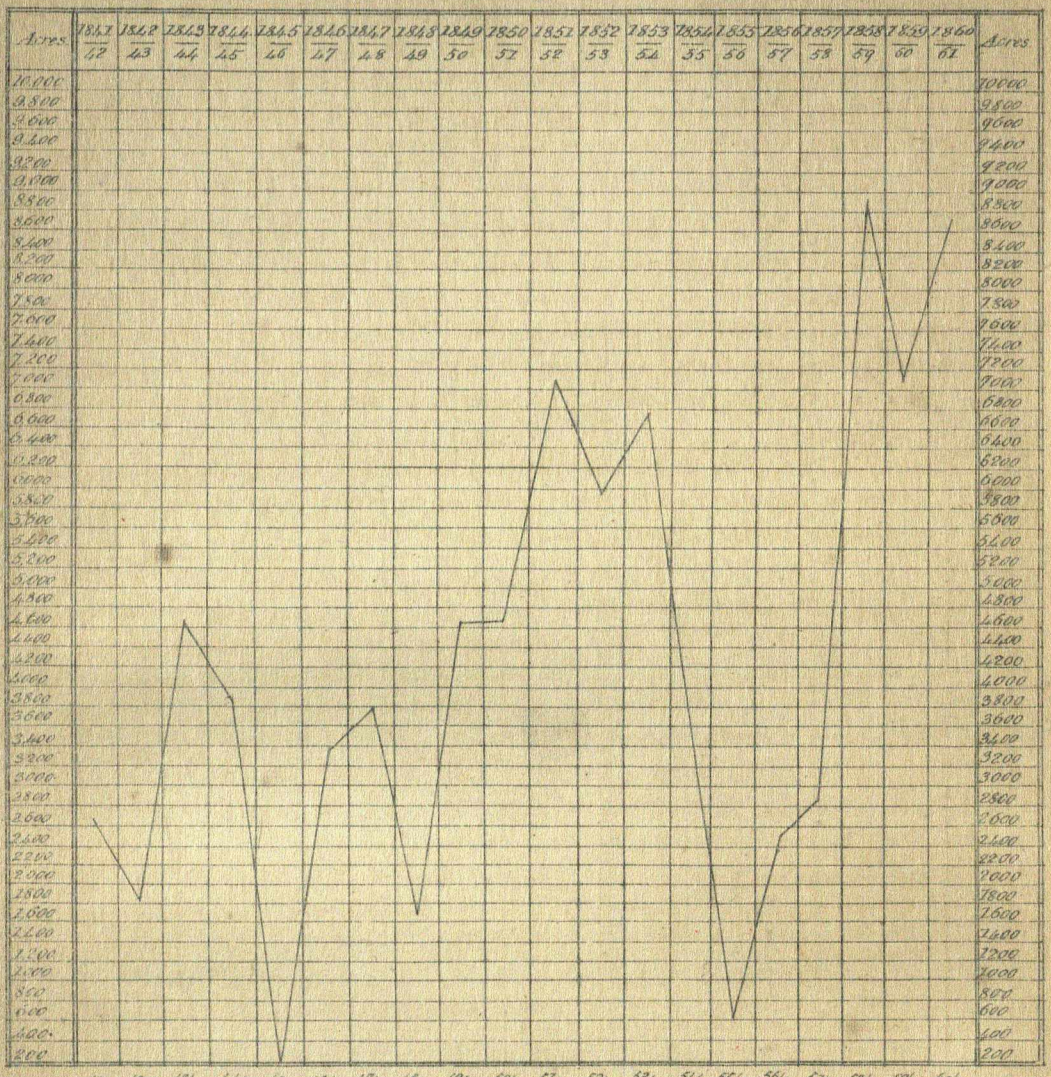
Diagram showing the Area cultivated with Cotton in the POONA Collectorate from 1841-42 to 1860-61 inclusive.

Prepared by W.R.C.



The Collector states that "nearly the whole of the culturable area of the collectorate is capable of producing cotton, and the total cultivated area, though now very large compared with what it has been, and with the total culturable area, is not yet equal in extent to the total *cotton culturable* area." He estimates the total area cultivated in 1860-61 at 2,385,825, acres, and the area capable of producing cotton at 2,552,575 acres.[1]

POONA.

Comparatively little cotton is grown in the Poona Collectorate, and the small quantity produced is almost entirely used for home consumption. Government have frequently endeavoured to stimulate the cultivation of this staple in the district, but without success. This part of the Deccan has generally been considered unsuitable for foreign cotton, and there does not seem to be much prospect of any great extension of the cultivation of the indigenous.

Statement showing the total Acres under cultivation, the quantity cultivated with Cotton, and also the total Acres capable of producing Cotton in the POONA *Collectorate, for* 20 *years, from* 1841-42 *to* 1860-61.

YEARS.	Total extent of land under cultivation.			Quantity cultivated with Cotton.						Extent of land capable of producing Cotton.
				Indigenous.			Exotic.			
	A.	G.	A.	A.	G.	A.	A.	G.	A.	
1841-42	9,82,600	15	12¼	2,684	22	0	...			Estimated at 100,000 acres.
1842-43	1,009,728	33	0	1,846	39	12	...			
1843-44	1,055,282	1	12¾	4,636	29	0	...			
1844-45	1,063,127	29	11¼	3,808	18	8	...			
1845-46	1,102,088	30	10¾	190	11	0	...			
1846-47	1,148,755	34	9¾	3,359	2	12	...			
1847-48	1,228,304	11	5¾	3,797	30	0	...			
1848-49	1,227,898	25	14¼	1,693	15	10½	...			
1849-50	1,196,719	32	10½	4,646	32	4	...			
1850-51	1,215,015	1	5¼	4,682	18	8	...			
1851-52	1,273,394	4	7½	7,015	33	0	...			
1852-53	1,316,767	33	4¼	5,967	36	10	...			
1853-54	1,368,430	21	4¾	6,712	8	8	...			
1854-55	1,395,080	15	12	4,122	22	4	...			
1855-56	1,447,006	8	6¼	602	13	0	...			
1856-57	1,534,473	33	6	2,534	8	0	...			
1857-58	1,566,231	31	8½	2,904	30	0	...			
1858-59	1,598,885	0	12½	8,857	25	0	...			
1859-60	1,654,399	0	14	6,934	38	0	...			
1860-61	1,664,801	35	10½	8,730	0	0	...			

[1] Revenue Department, No. 1169 of 1861.

TANNA.

Twelve barrels of the New Orleans seed, received from the Court of Directors in 1840, were forwarded to Tanna for experimental cultivation. In 1842 the Revenue Commissioner reported the almost total failure of the crop. The seed came up well, but was almost completely destroyed by the monsoon, the only exception being a small quantity grown at Mahim, which reached maturity, but only yielded a most scanty crop. This cotton was, however, so inferior in quality, that it was not considered worth sending to Bombay. [1]

The repetition of the experiment in succeeding seasons only led to a succession of failures. No detailed record of each attempt exists, but the total produce of nine successive seasons only amounts to 4 candies 18 maunds and 9 seers.

The following statement [2] shows the amount of *kuppas* produced each year, and the expense at which it was obtained :—

Seasons.	Amount of Charges.			Quantity of Kuppas produced.			Value.		
	Rs.	*a.*	*p.*	C.	M.	S.	*Rs.*	*a.*	*p.*
1841-42	2	2	6						
1842-43	172	3	8	2	2	31	42	12	7
1843-44	48	0	7	0	0	25	1	13	3
1844-45	13	9	0	0	14	16	14	6	7
1845-46	13	5	9	1	1	10	21	4	3
1846-47	7	14	0	0	6	6	6	2	9
1847-48	10	9	6	0	9	20	9	8	0
1848-49	6	1	6	0	1	26	1	10	7
1849-50	6	4	6	0	1	35	1	14	0
Total.....Rs.	280	3	0	4	18	9	99	8	0

[1] Revenue Consultations, vol. lxxxiv. 1851, page 127.

[2] Revenue Consultations, vol. xxxvi. 1843, pages 211 and 12.

CHAPTER VIII.

EXPERIMENTAL CULTURE IN KHANDEISH.

Experiments commenced by Mr. Blount, the American Planter, in 1845—Contract system—Failure of New Orleans Cotton in 1846-47—Saw-gins—New Orleans Cotton produced in 1848-49—Report of the Chamber of Commerce—Increased cultivation in 1849-50—Comparative yield of Exotic and Indigenous Cotton—Experiments made by Mr. Price—Agency established by Messrs. Ritchie, Steuart & Co.—Brilliant expectations of results from New Orleans Cotton in 1850-51 not realised—Mr. Simpson's experiment with American "sugar-loaf" Cotton Seed—Produce of the season—Increased cultivation in 1851-52—Unfavourable reports of Mamlutdars—Decline of exotic cultivation—Mr. Mansfield's Report—Abolition of experiments in 1854—Statement of Cultivation.

It was decided, towards the close of 1844, that the suitability of the soil and climate of Khandeish for the cultivation of improved descriptions of cotton should be tested, and, for this purpose, Mr. Blount, an American planter previously employed at Gorrucpore, was transferred to that province, where he arrived in 1845, and was appointed Joint Superintendent with Mr. Simpson, another American planter shortly after transferred from the Madras Presidency.

The season for planting having passed, operations were commenced by setting up saw-gins at Dhurrumgaum and Julgaum,[1] and the planters were permitted to purchase 150,000 lbs. of seed cotton or kuppas, in order to show the working of the machines. A quantity of kuppas, yielding about 26 candies and 91 lbs., was secured, ginned, and forwarded to Bombay, where the Chamber reported favourably of its quality. In England the parcel was sold at 5½*d.* to 5¾*d.* per lb., whilst Dharwar cotton was realising 6½*d.* per lb. [2]

They were likewise authorised to cultivate 50 beegahs of land with exotic cotton, as an experimental farm; to contract with the natives to cultivate about 1,000 acres with cotton, under their directions; and to construct a

[1] Revenue Consultations, vol. xlvii. 1845, page 179.
[2] Rev. Consultations, vol. lvi. 1845, p. 179; and Returns, E. I. Cotton, 1857, p. 794 & 795.

screw-press for packing the staple. A supply of New Orleans seed was procured from Dharwar, as well as of Bourbon seed from Madras.[1]

In 1846 both planters resigned. Mr. Blount was re-engaged and transferred to the Dharwar districts, and Mr. Simpson consented to remain a short time longer. He was appointed to superintend the experiments in Guzerat as well as at Khandeish, with Mr. Price to assist him in the latter collectorate.

Mr. Simpson found it more economical to abandon, for the time, the idea of an experimental farm, and he entered into contracts with ryots for the cultivation of New Orleans cotton on 132 beegahs of land in the talookas of Errundole and Nusseerabad, at the rate of Rs. 5 a beegah, with remission of the land-tax. He likewise sowed some of this seed in a small plot of land in the factory garden.[2]

The plants came up well, and by the beginning of August ranged in height from 4 to 8 inches, but the heavy monsoon rain began to injure them. The River Taptee inundated about 12 beegahs, and as the land could not be drained without incurring greater expense than the value of the cotton, the crop was lost. The plants in the garden thrived well. Some showers of rain fell in September, and were extremely beneficial to the growing indigenous cotton, which everywhere promised well, but they produced an injurious effect on the New Orleans kind. The plants at Dhurrumgaum, which had begun to put forth flower and fruit in profusion, prematurely lost both pods and blossom, but they afterwards produced a scanty second crop. The other fields of New Orleans presented "a respectable appearance," but were shortly afterwards affected by a species of blight, especially those which had been latest sown. The whole yield of New Orleans cotton only amounted to 220 lbs. of clean cotton.[3] The American planters themselves were of opinion that it was inferior to the native cotton both in length and strength of staple.[4]

In consequence of this failure of New Orleans cotton under the contract system, Government ordered that no further direct efforts should then be made to introduce this variety into Khandeish. No further steps were, consequently, taken to encourage its culture until after Mr. Simpson's departure. By his influence, however, a small trial was further made by ryots in 1847-48, when they planted 5 beegahs, which yielded about 219 lbs. of cotton.

Mr. Elphinston, who, about this period, became Collector of Khandeish, reported, "The native merchants evinced a desire to become purchasers of gins, and some of them had their cotton separated from its seed by the Government

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1 Revenue Consultations, vol. lvi. 1846, pages 28 and 29.
2 Returns, East India Cotton, 1857, pages 781—782, and 795.
3 Rev. Cons., vol. lxi. 1848, p. 103—156; & Returns, E. I. Cotton, 1857, p. 782 & 783.
4 Revenue Consultations, vol. lxii. 1847, pages 27 and 28.

gins in large quantities, paying hire for the same,—a fact illustrative of the impression made upon the minds of the natives of the superior advantages of the saw-gin machinery, then first introduced, over the country 'churka' or roller." The screw-press proved a failure from the unnecessary expense incurred in its use.[1]

The failure of New Orleans cotton was attributed by Mr. Blount to its not being adapted to the climate. Mr. Simpson, taking a modified view, thought that its poor out-turn was owing to the adverse nature of the two seasons during which it had been tried.[2]

In 1847-48 about 196 candies of indigenous kuppas were purchased and ginned for Government by Mr. Price, who had been authorised to pay a premium for all that was cleanly picked. A number of gins, made at the factory, were set up in the villages of Yawul, Arrawud, Chopra, and Cassoda. Applications were made for the machine by native merchants, which could not then be supplied, but more were requested from Bombay. Only about one per cent. of the whole Khandeish crop was ginned this season.[3]

At the recommendation of Mr. Simpson, a cart-load of New Orleans seed was procured from Dharwar for the season 1848-49, and distributed to the ryots, who planted with it about 221 beegahs. By July the plants had attained a height of two or three inches, and were looking well. Those in the factory garden were, at the same time, nearly two feet high. The prospects of the season were extremely favourable for some time, but, subsequently, the crop was partially destroyed by drought. Mr. Elphinston stated that the yield per beegah varied considerably, ranging from 9 lbs. in the Amulnair Talooka, to 54 lbs. in the Yawul Talooka, while in the factory garden at Dhurrumgaum, under the immediate supervision of Mr. Price, where great attention was paid to the cultivation, 200 lbs. of kuppas per beegah were gathered. The entire crop of New Orleans amounted to 11 candies and 422 lbs. of kuppas (9,046 lbs.), or 2,956 lbs. of clean cotton.[4]

The Bombay Chamber of Commerce reported as follows upon this crop:—"In the opinion of all the members of the Chamber, the sample of cotton is dull in colour, and the staple somewhat weak and irregular. It is clean, however, and free from seed. As the produce of New Orleans seed, it is considered rather an inferior parcel, but much superior to the indigenous cotton. Its freeness from impurities would secure it a ready sale, at say Rs. 10 to Rs. 12 per candy above the ordinary Khandeish cotton."[5]

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[1] Revenue Consultations, vol. lxxxi. 1849, pages 189—223.
[2] Revenue Consultations, vol. lxi. 1848, page 93.
[3] Revenue Consultations, vol. lxii. 1848, pages 83—101.
[4] Revenue Consultations, vol. lxxxii. 1849, page 8, and vol. lix. 1850, pages 23—56.
[5] Revenue Consultations, vol. lxxxii. 1849, page 43.

In the season 1849-50 the cultivation of New Orleans cotton increased to 2,569 beegahs. Of this, about 826 beegahs were early destroyed by excess of rain, and the land was re-ploughed, and sown with other produce. The rains, which were very heavy, proved generally injurious to the exotic, though they seemed beneficial to the indigenous cotton. Mr. Elphinston remarked, "The New Orleans is less hardy than the indigenous, and suffers, in a greater degree, from a deficiency or superabundance of either drought or moisture." [1]

The total yield of New Orleans was stated by Mr. Simpson at 33,000 lbs. of clean cotton, but, in his tabular return, he estimates the amount of kuppas at 218 candies and 257¾ lbs. [2] Taking this larger amount as the basis of his calculation, Mr. Elphinston gives the comparative yield per beegah of the exotic and native cotton as follows:—

New Orleans cotton with seed, 66 lbs. per beegah.
Indigenous cotton with seed, 194 lbs. per beegah.

Almost the entire crop of New Orleans was purchased for Government at 10 per cent. above the price of indigenous, according to previous arrangement. [3]

The following small experiment made by Mr. Price, the same season, may be detailed, although Government rightly represented the inutility of trials, limited to 1½ beegah of garden land, under the superintendence of a Government establishment, which could not afford any data for the out-turn of lands cultivated in the ordinary way by ryots. [4] Mr. Price manured about 1½ beegah of the factory garden at Dhurrumgaum with 120 cart-loads of decayed vegetation and cow-dung, and he planted 1¼ beegah with New Orleans, and ¼ beegah with Georgian cotton seed, on the 19th June, just after the ground had been properly saturated with the first rain. The seed vegetated in four days, and, by the end of June, the plants had attained the height of four inches, when the field was harrowed and thoroughly weeded thrice, at intervals of three days. The rows were thinned, so as to leave the plants at an interval of 18 inches apart. By the end of July they were 2½ feet high, and had formed blossoms and pods, the first crop of which soon withered and fell off. The final yield, however, was 544 lbs. of New Orleans and 480 lbs. of Georgian kuppas, of respectively about 180 lbs. and 160 lbs. of clean cotton a beegah. [5]

In 1850, Messrs. Ritchie, Steuart & Co. of Bombay established an Agency for the purchase and ginning of cotton in Khandeish. To facilitate their

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[1] Revenue Consultations, vol. lxxiv. 1851, page 13.
[2] Revenue Consultations, vol. li. 1850, page 80.
[3] Revenue Consultations, vol. lxxx. 1851, pages 71—83.
[4] Returns, East India Cotton, 1857, page 612.
[5] Revenue Consultations, vol. lxi. 1850, page 41.

operations, Government allowed their advances to the ryots, upon cotton, to be made through the Collector, as "tuccavee," to the extent of Rs. 18,000, and for the same purpose they likewise authorised that Rs. 82,000 of assessment on lands bearing cotton and other crops should be left uncollected from ryots who contracted with the firm. This latter accommodation, however, was really of no service to these gentlemen, as the cotton crop of Khandeish is gathered much earlier than the collection of revenue is effected. The Collector was desired to cash the drafts of Messrs. Ritchie, Steuart & Co., for the purpose of facilitating their purchases. Messrs. Ritchie, Steuart & Co. were allowed to hire the whole of the gins belonging to Government, 19 in number, together with a further supply of 21 to be constructed for them, and they were allowed to take into their pay such part of the Government establishment as they required for working them. Government, consequently, almost entirely ceased ginning operations, and in the following season they gave up making purchases of cotton, in order not to militate against the interest of the firm. [1]

In 1850-51, the cultivation of American cotton was extended to about 7,670¾ beegahs. The greater part of the seed was sown in May, before the rain had commenced. It was planted in drills fully three feet apart, and abundantly irrigated from wells in most of the talookas. When water was thus given, the shrubs at first grew most luxuriantly, but those fields which were not irrigated only looked "pretty well." Mr. Simpson entertained the most sanguine hopes of the crop. In June he reported, "Some of the plants have attained to 3 feet in height, and they generally range from 18 inches to 2 feet, and are beginning to throw out flowers and young fruit. These plants have the most vigorous and healthy appearance, with the finest developed leaves I have ever seen in India, some of these measuring nearly six inches in diameter." In July he stated, "The plants reared from irrigation are from waist to breast high, and are well filled with bolls and blossoms." He subsequently wrote, "I never before saw better cotton crops in India, they are equal to Louisiana;" and again, "The cotton plants at Chopra and Yawul, reared by irrigation, are superb. * * * This irrigated America cotton cultivation has approached perfection." In August he reported, "I found the plants at Chopra and Yawul, that were reared by being watered from wells for nearly a month before the rains set in, to be in the most luxuriant and promising condition, each plant being uniformly the same to the very utmost verge of these fields, and looked as though, had the whole of the Khandeish been sown at the same time, and treated in a similar manner, the result would have been all over alike, which I

[1] Rev. Cons. vol. lviii. 1850, pp. 217, 218, 233—239; and vol. lx. 1850, pp. 33—54.

can assure you would have been equal to the finest cotton province in the United States; these plants have attained to a height of four feet, and are now loaded with pods, blossoms, and some ripe cotton; the only defect in them is, that, having prospered beyond my expectations, they are rather too much crowded, notwithstanding that the rows are full three feet apart. However, the greatest danger is in a continuation of the rains, which will tend, under these circumstances, to rot the earlier pods." [1] Advances, to the extent of Rs. 5,200, were made to the ryots, in order to induce and enable them thoroughly to weed their fields. [2]

The result of these brilliant expectations was reported by Mr. Elphinston. This experiment of early sowing and irrigation he stated "held out the most encouraging prospects till the plants came into blossom. They then suffered from two causes—the excessive luxuriance of the plants had filled up all the spaces between the rows, and the density of the shade, the want of ventilation, and the fall of late rain caused the first-ripened pods on the lower branches to rot off, while at the same time caterpillars and insects which attacked the plants ate off the foliage; the blossoms and first crop were thus destroyed. After a time a scanty second crop was obtained from the same plants, which, under the foregoing circumstances, had become exhausted." [3] The season, however, was reported to have been "favourable for the cultivation of all kinds of crops throughout the province." [4]

A small trial was made with the American sugar-loaf seed, the result of which may be thus condensed from Mr. Simpson's report:—

Chopra.—30 lbs. of seed sown; yield 11 maunds (or 880 lbs.) of kuppas. The mamlutdar stated that the cotton succeeded to great perfection.

Errundole.—30 lbs. of seed sown, in three parcels of 10 lbs. each. Only one came up, the remainder having been destroyed by heavy rain immediately after being sown; yield 19¾ seers, or 39 lbs. of kuppas.

Yawul.—60 lbs. of seed sown; almost total failure of crop; yield only 18 seers, or 36 lbs. of kuppas.

Jamneir.—40 lbs. of seed sown; very little cotton produced.

Nusseerabad.—50 lbs. of seed sown; yield 2 maunds, or 160 lbs. of kuppas. [5]

The land cultivated by Mr. Simpson as an experimental farm amounted to

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[1] Revenue Consultations, vol. li. 1850, pages 49—99.
[2] Returns, East India Cotton, 1857, pages 619—627.
[3] Revenue Consultations, vol. lxxiv. 1851, pages 13—15.
[4] Returns, East India Cotton, 1857, page 1350.
[5] Revenue Consultations, vol. lxxxii. 1851, pages 63 and 64.

160½ beegahs of brown and red soil, and it was sown with New Orleans seed. The crop was a good deal injured by insects. The produce was estimated at 23,335 lbs. of seed cotton or kuppas, or about 7,785 lbs. of clean cotton, being a yield of 48 lbs. per beegah. Some native seed had been mixed with the exotic, which, being picked separately, amounted to 4,958 lbs. of kuppas. The

cost of cultivating this farm was.....	Rs.	1,380	11 8
The value of the crop gathered was estimated at.....	„	869	7 9
leaving a loss of	Rs.	511	3 11

or about 37 per cent. [1]

The total produce from New Orleans cotton, in 1850-51, amounted to 881 candies and 229 lbs. of kuppas. The comparative yield of the American and native cotton to the beegah, notwithstanding the irrigation and unusual care and expense bestowed on the former, was as follows:—

New Orleans cotton with seed, 90 lbs. per beegah.
Indigenous cotton with seed, 123¾ lbs. ditto.

Small prizes were offered and given to the ryots who cultivated the largest quantity of New Orleans cotton, and to those who produced the greatest yield per beegah. [2]

In consequence of the great exertions of the Collector and of the Superintendent, the cultivation of New Orleans cotton during the next season of 1851-52 was considerably extended. Mr. Elphinston in one place, on the 28th February 1852, stated its extent and produce as follows:—"The quantity of land sown last year (1851-52) with American cotton seed, in this zillah, was 13,619 beegahs and 13¾ pands, of which the yield was supposed to be about 1,357 candies (of 784 lbs. each) and 52 lbs.; but, in consequence of the too early cessation of the rains last September, these crops were more or less injured, and the crop in many places failed." [3] On the 16th September 1851, and 16th September 1852, he forwarded the report of the superintendent at the time, Mr. T. J. Edwards, in which he differently stated the quantity thus:—"The portion of this sown with American amounted to 12,124 beegahs, estimated to have yielded about 662 candies of seed and cotton. The prospects of the cotton crops were favourable till about the end of August 1851, when the rains held off, and a continued drought followed, to the great damage of the cotton and other crops. The failure of crops has been more considerable in the exotic cotton fields than in the indigenous (as it suffers more from

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[1] Revenue Consultations, vol. lxi. 1852, pages 39—45.
[2] Revenue Consultations, vol. lxi. 1852, pages 51—57.
[3] Revenue Consultations, vol. lxi. 1852, pages 20 and 21.

dry weather, and cannot, like the indigenous, resist drought), a circumstance which has discouraged the ryots from extending their American cotton cultivation during this present monsoon." [1]

The cultivation of exotic cotton in Khandeish had, in 1851-52, been artificially forced up to its highest point, from which it thenceforward rapidly and permanently receded. Writing in March 1851, Mr. Elphinston stated, "Hitherto the New Orleans cotton crop has been a precarious one, and if, in case of its failure, Government excuses the rental, still the cultivator has lost his time, labour, and the profits on which he has to maintain himself and family till the next year's crop is reaped and sold." [2] He reported, "The Choprah Talooka, between the Sathpoora Hills on one side, and the Taptee on the other, seems to be the district in which the American cotton is least affected by disease, and thrives best, I presume, not only from the land being good, but the air is moister between the hills and the river, than in the exposed open plains of other districts." [3]

The mamlutdars of every talooka, without exception, reported to Mr. Elphinston in the strongest terms the failure of New Orleans cotton, and the conviction of the ryots that it was quite unsuited to the soil and climate of Khandeish. The following are a few extracts taken from the report of the mamlutdar of Errundole, which may fairly represent the tone of the whole.

Of this mamlutdar Mr. Elphinston makes the following remark:—"The Errundole mamlutdar, in which district the town of Dhurrumgaum is situated, where Messrs. Ritchie, Steuart & Co. have established their head-quarters for the ginning, purchasing, and transmission of cotton, has always been one of the most zealously persevering officers for the introduction of American cotton into Khandeish, and, for his spirit and obliging disposition, the above firm wished to present him with a watch, which Government did not permit him to keep. This officer, so anxious for the improvement of Indian cotton by the establishment of the American variety, as it will be seen from his report, gives one of the most decided opinions of its failure." [4]

This mamlutdar of Errundole reports, "To benefit the ryots of this country, Government brought the American seed from a distant country, being certain of its fruitfulness and profitableness, and with this intent Government are undergoing the trouble and expense of distributing *gratis* the New Orleans cotton seed, but the crop produced from this seed has never had the boast of its superiority (realised); from this it must be concluded that the climate of

[1] Revenue Consultations, vol. lx. 1852, pages 187—205.
[2] Revenue Consultations, vol. lxxiv. 1851, page 59.
[3] Revenue Consultations, vol. lxxxii. 1851, page 76.
[4] Revenue Consultations, vol. lxxxii. 1851, pages 77 and 78.

this country is not favourable to its growth. The American cotton plant remains in as promising a condition as the indigenous up to the end of August or the middle of September, and towards the approach of October the plants get diseased, when their leaves assume a red appearance, and the plants themselves wither away; they do not bear good pods, and the growing pods fall off; the ryots, consequently, become disheartened (in prosecuting their attempt) to raise an American cotton crop. * * * To ensure good care being taken, circular orders are issued from time to time from the Hoozoor to the district officers, from the district officers to the village officers, and instructions are given verbally to the ryots; all this trouble is taken with no proportionate advantage. * * * I beg to state that American seed sown in a black soil, in soils having a proper drainage, in every description of soil promising productive properties, and properly cared for, has proved a failure. * * * The plants are in some places a cubit, and in others a span high, with their leaves dried up, and pods fallen off; it cannot, therefore, be said that these are consequences of want of care on the part of the ryots, but that it is true the climate of this country does not agree with the plant. * * * As for the New Orleans seed, the Government have taken the trouble, for nearly the last six years, in which there have been different degrees of rain, and the seed has had the advantage of being sown in a variety of soils; yet, nevertheless, the crop has never, and nowhere, been successful. * * * The ryots are destitute of any hope that this species of cotton will succeed in this country, and they state that Government should not saddle them with the seed; that they yield to the orders of Government because they are poor and cannot make a protest; that it is true that Government grants them remissions, but only of the Government dues—their other profits are lost to them." [1]

In 1852-53, in spite of "every encouragement to the ryots, as well as to the cotton dealers of the province," and the distribution of seed *gratis*, the cultivation of New Orleans cotton fell to 5,363½ beegahs. During the previous season the proportion of this kind to the indigenous was as 1 in 19, but in 1852-53 it only reached 1 in 44. This decrease is again attributed by Mr. Mansfield, who had become Collector of Khandeish, "to the general impression prevailing in the minds of the ryots of the zillah, that the soil and climate of the province are not suited to the growth of the species of exotic cotton." The total produce amounted to 442 candies and 207 lbs. of kuppas or seed cotton. [2] This gives a yield of 64½ lbs. of kuppas, or about 21 lbs. of clean cotton per beegah.

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[1] Revenue Consultations, vol. lxxxii. 1851, pages 79—87.

[2] Revenue Consultations, vol. liii. 1853, pages 103 and 104.

Mr. Binny, of the firm of Messrs. Ritchie, Steuart & Co., writing from Dhurrumgaum to Captain Rose, who had made a tolerably successful experiment, on a small scale, with American cotton at Kunhur on the Ghauts, stated, "I think, from what I have seen hereabouts of the attempt to introduce foreign seeds, that the crop to the ryots is a very uncertain one, and, consequently, in the long run not so remunerative as the indigenous variety. It is also found to degenerate in the course of a couple or three years, and lose the characteristics of the American to gain those of the Indian plant." [1]

In 1853-54 the cultivation of New Orleans cotton declined to 1,696 beegahs. The latter rain was considered insufficient, and this species again suffered severely from drought. The total produce amounted to 106 candies and 479 lbs. of kuppas, or 31 candies and 691 lbs. of clean cotton, [2] which was equivalent to a yield of 14¾ lbs. of clean cotton a beegah.

Mr. Mansfield reported, in 1854, "The increase of New Orleans, in 1850-51 to 1852-53, was owing to the exertions of the mamlutdars and mahalkurrees, who had instructions from time to time from the late Collector, Mr. Elphinston, enjoining them to impress upon the minds of the ryots the superiority of this exotic, and to encourage them by every means in its cultivation. * * * * If the ryots are left to themselves, and no unhealthy stimulus applied, I am of opinion that the New Orleans cotton will very soon cease to be cultivated in the province. * * * The ryots invariably object to it on the score of the uncertainty of the plant attaining maturity. * * * My opinion is, that the objections of the ryots to the New Orleans cotton are well founded." [3] He afterwards added, "I am convinced that the dryness of the climate is an insuperable barrier to the cultivation of New Orleans cotton in this province." [4]

In September 1854 the office of the superintendent of experiments in Khandeish was abolished, and only a small establishment retained to take charge of the Government gins. Of these machines, 19 had been sold since the commencement of the experiment, a few others hired out, and 59 remained ready for disposal without any applicants for them. [5]

The cultivation of New Orleans cotton in 1854-55 dwindled down to 16¼ beegahs, which produced 1 candy and 612 lbs. of kuppas, or 416 lbs. of clean cotton, being a yield of, or rather less than, 26 lbs. per beegah. [6] No exotic cotton has since been grown in Khandeish, and the Government machinery

[1] Revenue Consultations, vol. liii. 1853, page 248.
[2] Returns, East India Cotton, 1857, page 1468.
[3] Revenue Consultations, vol. xxxviii. 1854, pages 203 and 204.
[4] Revenue Consultations, vol. xxxviii. 1854, page 208.
[5] Revenue Consultations, vol. xxxviii. 1854, page 207.
[6] Revenue Consultations, vol. lvii. 1855, page 48.

MAP
OF
INDIA
Illustrating the
CULTIVATION OF COTTON

Scale of 30 Miles to an Inch

0 50 100 150 200 250

REFERENCE

Railway's Completed

— Do — in Progress

— Do — Sanctioned

— Do — Proposed

The dark brown colour indicates where cotton is largely cultivated.

The light Do Do where its cultivation is small and scattered over the districts.

By Burjorjee Bhaojee and Gungadhar Luxumunjee

Copied and Lithod.ª in the Office of the Chief Engr. at the P.ª Bombay 11th December 1861.

GSL

has remained almost entirely unused. Messrs. Ritchie, Steuart & Co. broke up their Agency in 1857.

Statement showing the total area under cultivation, and the proportion cultivated with Indigenous and Exotic Cotton in the KHANDEISH *Collectorate, from the year* 1828-29 *to* 1861-62 *inclusive.*

YEARS.	Aggregate cultivation. [B]	Area of Cotton cultivation.		
		Indigenous.	Exotic.	Total.
	Beegahs.	Beegahs. [A]	Beegahs.	Beegahs.
1828-29	No Returns.	27,201	.....	27,201
1829-30	Do.	43,010	.....	43,010
1830-31	Do.	49,188	.....	49,188
1831-32	Do.	42,267	.....	42,267
1832-33	Do.	41,415	.....	41,415
1833-34	Do.	51,787	.....	51,787
1834-35	Do.	91,433	.....	91,433
1835-36	Do.	119,494	.....	119,494
1836-37	Do.	94,757	.....	94,757
1837-38	Do.	121,194	.....	121,194
1838-39	Do.	89,436	.....	89,436
1839-40	Do.	92,273	.....	92,273
1840-41	Do.	76,014	.....	76,014
1841-42	Do.	123,763	.....	123,763
1842-43	Do.	108,956	.....	108,956
1843-44	1,222,633	87,912	.....	87,912
1844-45	1,187,276	119,800	.....	119,800
1845-46	1,298,768	129,533	.....	129,533
1846-47	1,429,431	114,801	132	114,933
1847-48	1,466,024	174,089	5	174,094
1848-49	1,402,758	149,203	221	149,424
1849-50	1,364,050	121,471	2,569	124,040
1850-51	1,356,805	162,875 [C]	7,671	170,546
1851-52	1,436,035	231,842	12,124	243,966
1852-53	1,561,649	237,529	5,364	242,893
1853-54	1,598,380	245,959	1,696	247,655
1854-55	1,715,112	266,089	16	266,105
1855-56	1,726,192	199,951	.....	199,951
1856-57	1,816,594	223,376	.....	223,376
1857-58	1,914,656	197,957	.....	197,957
1858-59	2,098,963	296,796 [D]	.....	296,796
1859-60	2,166,640	301,374 [E]	.....	301,374
1860-61	2,246,693	273,141 [F]	.....	273,141
1861-62	.....	297,000	.....	297,000

A Revenue Consultations, vol. lxxiv. 1851, page 109.
B Return No. 1455 of 1861.
C Returns, East India Cotton, 1857, pages 1350—1470.
D Revenue Consultations, vol. li. 1859, page 62.
E Revenue Consultations, vol. xxxix. 1860, page 41.
F Revenue Consultations, No. 527 of 1861.

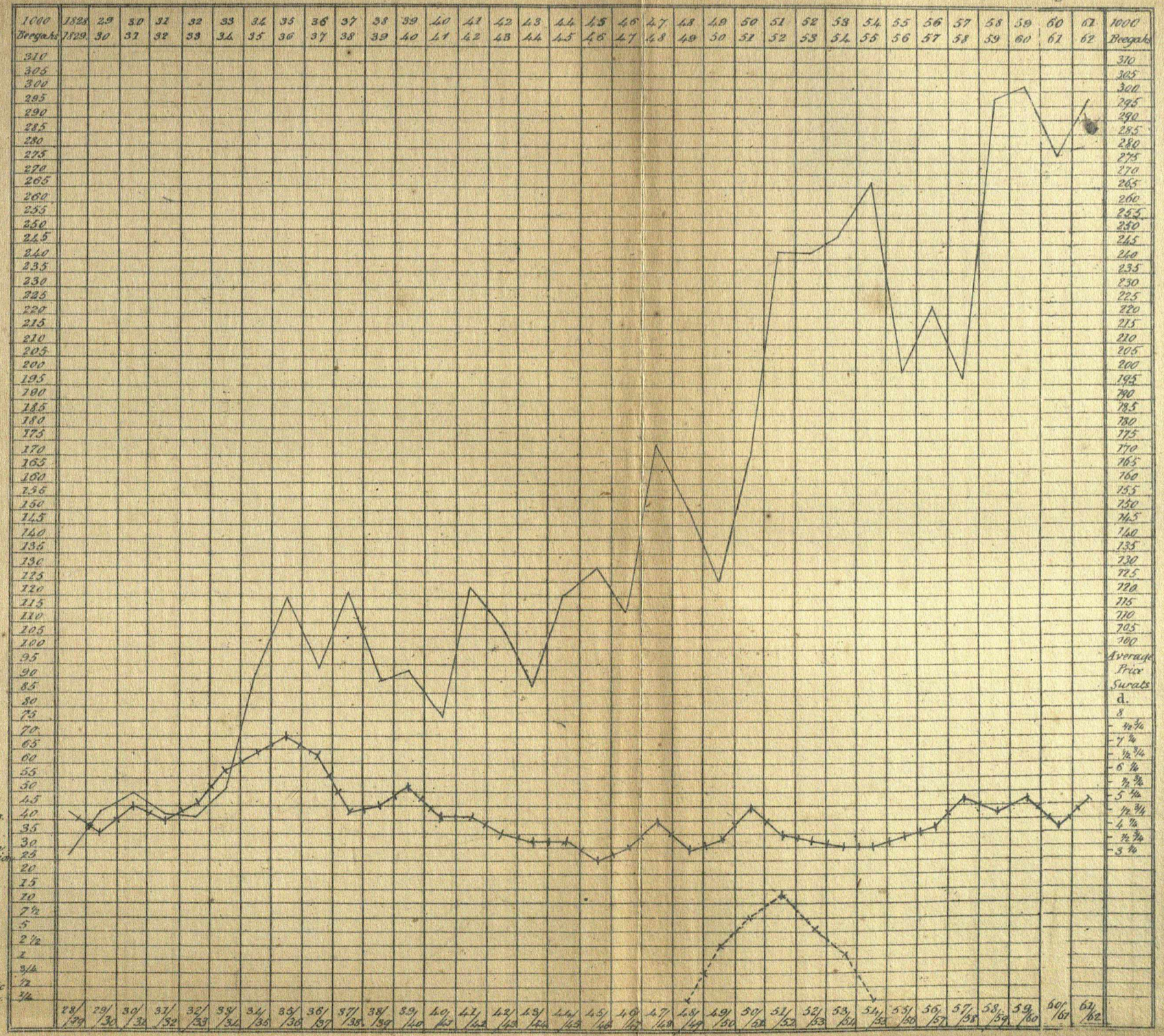
Mr. Grant, the Acting Collector, in his report of 23rd November 1861, states, "I have no means of ascertaining the exact number of acres capable of producing cotton, even in the surveyed districts, but, in the reports of the last eight years, it is estimated roughly at 1,440,400 beegahs." The district is so extensive, however, that probably this estimate is considerably below its capacity at present, and it certainly bears little or no relation to the eventual capabilities of the province, when waste land shall have been brought into cultivation.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA

Diagram showing the Area of Cotton cultivation, distinguishing Exotic, in the KHANDEISH Collectorate from 1828-29 to 1861-62 inclusive, and the average price of Surats in Liverpool during the same period

CSL

Prepared by W.R.C



CHAPTER IX.

EXPERIMENTAL CULTURE IN RUTNAGHERRY.

Dr. Gibson's opinion of the suitability of Rutnagherry to Cotton—Mr. Elphinston's experiments with Sea Island, New Orleans, and "Concanee" Cotton—Report of the Chamber of Commerce and of London Brokers on Samples—Mr. Elphinston's experiments in 1840-41, and results—Refusal of Ryots to cultivate New Orleans seed—Extended experiments in 1841-42—Prices realised for the Cotton produced—Statement of cost of cultivation and out-turn—Government grant for the prosecution of experiments—Their failure in 1843-44 and 1844-45—Cultivation under difficulties—Unsuitability of the soil of the district for Cotton—Experiments abandoned—Description of Rutnagherry in 1860—Revenue Commissioner's Report.

It has already been mentioned that an experiment, on a small scale, with exotic cotton was tried in 1818 at Malwan, in the Rutnagherry Collectorate, which, though attended with some present success, led to no permanent advantage. The high valuation placed upon a sample of Sea Island cotton, grown in India in 1838, attracted the attention of Mr. Williamson, Revenue Commissioner, who referred to Dr. Gibson for his opinion as to the best site for an experiment with this species of cotton. Holding the opinion then so general, that mere proximity to the sea was the chief requisite for the growth of Sea Island cotton, (a theory which so often led to the selection of Caranjah, and other islands, as the most suitable localities,) Dr. Gibson suggested, that "perhaps all that low-land south of the town of Rutnagherry, towards the mouth of the river, might be found eligible." He added, "The flats south of Malwan, near the Salt Pans, afford ground probably just of the kind wanted, as do the low-lands to the southward of the town. There is also no reason why the plant might not be tried on Malwan Island, and on some of the small rocky islands off the harbour." [1]

Mr. Elphinston, the Collector of Rutnagherry, soon after made an experiment with various descriptions of exotic cotton in his own garden. He described the soil as "a poor, stiff clay," to remedy the natural poverty of

[1] Returns, East India Cotton, 1847, page 430.

which, he manured the land "highly, with pounded shells and sea-weed, cow and sheep dung, together with stable dung first burnt to ashes."

In this garden he planted Sea Island, New Orleans, and a variety which he called "Concanee" cotton seed. The last he at first believed to be indigenous, but he afterwards identified it as perfectly naturalised Bourbon cotton. He described it as a perennial, growing to the height of six to twelve feet, and lasting for twelve or fifteen years.

The seed was sown at the commencement of the monsoon, and the crop was freely irrigated during the hot season. The Sea Island plants grew vigourously, and, where the soil was good, attained a height of five feet, sending out numerous branches, and forming so large a bush as to require considerable space for each plant. This species, by careful irrigation and manuring, was preserved for a second season. The produce of each plant was said to be considerable. The New Orleans proved more delicate, and of slower growth, but the pods were, comparatively, very numerous. The Concanee produced pods, in great number, of a medium size. The crop of cotton was gathered as it ripened; none was suffered to fall to the ground, but it was carefully picked to the exclusion of all leaf. It was carried to Mr. Elphinston's own house, and there cleared of seed by the hand, no gin or other instrument being employed. [1]

Samples of these cottons were forwarded to the Bombay Chamber of Commerce, and the following is an extract from the account of their proceedings with regard to them.

"These samples contained the finest cotton ever seen in Bombay, and excited the most lively interest. The following was the report on their qualities and relative values:—

"The *Sea Island* is the best—beautiful both as to staple, colour, fineness, and entire freedom from impurity of any kind. Such cotton, it was stated, would be likely to produce 150 per cent. above the market price of the best Surat, or, at the present rates, Rs. 250 per candy, or even more, as the Sea Island brings from 1*s.* 6*d.* to 3*s.* per lb. in the Liverpool market, and this specimen would not fail to realise at least 1*s.* per lb.

"The *Concanee Cotton*, of which it is not stated from what seed it was grown, is the next in value. Though not quite equal to the former, it is also a very beautiful cotton in staple, colour, fineness, and cleanliness, and would produce fully 100 per cent. above the market price of the best Surat, or, at the present time, Rs. 200 per candy, its quality being little inferior to the former.

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[1] Revenue Consultations, vol. xlvi. 1840, pages 25—37.

"The *New Orleans*, in colour, cleanliness, and fineness is equal to the other two; its staple, however, is not so good; it must, therefore, rank as the third, but still would produce 50 per cent. above the price of the best Surat, or, at present rates, Rs. 150 per candy, the price of good New Orleans in England being 8*d.* per lb.

"All these cottons should sell instantly at the above prices to the extent of several thousand bales." [1]

The London brokers reported upon these samples as follows:—

"*New Orleans.*—Staple short and rather tender, but even; a very useful kind, and suitable for general purposes, at about the price of fair bowed Georgia—say 6*d.* per lb.

"*Sea Island.*—Staple stout and even, with sufficient fineness and length to rank between fine Egyptain and fair Sea Island. Being adapted for the finer purposes, its consumption would not be very extensive; value about 12*d.* per lb.

"*Concanee.*—Staple good, strong, and even; a valuable kind for general purposes; would rank with the better quality of the New Orleans, at about 7*d.* per lb." [2]

Mr. Elphinston proposed that Government should undertake the cultivation of these cottons on a more extensive scale, and adopt measures to induce the ryots of Rutnagherry to plant them. The Government of India, however, did not consider the information received sufficient to justify expensive experiments. They stated, "It is no secret that careful and expensive garden cultivation, followed by clean and attentive picking and storing, will produce results such as have attended Mr. Elphinston's successful experiments, * * * but experiments so conducted convey little practical information."

The Revenue Commissioner also observed, "From the manner in which these specimens have been produced, little judgment can be formed as to whether these cottons could be produced on a large scale, or at an expense that would remunerate the growers." [3]

Encouraged by the result of this experiment, however, Mr. Elphinston persevered, in the season of 1840-41, with the cultivation of the Sea Island and Bourbon varieties. He continued the system already described: the land was

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[1] Revenue Consultations, vol. xlvi. 1840, pages 12—14.

[2] Revenue Consultations, vol. xxxiv. 1842, page 167.

[3] Revenue Consultations, vo. xlvi. 1840, pages 35 and 52.

manured and the plants irrigated, and the crop was carefully picked at maturity, and cleaned by hand. The produce was forwarded to the Bombay Chamber of Commerce, who reported that "these samples were quite equal in quality to those sent to the Chamber the previous year, (an opinion subsequently confirmed by brokers in England). * * * * They were put up to sale at the adjourned quarterly meeting, and, after some competition, disposed of as follows:—

"10	Bales Sea Island	At Rs.	225	per candy.
"14	Do. do.	At „	230	do.
"6	Bags do. stained	At „	100	do.
"1	Bag Indigenous Concanee..	At „	170	do."

Although the Chamber thought that these experiments had been "on so small a scale that little weight could be permanently attached to them," they considered them deserving of extension. No details, however, as to the actual cost of production had been furnished to Government by Mr. Elphinston, although he had been requested to do so, but he made the general admission that the expense of cultivating the cotton "had far exceeded the price it had realised." Government, therefore, did not consider themselves warranted in undertaking costly experiments without more precise data.[1]

Twelve barrels of New Orleans seed, however, were forwarded in 1841 to the Collector for distribution to the ryots. Mr. Elphinston reported that all his efforts to induce them to cultivate the seed had proved unsuccessful, and he, therefore, returned eleven barrels to the Presidency, merely retaining one for his collectorate. This was sown in various parts, and sprang up, but subsequent heavy rain destroyed the greater portion, and the remainder yielded only a very scanty crop.[2]

In 1841-42, Mr. Elphinston still further extended the cultivation of these exotic cottons, and the produce, cleaned by the native churka, was, as before, placed in the hands of the Bombay Chamber of Commerce. The report made regarding these samples was, that, "although, from having been cleaned by the country churka, instead of hand-picked, they did not exhibit the fine appearance of the samples formerly sent down by Mr. Elphinston, the staple was not at all deteriorated. The value of the Sea Island will probably be enhanced by the change of process. Of these two varieties," they continued, "the Concanee or Bourbon is in every respect preferable to the Sea Island as an article of

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[1] Revenue Consultations, vol. xxxii. 1841, pages 125—149.

[2] Revenue Department, Outwards, vol. xxxiv. 1842, p. 240, & vol. xxxvi. 1843, p. 212.

ROUTE MAP
of the
NORTHERN DIVISION
of the
BOMBAY PRESIDENCY

Scale 20 Miles to an Inch

0 5 10 15 20 30 40 50 60 70 80 90

Reference

VII	Tanna Collectorate	Denote made Roads	
VIII	Ahmednuggur Dº	Unmade Dº	
XI	Khandeish Dº	Fair weather Dº	
XII	Surat and Broach Dº	In Progress	
XIII	Kaira Dº	Sanctioned	
XIV	Ahmedabad Dº	Railways Open	
XV	Political agent at Kattiawar	Dº in Progress	
XVI	Political agent at Kutch		
XVII	Hº Mt the Guicawar's Territory		

Copied & Litho in the Office of Chief Engr at the Presy
Bombay 22nd December 1861.

GULF OF KUTCH

GULF OF CAMBAY

BROOCH

AHMEDABAD

BARODA

SURAT

BOMBAY

DAMAUN

DIU

JOONEER

AHMEDNUGGUR

AURUNGABAD

BOORHANPOOR

DHARWAR

Beyt
Nowanuggur
Rajkote
Sirdargurh
Goundul
Veerpoor
Dhorajee
Porbunder
Jettpoor
Bhowngur
Mangrole
Verawul
Mahwa
Pallitana
Sihor
Gogo
Jaffrabad
Dwarka
Okamundel
Mandvee
Mundra
Anjar
Bhooj
Luckput
Wanquaneer
Sacela
Limree
Dhrangra
Durungara
Halwad
Morvee
Maleea
Wudwan
Joora
Roree
Taora
Mandhee
Mejindra
Kuttaree I.
Kuttaree
Veerumgaum
Sanund
Dholka
Dholera
Gogha
Gandeve
Chikhla
Bansda
Dharumpoor
Balda
Bugwara
Sujjun
Daneo
Cheechun
Malum
Bassein
Bhewndy
Tannah
Trumbay
Panwell
Apta
Kalumboo
Kurrumbee I.
Kurrumbee
Kanhagum
Kotharia
Jumboosur
Tankaria
Amrood
Dubhoee
Dabhoee
Padrah
Camboy
Dholka
Hansot
Jubboogaum
Kanreej
Oomrah
Currore
Songurh
Saddervel
Nuddoorbar
Dhoolia
Sindwa
Shahpoor
Yawul
Pillawud
Rutlam
Noyla
Dopalpoor
Sunwar
Amjhera
Dhar
Amjeera
Mhow
Mhysir
Rookseer
Akrawee
Kungurh
Nagurpore
Sindwa
Belagurh
Dhoolia
Dhamnia
Tulneir
Amrawud
Burangaum
Mullegaum
Nandgaum
Yeola
Byzapoor
Ellore
Kopergaum
Aurungabad
Tuka
Pytun
Rakshoke
Ahmednuggur
Mungee
Bere
Parrea
Jaulnah
Borgaum
Pulpy Anmeir
Jesturgur
Jumlood
Akote
Mulkapoor
Chandore
Malligaum
Jafferabad
Malker
Basseen
Dhapoor
To Jubbulpoor
To Nagpoor

commerce. The latter is an excellent article, and would fetch a good price in the home markets, but being used only for the finer purposes, its consumption would be comparatively limited, while the former, though not likely to sell at quite so high a rate, would doubtless be extensively employed in manufactures."[1]

This cotton was disposed of at a meeting of the Chamber of Commerce as follows:—

"The first lot, consisting of 36 bags (each containing one Surat maund) of *Sea Island* cotton, apparently stained, was knocked down at Rs. 142 per Bombay candy of 7 cwts.

"The second lot, consisting of 23 bags (23 maunds) of *Concanee* or *Bourbon* cotton, went off at Rs. 140 per candy.

"The third lot, consisting of two maunds of a Hybrid Bourbon, was knocked down at Rs. 172 per candy.

"A fourth lot, consisting of about 18½ maunds of foul Sea Island and Concanee cotton, was sold at the rate of Rs. 30 per candy.

"The competition for the three first lots was very spirited."[2]

Mr. Elphinston now furnished a statement of the cost of cultivation during the two seasons 1840-41 and 1841-42. A loss during the former period was rather more than compensated by a profit in the second year. Contrasting the expense with that incurred at Kaira in 1816-17 and 1817-18, in the experiment made by Mr. Assistant Surgeon Gilder, already described, he found that it exceeded the latter by an average of 135 per cent., whilst the yield per beegah, contrasted with the produce of Kaira and Broach, was as follows:—

Rutnagherry	178	Surat seers.
Kaira	66	do.
Broach	60	do.

He estimated that 13⅓ beegahs of land at Broach were required to produce a candy of clean indigenous cotton, whilst at Rutnagherry 4½ beegahs yielded the same quantity of the Bourbon variety.

He likewise presented the following statement of the quantity of Bourbon cotton produced in four collectorates of the Madras Presidency contrasted with the yield at Rutnagherry[3]:—

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[1] Revenue Consultations, vol. xxxiv. 1842, page 210.

[2] Revenue Consultations, vol. xxxiv. 1842, page 223.

[3] Revenue Consultations, vol. xxxiv. 1842, page 223.

Collectorates.	Produce in the Madras Presidency.*			Produce in Rutnagherry per Beegah in 1841-42.	Difference.	
	Per Acre.		Per Beegah		More at Rutnagherry.	Less at Rutnagherry.
	Seed and Cotton.	Clean Cotton.	Clean Cotton.	Clean Cotton.	Clean Cotton.	
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Tinnevelly	...	100	75	166	91	...
Viziagaptam.....	1,150	290	217½		...	51½
Trichinopoly	783	197½	148		18	...
Masulipatam	...	150	112½		53½	...

* Taken from Dr. F. Royle's "Productive Resources of India," pages 341—343.

The Bombay Chamber of Commerce represented to Government that it was "highly desirable that some experiments, on an extensive scale, should be conducted under the direction of Government in the Rutnagherry district. With the data furnished by Mr. Elphinston's experiments as a guide," they continued, "there can hardly be a doubt of success, and the results, if favourable, would prove of high importance to the commerce of Bombay." Government agreed in thinking the results obtained sufficiently encouraging to warrant the prosecution of more extensive experiments, and, for that purpose, they placed a sum of Rs. 10,000 at Mr. Elphinston's disposal. This grant, however, was made too late for the commencement of any operations in 1842-43.[1]

In 1843-44, Mr. Elphinston made arrangements for carrying on the experiments sanctioned by Government. He secured land, in twelve detached spots, to the aggregate extent of 275 beegahs, which, the following season, he increased to 342 beegahs, exchanging a portion of the land first selected for a better quality. He stated that the inferiority of the soil was his greatest obstacle, "fertile land near Rutnagherry not being procurable, except at an exorbitant rent, and then, even, not in sufficient continuous quantity." The experiment was a decided failure, most of the seed planted never arriving at maturity. The kinds sown were Bourbon, Hybrid Bourbon, obtained by artificial impregnation with the best varieties of America, and Sea Island, all of which Mr. Elphinston considered well adapted to the locality, and with which he had achieved his previous successes.

The expense of cultivation during the two seasons 1843-44 and 1844-45 amounted to .....Rs.	3,386	11	11
The returns realised, or estimated, were ..... ,,	1,029	14	0
leaving a loss of .....Rs.	2,356	13	11

or nearly 70 per cent.

[1] Revenue Consultations, vol. xxxiv. 1842, pages 207—237.

The following tables show the experiments of the two seasons in detail [1]:—

Statement of the number of Beegahs in each Garden, and the Quantity of Produce.

Names of the Gardens.	1843-44 Quantity of Land.	Quantity of Cotton with the Seed.	Quantity of Cotton alone.	Quantity of Seed alone.	Average quantity of clean Cotton per Beegah.
	B. P. P.	C. M. S.	C. M. S.	C. M. S.	lbs.
1. Sewray Cotton Garden..	160 9 4¾	3 7 0	0 16 30	2 10 10	....
2. Shewud ditto ..	7 10 1	2 11 20	0 12 35	1 18 25	....
3. Rutnagherry ditto ..	4 7 3	1 4 0	0 6 0	0 18 0	....
4. Newray ditto ..	9 6 19¼	0 15 0	0 3 30	0 11 10	....
5. Dhamunsay ditto ..	22 19 18	3 5 0	0 16 10	2 8 30	....
6. Bhattia ditto ..	20 4 10	1 18 20	0 9 25	1 8 35	....
7. Jaondeh ditto ..	10 8 12	....	....	....	....
8. Pattgaum ditto ..	15 18 10½	0 1 0	0 0 10	0 0 30	....
9. Khond Assoordeh ditto..	6 7 7½	0 10 0	0 2 20	0 7 20	....
10. Bheerkond ditto ..	4 12 15	0 2 0	0 0 20	0 1 20	....
11. Arrowlee ditto ..	9 18 4½	0 4 0	0 1 0	0 3 0	....
12. Gowul Garden, near Chiploon	3 15 0	0 14 0	0 3 20	0 10 20	....
13. Dewrook Garden	....	....	....	....	....
14. Satowlee ditto	....	....	....	....	....
15. Katowlee ditto	....	....	....	....	....
Total ..	275 18 5½	14 12 0	3 13 0	10 19 0	10½

Names of the Gardens.	1844-45 Quantity of Land.	Quantity of Cotton with the Seed.	Quantity of Cotton alone.	Quantity of Seed alone.	Average quantity of clean Cotton per Beegah.
	B. P. P.	C. M. S.	C. M. S.	C. M. S.	lbs.
1. Sewray Cotton Garden..	190 1 16½	4 17 1	1 4 10	3 12 10	....
2. Shewud ditto ..	7 10 1	3 16 0	0 19 0	2 17 0	....
3. Rutnagherry ditto ..	4 7 3	1 8 0	0 7 0	1 1 0	....
4. Newray ditto ..	9 6 19¼	1 8 0	0 7 0	1 1 0	....
5. Dhamunsay ditto ..	14 1 17½	4 16 0	1 4 0	3 12 0	....
6. Bhattia ditto ..	24 10 1¾	1 14 13½	0 8 23	1 5 30	....
7. Jaondeh ditto ..	....	....	....	....	....
8. Pattgaum ditto ..	25 3 11¾	0 11 20	0 2 35	0 8 25	....
9. Khond Assoordeh ditto..	16 7 10	0 12 0	0 3 0	0 9 0	....
10. Bheerkond ditto ..	4 18 3¼	0 7 0	0 1 30	0 5 10	....
11. Arrowlee ditto ..	....	....	....	....	....
12. Gowul Garden, near Chiploon	....	....	....	....	....
13. Dewrook Garden	7 5 9	0 0 20	0 0 5	0 0 15	....
14. Satowlee ditto	33 12 9	0 0 20	....	....	....
15. Katowlee ditto	5 4 11	....	....	....	....
Total ..	342 16 32¾	19 10 13½	4 17 23½	14 12 30	11¼

[1] Revenue Consultations, vol. lvii. 1846, pages 21—96.

The following account given by Mr. Blane, the Revenue Commissioner, Southern Division, of one of the gardens which contained considerably more than half of the entire number of beegahs cultivated, throws a new and singular light upon the real character of these experiments:—

"The larger garden, viz. that of "Sewray," in the immediate neighbourhood of Rutnagherry, has been formed, as I found on my late visit, by the excavation of small holes in a hard, red gravel, filled up with artificial soil brought from a distance,—so preposterous a method of growing cotton as only to have suggested itself to the zeal of an experimentalist; and, although some of the smaller spots are more fertile, the rent paid for them renders them necessarily unprofitable for a species of produce which must be raised at the cheapest rate in order to find a market." [1]

Although Mr. Elphinston himself does not appear to have stated the expedients to which he was forced to resort, in order to obtain the results which have been recorded, his report to Government, in 1845, seems to express his own conviction of the hopelessness of introducing cotton cultivation into the Rutnagherry Collectorate. He states—

"In reference to the loss sustained, I beg to offer the following explanations:—The chief obstacle to the success, in a remunerative point of view, of the cotton plantation has been the expense of cultivation, which, under European superintendence, can never compete in economy with the less expensive cultivation of the natives, the sterility of the red soil at Rutnagherry, and the highness of the rents, it being difficult to procure more fertile land. As the ryot's own subsistence depends upon his cultivating his field, and raising the necessary quantity of grain for his own consumption, he is unwilling to let it to others. The climate quite suits the plant, though of foreign origin, and it seems to me only a more favourable soil is required to insure its success; but I do not apprehend that available land in adequate quantity can be procured in this zillah, and I, therefore, deem that it would be quite sufficient if merely the cotton fields already planted were kept up for the sake of furnishing the seed of a superior sort of cotton to more favoured districts; but on this point I beg the instructions of Government may be communicated." [2]

Mr. Elphinston was shortly after removed to the collectorate of Khandeish.

In 1845-46 the produce of these gardens only amounted to 4 candies and 7½ maunds of kuppas, or about 1 candy and 12 maunds of clean cotton. [3]

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1 Revenue Consultations, vol. lvii. 1846, pages 15 and 16.
2 Revenue Consultations, vol. lvii. 1846, pages 26 and 27.
3 Revenue Consultations, vol. lvii. 1846, page98.

Mr. Liddell, who succeeded Mr. Elphinston as Collector of Rutnagherry, recommended the abandonment of the experiments, "considering the nature of the soil, and the consequent difficulty and expense of cultivation." The Bombay Government considered that it was useless to proceed further, and, on the 28th April 1846, directed that the farms should be abolished. [1]

When these experiments were commenced, no cotton was grown in the Rutnagherry district, with the exception of a few plants of Concanee in each village for domestic use. Mr. Elphinston had even then reported, that, "though the salt batty lands of the collectorate, if drained, might be made to produce Sea Island cotton, in general the soil is too poor and sandy to suit so luxuriant a plant. It appears that the best land would be found on alluvial tracts at the mouths of rivers, and also on flats along the coast." [2] At the outset, and at the end of his experiments, Mr. Elphinston recognised that "only a more favourable soil was required to insure success," although, during their progress, this somewhat important obstacle to the introduction of cotton cultivation was apparently overlooked.

In 1860, the Collector of Rutnagherry, Mr. L. H. B. Tucker, gave the following description of his district:—"It is an extremely hilly, rocky, and sterile country, intersected by numerous creeks and tidal rivers. Along these the only fertile soil is to be found, which is principally devoted to the cultivation of rice, and is not suited to cotton. Inferior grains are raised on the higher ground, wherever a little soil is to be found, but the produce is poor and scanty, and the cultivation shifts from place to place every year, as none of the upper lands admit of two years' consecutive tillage, and in most cases require many years' rest after yielding one crop. Waste lands, properly so called, there are none, every acre of productive soil being required to raise food for the dense population, which, as it is, has to depend largely on imported grain.

"Under these cirmustances, no hopes can be held out that the cultivation of cotton will ever be introduced." [3]

On the 10th April 1860, the Bombay Chamber of Commerce, in replying to communications from Government regarding cotton cultivation in the Southern Maratha Country, suggested that, as the special Government establishments for the experimental cultivation of cotton were all broken up, it might be desirable to intimate to the various Collectors in the Presidency that Government still regards the question with interest, and that, if they or their subordinates are willing to make trials, on a small scale, the Government is not unwilling to

[1] Revenue Consultations, vol. lvii. 1846, pages 11 and 101.
[2] Revenue Consultations, vol. xlv. 1840, page 85.
[3] Revenue Consultations, No. 257 of 1860.

sanction the expense." The Chamber explained that they were chiefly induced to offer their suggestion from "the unexpected success which seems to have attended the experiments of Captain Meadows Taylor;" and, they added, "in former years those of Mr. Alexander Elphinston, at Rutnagherry, appeared also to give hopes of success, but his removal to another district brought them to a premature conclusion. It would seem that, in most cases where care and intelligence had been brought to bear on the plant, success attended the experiment."

This communication was referred for report to the Revenue Commissioner, Northern Division. Mr. Mansfield replied, "I certainly cannot support this recommendation of the Chamber, which is contrary to their repeatedly expressed opinions of the inutility of such experiments. No later than the 5th May 1859 did the Secretary, in his letter, No. 48, to Government, write as follows:—'The officers should also be directed to avoid *garden experiments* with the seed, as the results of such afford little or no criterion as to the success or otherwise of an extended cultivation of the plant.'

"The absurdity and uselessness of such experiments were well exemplified in Mr. Elphinston's experiments in Rutnagherry, alluded to in the Chamber's 13th paragraph. The soil and climate of that collectorate are only adapted to rice and very coarse grains, and are quite unsuitable to the grains, &c. cultivated above the Ghauts. Mr. Elphinston certainly did produce cotton, but how did he do it? By expending four shillings in realising a pound of cotton, valued in Liverpool at three pence." [1]

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[1] Revenue Consultations, No. 110 of 1861, pages 18, 19, and 43.

CHAPTER X.

EXPERIMENTAL CULTURE IN BELGAUM.

Experiments commenced in 1845 under Mr. Channing—Unsatisfactory result of the first season—Saw-gins—Increased cultivation of New Orleans and Broach Cotton in 1846-47—Small experiments with exotic seed, and report of the Chamber of Commerce on the produce—Failure of New Orleans crop in 1847-48—Partial success in 1848-49—Purchases for Government—Diminution of cultivation—Prospects and requirements—Comparative yield of New Orleans and Native Cotton—Discouraging result of the season 1850-51—A European Agency established—Failure of New Orleans Cotton in 1851-52—Statement of Saw-gins in and out of use—Unfavourable reports on suitability of New Orleans Cotton—Estimated yield for five years—Its culture not voluntarily undertaken—Report on the causes of failure—Abolition of the Experimental Establishment in 1853—Instructions to District Officers to encourage its cultivation—Statement of cultivation in Government and Enam land—Statistics of cultivation—Experiment with Egyptian Cotton Seed in 1857-58—Failure.

A SERIES of experiments for the introduction of exotic cotton and the saw-gin into the Belgaum districts was commenced, in 1845, under Mr. T. W. Channing, assistant to Mr. Mercer the American superintendent of cotton operations in Dharwar. For the purpose of testing the soil and climate, he selected about 300 acres of land at Negunhal, in the Sumpgaum Talooka, which appeared well adapted, in every respect, for an experimental farm. A supply of New Orleans and Broach cotton seed was obtained, and distributed to the ryots.

The extent to which the seed was planted was not stated; and, although subsequently it was estimated at about 19 acres only, there is good reason for believing that this is a mistake, and that a much more considerable amount was cultivated. The plants came up well, and at first looked so promising, that the superintendent was "led to believe, that the return from them would be so satisfactory, as to ensure the cultivation of New Orleans cotton being

greatly extended in future seasons." The crop received a check, however, from the hot and sultry weather in the months of August and September, when the plants suffered from want of moisture. Rain in October revived them, but the succeeding harsh easterly wind proved injurious, and the plants seemed rather stunted. They shed the whole of their first leaves, and the greater part of their flowers and pods. They afterwards threw out fresh blossoms, which, however, did not come to maturity, but continued to fall in great numbers as they were forming into bolls.[1] The result of the season was very unsatisfactory. Mr. Channing wrote to the Collector, "I would beg your consideration for those ryots who did plant New Orleans, the unfavourable season having greatly disheartened them, and in several cases they will be losers for having done so."[2]

The Broach, on the contrary, thrived well, and the crop proved a good one. Mr. Reeves, the Collector, in comparing the New Orleans with the Broach and indigenous cotton, was struck with the comparative shortness of its staple, and he stated, "This circumstance, in connection with other disadvantages of climate and machinery, makes me averse to recommending it for further encouragement by Government. Some of the cotton plants of the Negunhal farm were very good, and yielded beautiful pods. I therefore doubt whether the New Orleans staple will improve." The greater part of the exotic cotton grown by the ryots was purchased by a native at 12 per cent. above the value of the indigenous.[3]

Saw-gins were set up at Sounduttee, Moorgoor, and Byle Hongul, at the request of the cotton dealers there, in order to clean their cotton. The charge for doing so was fixed at 27 maunds of well-picked and only 24 maunds of ordinary kuppas for a rupee.[4]

In the following season, 1846-47, about 2,300 acres of exotic cotton were cultivated, of which about 2,016 acres consisted of New Orleans, and the remainder chiefly of Broach seed. Mr. Channing, however, stated that no encouragement he could hold out to the ryots to plant the latter, largely, could induce them to do so, as they objected that its roots ran so deep into the soil that they had the greatest trouble in removing them.[5]

Variable weather at the beginning of 1847 injured the New Orleans plants to a considerable extent, and fields that had presented a favourable appearance at the opening of the year, began to look unpromising. The flowers and

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[1] Revenue Consultations, vol. xli. 1845, pages 235—246, & vol. l. 1853, page 216.
[2] Revenue Consultations, vol. xlix. 1846, page 141.
[3] Revenue Consultations, vol. xlix. 1846, pp. 151—173, & vol. liv. 1847, pp. 285—296.
[4] Revenue Consultations, vol. lvi. 1847, pages 75—84.
[5] Revenue Consultations, vol. liv. 1847, page 297, and vol. lvi. 1848, page 50.

half-formed pods dropped off without arriving at maturity, and, although fresh blossoms came out, the crop was greatly diminished. The Broach kind did well. [1]

Mr. Channing made experiments on a small scale with a variety of other exotic cottons on the Government farm. The following are the details, together with the opinion expressed by the Bombay Chamber of Commerce, upon the cotton produced :—

Bourbon Cotton (which Mr. Channing considered identical with "Abyssinian").—Half an acre of land planted, which produced 64 lbs. of kuppas, or 18 lbs. of clean cotton :—

> "Clean, and of good colour, but short and somewhat irregular in staple, both in length and strength."

Georgia Cotton.—Seed obtained from America ; one-eighth of an acre of land planted, which produced 36 lbs. of kuppas, or 11 lbs. of clean wool :

> "Colour objectionable, being of too yellowish a tint, apparently from age or exposure to wet. In other respects the cotton is well suited for manufacturer's purposes, the staple being good, and the cotton clean."

Sea Island Cotton.—Seed obtained from Dharwar; one-eighth of an acre of land planted, which produced 25 lbs. of kuppas, or 7 lbs. of clean wool :

> "Not better than the Georgia ; by some thought inferior, being weak and short in the staple."

Nurmah Cotton.—Seed obtained from Indore ; one-eighth of an acre of land planted, which produced 109 lbs. of kuppas, or 31 lbs. of clean wool :

> "Staple weak and irregular; colour pretty fair, and cotton clean ; better suited to the China than the English market."

The actual yield of clean cotton per acre of these varieties was as follows :—

Bourbon cotton	36 lbs.	per acre.
Georgia do.	88 lbs.	do.
Sea Island do.	56 lbs.	do.
Nurmah do.	248 lbs.	do.

New Orleans Cotton.—"Clean, but harsh ; of bad colour ; weak and short in staple ; not particularly adapted to the English market."

Broach Cotton.—"A very excellent sample. The staple is not so long nor so strong as the Georgia, which makes it inferior to that cotton for manufacturing purposes ; still the staple is good and regular, and the cotton clean, and of good colour ; altogether a showy lot." [2]

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[1] Revenue Consultations, vol. lv. 1847, page 205.
[2] Revenue Consultations, vol. lvi. 1847, pages 29—50.

The extent of land cultivated with New Orleans cotton in 1847-48 was estimated by the superintendent at 3,200 acres, but was really found only to be about 2,616 acres. This discrepancy, which frequently recurs, arises from the calculation of the superintendent being based upon the quantity of seed distributed, which generally much exceeded the actual measurement of the land sown with it. The want of moisture, and subsequent rain at unusual periods, was very injurious to the New Orleans cotton, much of which was a complete failure. Mr. Channing estimated the produce of the season generally at "scarcely more than one-fifth of an average crop."[1] On the 5th April 1848 he reported, "From the peculiar state of the weather for the week past, and the great quantity of rain which has fallen, cotton has been much injured in the fields. The crops were very late, and may now be considered as much damaged in colour and staple, and much reduced in quantity from being beaten off by the wind and rain, a great quantity of which has fallen since the 29th March. Some fields of New Orleans have yielded a very good crop, the staple of which is equal to any heretofore grown; but I regret to add that the instances are so few, as to leave but little encouragement to the generality of ryots to continue its cultivation, although they appear to be quite well aware of the reason, viz. a scanty monsoon, followed by such early wet weather as the present. Many who planted in the last season will not be inclined to do so this."[2] On the other hand, Mr. Channing mentioned that some fields of good land had yielded upwards of 300 lbs. of kuppas to the acre, and one field of 16 acres, farmed by contract for Government, had produced 313 lbs. of kuppas or seed cotton the acre.[3]

Purchases on account of Government, to encourage the production of the exotic, and the improvement of the indigenous cotton, amounted, this season, to 64 candies of New Orleans, 9 candies of Broach, and 24 candies of native.[4]

In 1848-49, the cultivation of New Orleans cotton was extended to 4,189 acres, the superintendent, as usual, erroneously estimating the extent, from the seed distributed, at 6,725 acres. Only 16 acres were planted with Broach cotton.[5] Mr. Channing expressed great satisfaction at the appearance of the crops; but, in some places, the result was not favourable. On the 12th March 1849, he reported, "The crops in the Hoongoond Talooka, and in the Rohan districts of the Badamee Talooka, are on the whole very favourable. In the village of Munnoor (55 acres) in the Badamee Talooka, and also in the Enam village of

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1 Revenue Consultations, vol. lxxv. 1849, pages 16—28.
2 Revenue Consultations, vol. lvi. 1848, pages 103 and 104.
3 Revenue Consultations, vol. liv. 1848, pages 136 and 137.
4 Revenue Consultations, vol. liv. 1848, pages 131—137.
5 Revenue Consultations, vol. lxxv. 1849, pages 11—21.

Alloor, the New Orleans is an entire failure, the plants having perfectly died out. The ryots of these places stated that, until the heavy rain which fell in October and November, the plants bore every appearance of health and throve well; at present they are simply dead sticks, and will not yield one pound per acre." [1]

Mr. Channing was authorised to purchase clean-picked indigenous cotton at a premium upon the market price (say at 9 annas a maund of kuppas, whilst ordinary kuppas was selling at 7 to 8 annas), in order to encourage care in the picking. It was stated in this condition to yield 3 per cent. more wool, and the Chamber of Commerce valued it at 30 per cent. above cotton picked in the usual way. He recommended that premiums should be given for the cultivation of New Orleans, and that all the produce should be purchased at 13 annas the maund of kuppas. He observed, "The only thing requisite to ensure its cultivation being extended, is a certainty that the produce will be purchased at a price sufficiently high to encourage them in their labour." The reply given was, that "Government could not continue to furnish seed *gratis*, provide a market for the produce, and give rewards to the growers, if they expect or hope the experiment to succeed when this support is withdrawn. The ryots will, of course, be glad to continue to cultivate the New Orleans cotton so long as Government agree to purchase it from them at prices above that which it would fetch in the market; but the Governor in Council is of opinion that the experiment cannot be considered to have succeeded until Government can withdraw altogether, and leave it to make its own way, according to its market value." [2] In July 1849, he represented that the only merchants who could buy the New Orleans kuppas had left Belgaum, and that the ryots, consequently, could only sell it at a reduced price. He added, "I can see no other way of keeping up the cultivation but by Government continuing to purchase it, so as to give encouragement to the growers." [3]

The cultivation of New Orleans cotton, in 1849-50, diminished to 3,058 acres, although, as usual, it had been estimated, by the superintendent, at 4,743 acres. The appearance of the crops in the eastern talookas was very encouraging, but in the northern districts was not satisfactory. The rain which fell in March had a pernicious effect upon the plants, beating off the unripe pods, and discolouring the riper and more advanced cotton.

The following is an extract from the report of Mr. Reeves, the Collector, dated March 1850:—"The prospects of the present season are stated to be

[1] Revenue Consultations, vol. lxxiv. 1849, page 210.
[2] Revenue Consultations, vol. lxxiv. 1849, pages 179—187.
[3] Revenue Consultations, vol. lxxiv. 1849, pages 240 and 241.

good; and, if purchasers are forthcoming, the cultivation of cotton will be largely extended; but, if otherwise, it will be diminished. It thus appears, from what Mr. Channing says, that all we require in this collectorate is a market; and this is exactly what my own views are on this important subject. The New Orleans produce of the Belgaum Collectorate is in no degree, as far as I can find, inferior to that of Dharwar, together with which it has been despatched to England and sold; but the ryots themselves being too ignorant, too much involved in debt, and possessing too little enterprise to clean, pack, and export their produce themselves, are obliged to trust to native dealers for the disposal of it. But again, the native dealers are exceedingly backward, and very few of them will have anything to do with this article, its merits, although the result of the sales on account of Government has been published throughout the Belgaum districts, being still unappreciated by them. The British merchants of Bombay appear to be equally apathetic with the native dealers of my district. * * * * If merchants were to come forward and ask for it, the cotton, finding a *ready* sale, would necessarily be *readily* produced. * * * * The New Orleans cotton has both been grown and cleaned in satisfactory style, but the best machinery in the world will never induce the cultivators to grow a crop for which they cannot find a market close at hand." [1] The fears regarding a market proved quite groundless, for Mr. Channing subsequently reported that "any quantity of cotton could have been disposed of at a very enhanced price."

The superintendent estimated the yield of New Orleans cotton at 36¾ lbs. an acre, whilst the indigenous he stated at 39 lbs; but the actual out-turn was very much more unfavourable to the exotic kind. More than a quarter of the crop was purchased by Government. [2]

In the season 1850-51 about 2,331 acres were planted with New Orleans cotton. "In the early part of the season the prospect was good, but, owing to the heavy rain which fell early in November, and the continuance of east winds, the fields were seriously injured. * * * * In Sumpgaum, Bagulkote, Gokak, Uthnee, and Tasgaum, the American cotton was quite a failure, and in Pursghur, Badamee, Padshapoor, and Hoongoond about half a crop. The average produce per acre, for the whole zillah, of American cotton was about 30 lbs. of clean cotton." [3]

In 1850 an agency was established in the Belgaum districts by Mr. Davis, who was engaged to purchase and gin cotton for Messrs. Lancaster & Co. of

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[1] Revenue Consultations, vol. lviii. 1850, pages 101—106.
[2] Revenue Consultations, vol. lxxviii. 1851, pages 63—67.
[3] Revenue Consultations, vol. lviii. 1852, pages 159—169.

Bombay. The demand for New Orleans cotton therefore increased, and Government resolved not to enter into competition with private enterprise. A large number of gins was made for Mr. Davis, but they were afterwards received back, owing to their faulty construction.

The cultivation of New Orleans cotton in the following season (1851-52) fell to 2,212 acres. The prospect at first, as usual, was promising, but the season eventually proved a most unfavourable one. Mr. Blount, the American planter superintending the experiments at Dharwar, had now also assumed charge of those in Belgaum, on the death of Mr. Channing, which occurred early in 1851. He stated, "From what I can learn, there certainly have not been 25 candies produced in the whole district. * * * Taking 25 candies as the whole produce, it would give an average of less than 6 lbs. of *rooe* (clean cotton) the acre,—a result sufficient to discourage any people from planting the cotton." Mr. Blount stated, in his report for the half-year ending 31st May 1852, "The progress of the experiments in the Belgaum Collectorate is far from satisfactory." The ryots expressed their objection to planting the New Orleans seed, and they stated that 'the reason of their dislike to the cotton was, that they had tried it for several years, and it had always proved a failure.'" [1]

The following statement [2] of saw-gins in and out of use shows the position of the experiment, so far as the introduction of the machine into the Belgaum districts is concerned:—

Period.	Gins in use.			Gins out of use.			Total of Gins.
	Government.	Private.	Total.	Government.	Private.	Total.	
Half-year ending 31st May 1849 ...	7	3	10	...	...	...	10
Ditto ditto 1850 ...	6	14	20	...	...	...	20
Ditto ditto 1851 ...	5	22	27	21	34	55	82
Ditto ditto 1852 ...	2	13	15	50A	26B	76	91

A 25 of these returned by Mr. Davis as unserviceable. B 12 of these out of repair.

A doubt was expressed by Government, whether the faulty construction of Mr. Channing's gins might not have occasioned a distaste amongst the people for their extended use, but it was found that, of the whole number of gins issued to the ryots, only 11 were manufactured by Mr. Channing, the remainder

[1] Revenue Consultations, vol. I. 1853, pages 153—155, 177 and 178.
[2] Revenue Consultations, vol. I. 1853, page 219.

being English made, or constructed by Mr. Frost, the engineer of the Dharwar establishment.[1] The difficulty of getting saw-gins repaired, when out of order, was one great obstacle to their introduction.

Mr. J. D. Inverarity, the Collector of Belgaum, expressed his opinion that the unfavourable prospects of the experiment were "due to the inferior yield" of the New Orleans cotton, and that, "except as an irrigated crop, it will not thrive" in that district. He added, "It is said that this cultivation has not been so remunerative as to induce its continuance; hence the falling off of late, and hence the disfavour shown to the variety."[2]

In 1852-53, the cultivation of the American plant declined to 1,949 acres; but the result was not more successful than in previous years. Mr. Blount reported of the crop, "No other conclusion can be arrived at than that the American cotton was almost a total failure."

The following table[3] exhibits the estimated yield of New Orleans cotton during the seasons 1848-49 to 1852-53 inclusive:—

Years.	Number of Acres planted with New Orleans Cotton.			Estimated produce of Kuppas or Seed Cotton.		Average yield of clean Cotton per Acre.
	Acres.	G.	A.	Cds.	lbs.	lbs.
1848-49	4,189	28	11¾	267	0	16
1849-50	3,058	25	4¾	180	0	15
1850-51	2,331	30	11¾	425	26½	47A 30B
1851-52	2,212	19	0	166C 25D	318½ 0	19C 3D
1852-53	1,949	26	10½	234	125	31

A Collector's statement. B Superintendent's estimate.
C Collector's statement. D Superintendent's estimate.

Government instituted inquiries with a view to ascertain the reason of the unsatisfactory progress of the experiment in Belgaum, as compared with Dharwar. The Collector of Belgaum, in reply to a question as to whether the cultivation of New Orleans cotton was voluntarily undertaken by the ryots, stated, "I do not think that the cultivation of New Orleans cotton has been voluntarily engaged in by ryots, from a conviction of its superiority over the indigenous variety. It has, I am of opinion, been engaged in partly to please the "sirkar," and partly in the knowledge that what could not be disposed of elsewhere would be taken by Government. From first to last, one

[1] Revenue Consultations, vol. i. 1853, page 179.
[2] Revenue Consultations, vol. i. 1853, pages 176 and 177.
[3] Revenue Consultations, vol. xlix. 1853, page 246.

real objection of the ryots to the New Orleans cotton has been its liability to failure. My own opinion is, that a really good crop of New Orleans cotton, of any extent, has yet to be grown in this collectorate." [1]

Mr. Blount confirmed this opinion, and stated, "The failure to introduce, generally, the New Orleans cotton into this collectorate is, I think, to be attributed chiefly to the precarious nature of the crop." [2]

Both Mr. J. D. Inverarity, the Collector, and Mr. Courtney, the Revenue Commissioner, concurred in thinking it undesirable and unwise longer to continue the experimental establishment in Belgaum. The latter observed, "There can be no question, as remarked by Government, that the cultivation of New Orleans cotton will gradually extend itself from Dharwar into Belgaum, should it be found more profitable than the cultivation of the native." [3]

The experiments in Belgaum were, consequently, abolished in 1853. In communicating to him this decision, the Collector was addressed, as follows, by the Revenue Commissioner:—"Still, however, the interest which Government have felt in the production of New Orleans cotton in this Presidency is undiminished, and it will be a source of much satisfaction to them to know that its cultivation steadily progresses, and that the labour and expense of the past eight years have not been unprofitably incurred.

"I request, therefore, that you will have the goodness to issue instructions to your assistants, and native district officers, on the following points:—

"1*st*.—Prompt attention should be given to representations from ryots and dealers in all matters connected with the cultivation of New Orleans cotton.

"2*nd*.—While all measures having the appearance of coercion, or what has been termed a 'forcing system,' should be carefully abstained from, every proper *encouragement* should be given to a voluntary and natural extension of the cultivation.

"3*rd*.—No promise, without special orders to that effect, should at any time be held out that the whole, or a portion of the season's crop, will be purchased for Government. Should either American or native cotton be required for consignment to the Honourable the Court of Directors, special requisitions will be made, and it will then rest with the local officers to procure the same at the prices ruling in the market.

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[1] Revenue Consultations, vol. xlix. 1853, pages 259—268.
[2] Revenue Consultations, vol. l. 1853, page 215.
[3] Revenue Consultations, vol. xlix. 1853, pages 278 and 279.

"4*th*.—A notification should be posted up in the village chowdies, informing the cultivators and others that supplies of best seed, (*grati*,) and saw-gins, can be obtained on application to the patel, kulkurnee, or mamlutdar of the talooka, the gins being paid for according to the expense which their cost and transport may involve.

"5*th*.—It should also be mentioned in the notification, that facilities will be afforded for the repair of gins, and for gaining a knowledge of gin machinery, during the tours of Mr. Frost, the engineer, and his apprentices,—the former being charged for at reasonable rates, and the latter being at all times imparted *gratis*."[1]

The following table exhibits the proportion of Government land, and of land free from assessment, in which New Orleans cotton has been cultivated in Belgaum since 1848-49 :—

Years.	Cultivation of Government Land.		Cultivation of Enam Land.		Total.	
	Acres.	G.	Acres.	G.	Acres.	G.
1848-49	2,532	15	1,657	13	4,189	28
1849-50	1,906	27	1,151	37	3,058	24
1850-51	1,568	29	763	1	2,331	30
1851-52	1,589	18	623	1	2,212	19
1852-53	1,210	36	738	31	1,949	27
1853-54	946	17	439	7	1,385	24
1854-55	.....		.....		1,911	10
1855-56	993	20	734	35	1,728	15
1856-57	3,382	12	1,078	34	4,461	6
1857-58	703	22	783	11	1,486	33
1858-59	733	27	824	15	1,558	2
1859-60	1,111	30	865	28	1,977	18
1860-61	.....		.....		6,513	30
1861-62	.....		.....		6,620	0

The cultivation of New Orleans cotton, in this collectorate, has continued, and lately increased; but a reference to the subjoined statement will show that the exotic, at first introduced and cultivated to a certain extent in every talooka, has gradually become extinct in all but the Badamee district, to which, indeed, its cultivation has long been almost entirely confined. It has already been mentioned that the extent under cultivation, in 1845-46, must have been very considerably more than 19 acres; but, as that amount alone

[1] Revenue Consultations, vol. xlix. 1853, pages 294—296.

is found amongst Government Records, it is allowed to stand with this explanation :—

Talooksa.	1st year of Experiment 1845-46.	2nd year of Experiment 1846-47.	3rd year of Experiment 1847-48.	4th year of Experiment 1848-49.	5th year of Experiment 1849-50.	6th year of Experiment 1850-51.	7th year of Experiment 1851-52.	8th year of Experiment 1852-53.	9th year of Introduction 1853-54.	10th year of Introduction 1854-55.	11th year of Introduction 1855-56.	12th year of Introduction 1856-57.	13th year of Introduction 1857-58.	14th year of Introduction 1858-59.	15th year of Introduction 1859-60.	16th year of Introduction 1860-61.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Padshapoor	..	..	15	15	7	10	..	..	..	..	..	..	..	..	..	..
Sumpgaum	19	833	410	14	80	58	..	..	..	..	..	..	..	..	..	..
Beedee	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
Chickoree ..	..	..	..	..	..	..	1	5	..	..	..	..	..	..	..	..
Pursghur ..	..	1,039	2,036	1,755	1,143	823	23	63	13	..	..	..	29	..	..	..
Bagulkote ..	..	..	..	..	37	291	175	379	7	..	..	..	8	1	..	..
Badamee ..	..	144	154	663	795	512	256	660	962	1,911	1,728	4,461	1,432	1,557	1,977	6,51
Hoongoond .	..	..	..	1,742	974	614	1,629	826	404	..	..	..	..	..	..	..
Gokak	..	..	..	..	..	13	18	..	..	..	..	..	18	..	..	..
Uthnee	..	..	..	..	24	9	39	..	..	..	..	..	..	..	..	..
Tasgaum ..	..	..	..	..	..	1	72	17	..	..	..	..	..	..	..	..
Total..	19	2,016	2,617	4,189	3,060	2,331	2,213	1,950	1,386	1,911	1,728	4,461	1,487	1,558	1,977	6,513

In a report from Belgaum, dated 3rd September 1861, it is stated that, in conversation with the ryots regarding New Orleans cotton, the Assistant Collector "had invariably been informed that they found it less profitable to sow foreign seed than Indian." [1]

In 1857-58, an experiment was tried with Egyptian seed, freshly procured from Egypt, which proved a complete failure. The time of sowing is not specified. The following is the report of Mr. Seton Karr, then Collector there :—

"The Egyptian cotton seed (11 maunds 5 seers) forwarded to me was duly distributed to ryots of this collectorate who were willing to sow it as an experiment.

"The seed was put into good black cotton soil, and, although more was sown than would have been used of indigenous cotton, the yield (when the plants came up) was one-half less than the same extent of land would have given of the latter sort. The seed, I imagine, must have been damaged in transit, or else be unsuited to this climate, for the indigenous cotton grew pretty well this year in the same localities. The fall of rain, however, was scanty, and it may be possible that in irrigated land the Egyptian cotton might thrive ; but if it will not grow as a dry crop, there is not much probability of the cultivators preferring it to the country species. At any rate, the ryots are not willing at

[1] Revenue Compilations, No. 797 of 1861.

present to try any further experiments. The following statement shows the results [1] :—

Talookas.	Number of Villages in which the Seed was sown.	Quantity of Seed sown.	Extent of Land planted.	Yield.	Remarks.
		Mds. S.	Acres. G.	Mds. S.	
Pursghur.....	3	3 0	40 0	10 0	The seed came up only in one village.
Bagulkote	15	1 10	7 37	1 22	The seed came up only in three villages.
Badamee.....	19	4 5	42 0	....	The seed came up in a few places only, and the plants produced nothing.
Gokak	4	1 10	....	....	
Uthnee	1	1 20	....	....	The seed nowhere germinated."
	42	11 5	....	11 22	

The Bombay Chamber of Commerce reported upon the cotton (kuppas) produced as follows :—

"All the samples indicate extensive injury by insects, and the cleaned cotton would be spotted and uneven in staple in consequence, and, of course, deteriorated in value. The staple is very long, fine, and silky, and, where uninjured by damp or insects, is very strong. It is in some cases rather soft, indicating, the Committee think, that the cotton had been left on the plant several days after it had ripened. This cotton, if cleaned carefully, would probably be equal to good Egyptian, the quotation for which, in the Liverpool market, on the 16th July, was 8½*d.* to 9*d.* per lb." [2]

A further experiment with fresh Egyptian seed was tried in 1859-60, and Mr. Seton Karr, the Collector, gave the following report of the result :—

"The seed was distributed gratuitously to some intelligent cultivators in the following districts :—

	Villages.		Villages.
1. Badamee.....	4	4. Gokak	10
2. Bagulkote	3	5. Tasgaum	7
3. Hoongoond	15	6. Pursghur	1

[1] Revenue Consultations, vol. 1. 1858, pages 3 and 4.
[2] Revenue Consultations, vol. lv. 1855, pages 27 and 28.

which contain the best cotton land in this collectorate. The cultivators were enjoined to sow early, and to pick the cotton promptly as it ripened, and I am informed that the injunctions were attended to.

"The result has been as follows:—

"1. In Badamee the cotton came up in two villages, and failed totally in the other two.

"2. In Bagulkote the cotton came up in one village, and failed totallyin two.

"3. In Hoongoond the cotton came up in six, and failed in nine.

"4. In Gokak it came up in one, and failed in nine.

"5. In Tasgaum it came up in five, and failed in two.

"6. In Pursghur the seed was distributed in twenty-six lots, twenty-four of which succeeded, and two failed.

"It seems clear that the seed was good, for otherwise its failure would have been general. Its partial failure must, I think, be attributed to bad management on the part of the cultivators in storing it in some unfit place until used.

"The yield, I am informed, was scanty, and the operation altogether unprofitable, and cultivators have expressed themselves unwilling to sow any more seed of the same sort.

"About 4 lbs. of the seed was sent by me to Dr. Gibson, and I should be glad to learn if, in his hands, the experiment has succeeded." [1]

It may be stated here that, upon being referred to, Dr. Gibson gave the following report on his experiments with the same seed:—"The plant was carefully sown, at the end of April, both at Dapoorie and at Hewra. Its growth was assisted by watering until the rains fell, and afterwards, on the rains ceasing, by two more irrigations.

"The growth of the plantand the wool produced have, neither ofthem, been at all different from what that of cotton sown at the usual time in the Deccan would have been, *i. e.* from ¾ of a beegah about 44 lbs. of worthless short-stapled material, with hardly one seed free from disease. The undersigned (Dr. Gibson) cannot recommend a repetition of the experiment here." [2]

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[1] Revenue Consultations, vol. xl. 1860, pages 332—334.

[2] Revenue Consultations, vol. xl. 1860, page 345.

The following is the contrasted cultivation of New Orleans and indigenous cotton from 1846-47 up to the present time :—

YEARS.	New Orleans.		Indigenous.		Total.	
	Acres.	Goontas.	Acres.	Goontas.	Acres.	Goontas.
1844-45	.....		.....		135,388	8
1845-46	.....		.....		117,182	38
1846-47	2,016	23	110,103	4	112,119	27
1847-48	2,616	36	115,887	38	118,504	34
1848-49	4,189	28	134,514	8	138,703	36
1849-50	3,058	25	145,216	0	148,274	25
1850-51	2,331	30	181,728	6	184,059	36
1851-52	2,212	19	158,371	25	160,584	4
1852-53	1,949	26	168,427	12	170,376	38
1853-54	1,385	24	192,283	35	193,669	19
1854-55	1,911	10	167,317	5	169,228	15
1855-56	1,728	16	124,188	1	126,616	17
1856-57	4,461	6	183,091	15	187,552	21
1857-58	1,486	33	230,548	7	232,035	0
1858-59	1,558	2	244,787	13	246,345	15
1859-60	1,977	18	288,668	4	290,645	22
1860-61	6 513	30	243,823	19	250,337	9
1861-62	6,620	0	278,963	14	285,583	14

The Collector gives the following information with regard to cotton cultivation in the Belgaum district in 1861-62 :—

TALOOKAS.	The total Area capable of any cultivation.			Area not capable of Cotton cultivation.			Area capable of Cotton cultivation.			COTTON CULTIVATION.					
										Area under cultivation with Indigenous Cotton.			Area under cultivation with Exotic Cotton.		
	Acres.	G.	A.	Acres.	G.	A.	Acres.	G.	A.	Acres.	G.	A.	Acres.	G.	A.
Padshapoor ..	153,273	29	3¾	135,322	1	3¾	17,951	28	0	3,336	33	0	....		
Sumpgaum ..	181,749	26	0	128,106	32	0	53,642	34	0	13,341	0	0	....		
Beedee	247,456	36	0	247,207	13	0	249	23	0	249	23	0	....		
Chikodee	301,361	12	0	271,108	29	0	30,252	23	0	8,351	2	0	....		
Purusgud....	328,933	30	1½	240,933	30	1½	88,000	0	0	40,360	0	0	....		
Bagulkote ..	309,443	19	13	227,047	19	13	82,396	0	0	40,465	12	0	....		
Badamee	406,127	1	9	344,152	1	9	61,975	0	0	41,100	0	0	6,500	0	0
Hoongoond ..	287,933	18	9	65,308	18	0	222,625	0	9	69,996	21	0	120	0	0
Gokak	306,127	10	0	123,508	23	0	182,618	27	0	30,000	11	0	....		
Uthnee.....	563,221	16	12	387,255	16	12	175,966	0	0	26,045	0	0	....		
Tasgaum	162,816	38	0	77,092	2	0	85,724	36	0	5,717	32	0	....		
Total..	3,248,444	37	15¾	2,247,042	26	6¾	1,001,402	11	9	278,963	14	0	6,620	0	0

The Collector "explained to the village officers and ryots the benefits likely to ensue to them from growing cotton extensively, but with little apparent effect." [1]

[1] Revenue Department, No. 723 of 1861.

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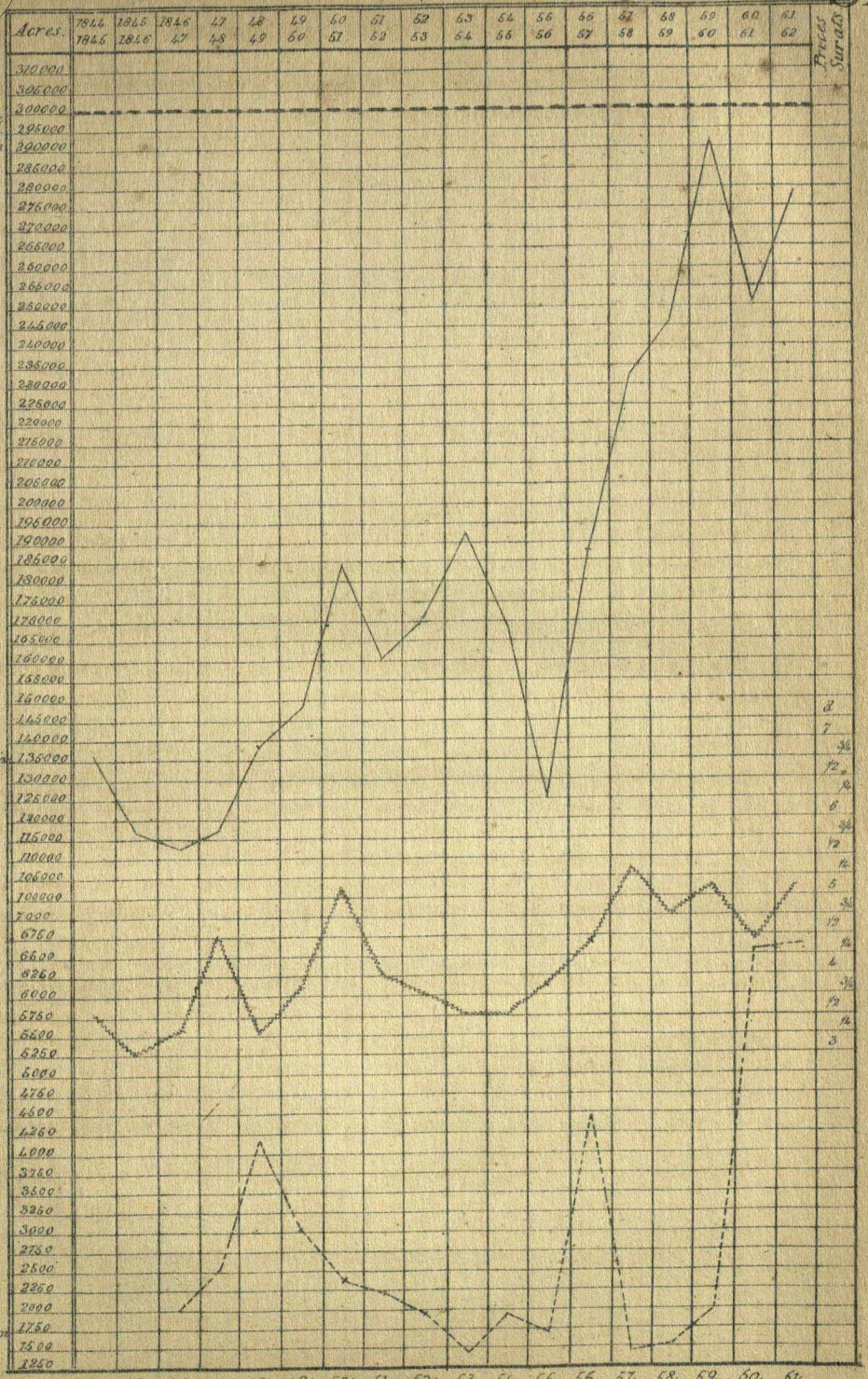
from 1844-45 to 1860-61, the extent of Exotic Cotton planted ------; the area capable of producing Cotton ------; and the average price per lb. of East Indian Cotton in Liverpool.

Prepared by W. K. C.



CHAPTER XI.

EXPERIMENTAL CULTURE IN DHARWAR.

Mr. A. N. Shaw's experiments with exotic seed 1842-43—Out-turn of Cotton cleaned by hand and by the foot-roller—Experiments of Mr. Hadow with Bourbon seed—Mr. Mercer appointed Superintendent—Experimental culture at Koosighul 1843-44—Report of the Chamber of Commerce on samples—Unfavourable opinions of Bourbon Cotton—Saw-gins—Experimental culture at Koosighul and Gurrug 1844-45—Order for the purchase of Cotton from the Court of Directors—Mr. Mercer's operations—Shipments to England—Report of the Liverpool Brokers—Abolition of the experimental Farms, and commencement of the Contract system—Sale of experimental Cotton in Bombay—Result in England—Shipment of Dharwar New Orleans Cotton by the *Quintin Leitch*, and results—Comparative out-turn of Dharwar saw-ginned and New Orleans Cotton in spinning—Deficient crop 1847-48, and decrease of cultivation—Reports on the cause of the decline—Statement of Cotton cultivation 1842-43 to 1851-52—Purchases from the Ryots—Contracts—Dr. Forbes appointed Superintendent—His successful management—Experiments with Egyptian Cotton—The Gin Factory—Further experiments with Egyptian seed—Satisfactory arrangements with Natives regarding Gins—Deterioration of saw-ginned Dharwar Cotton—Subsequent improvement—Reports on Samples—Statements of Cotton cultivation.

After the unsuccessful termination of the experiments of Dr. Lush, in 1836, no further attempts were made to introduce the cultivation of exotic cotton into the Southern Maratha Country until 1842, when Mr. A. N. Shaw, then Collector of Dharwar, began to take an active interest in the subject. This gentleman obtained permission to sow some New Orleans cotton seed which had been received, in 1840, from the Court of Directors, and he selected for the purpose some land in the Hooblee Talooka. The cultivation was pursued altogether on the native system, and the seed was planted in the month of

August 1842, but, being old, and having been two monsoons in the country, only a small quantity germinated, and the vacant places had to be resown. The whole of the land, consequently, was not planted until October, and, eventually, many large blank patches were left, not more than about half of the usual number of plants being produced. Notwithstanding these adverse circumstances, the appearance of the crop was sufficiently favourable to induce Mr. Shaw to court publicity. He invited the merchants of Hooblee, and the ryots generally, to visit his land, and compare the exotic with their own fields of indigenous cotton. They generally admitted the superiority of the New Orleans crop, both in quality and abundance of yield, and, although they were not acquainted with the market value of the variety, they offered, in consideration of its intrinsic merits, a higher price for it than was current for native cotton.

Mr. Mercer, the American planter then just transferred to this Presidency from the North-West Provinces, visited Mr. Shaw's fields, and reported of this cotton:—"The individual plants of each are equal to the best I have seen of that description of cotton in India; they are quite as well grown, and healthy, and, judging from the number and size of the bolls now on the plants, as also from the old shells from which the cotton has been picked, I think they have the advantage of any I have seen. The staple, though not equal to the same description of cotton grown in America, is decidedly better than any grown in the North-West Provinces without irrigation. I have now much greater hope of the American cotton becoming a valuable product of India than I had before seeing these fields." [1]

The produce of 10 acres amounted to about 102 maunds of kuppas, which yielded about 34 maunds, or 884 lbs. of clean cotton. An adjoining field of native cotton of similar extent gave only 70 maunds of kuppas, which yielded about 17 maunds, or 442 lbs. of clean wool. [2] Great difficulty was experienced in separating the cotton from the seed, and Mr. Shaw pointed out that, unless this could be overcome by the introduction of some simple and portable machine, the culture of American cotton could never become popular. [3]

Mr. Shaw made an experiment to ascertain the comparative out-turn of New Orleans and indigenous cotton cleaned by hand and by the native foot-roller,

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[1] Revenue Consultations, vol. xxxvi. 1843, page 85.

[2] Revenue Consultations, vol. xxxvi. 1843, pages 1—12.

[3] Revenue Consultations, vol. xxxvi. 1843, pages 57—59.

together with the time occupied by each operation. The following are the details [1] :—

Statement of the out-turn of New Orleans and Indigenous Cotton cleaned by the hand and by the native foot-roller.

Description of Cotton.	How cleaned.	Wool, Seed, or Waste.	lbs.	Seers.	Time in Days.	Expense in Rupees.
American Cotton (30 lbs.)	Cleaned by hand.	Wool.	9 7/8	19 3/8		R. a. p.
		Seed.	19 1/8	39		
		Waste.	0 5/8	1 3/8		
	Total...	...	30	60	60	4 11 0
	Cleaned by the country machine	Wool.	13 3/8	27		
		Seed.	15 5/8	31		
		Waste.	1	2		
	Total...	...	30	60	10	0 12 6
Country Cotton (30 lbs.)	Cleaned by hand.	Wool.	7 1/8	15		
		Seed.	21 1/8	43		
		Waste.	1	2		
	Total...	...	30	60	65	5 1 3
	Cleaned by the country machine	Wool.	7 3/8	14 6/8		
		Seed.	22 3/8	44 1/8		
		Waste.	0 3/8	0 6/8		
	Total...	...	30	60	2	0 2 6

The Bombay Chamber of Commerce reported upon this cotton as follows :— "It is of fair quality, but of rather irregular staple, and, were a considerable quantity produced, the article would bring about Rs. 10 to Rs. 15 per candy more than the best Broach now in the market." [2]

In 1842-43, Mr. Hadow, Assistant Collector of Dharwar, also obtained permission to sow 10 acres of land with Bourbon seed, received from Mr. Elphin-

[1] Revenue Consultations, vol. xxxvi. 1843, page 63.

[2] Revenue Consultations, vol. xxxvi. 1843, page 31.

ston of Rutnagherry. He had rather hastily to select 10 acres of unoccupied black soil a short distance from Gudduk. He adopted the native mode of culture, in regard to the preparation of the ground, and the time and manner of sowing. About a fourth of the quantity failed altogether, on account, Mr. Hadow discovered, of the land having been long over-cropped. The produce amounted to 3 Dharwar candies of kuppas, which, being cleaned by the native foot-roller, yielded about 12 Dharwar maunds, or 312 lbs. of clean cotton, or an out-turn of about one-fifth wool to four-fifths of seed and refuse. The yield of this perennial, the first season, is generally small, and this gave only 31 lbs. of clean cotton the acre.

The Bombay Chamber of Commerce expressed the following opinion on the samples of this cotton which were submitted to them :—" The specimens are considered to be of excellent quality, both as regards colour and staple, though, in the latter point, one appears rather superior to the other ; such cotton, if brought to this market, would be worth, at least, Rs. 12 to Rs. 16 more than the best cotton usually shipped from hence (or say $\frac{3}{8}d.$ to $\frac{1}{2}d.$ per lb. in the home market), and fully Rs. 15 to Rs. 20 more than any Broach of the present season's crop. It has been beautifully cleaned."

The highest price at that time quoted for Broach was Rs. 98, and for Compta Rs. 80 per candy of 784 lbs. Mr. Hadow sold the small quantity produced at a rate equal to Rs. 135 per candy. The expense of cultivation was Rs. 87-6, and the amount realised for the cotton and seed left a loss of Rs. 17-6, or nearly 20 per cent. [1]

In 1843, in consequence of Mr. Shaw's suggestions, Mr. Mercer was appointed to superintend a series of experiments in the Dharwar districts. He was at first assisted by Mr. Hawley, another American planter, and by Mr. Channing. He selected land for an experimental farm at Koosighul, in the Hooblee Talooka, which, although not very good soil, was the best then available. Dr. Wight, of Coimbatore, and others, furnished a supply of exotic cotton seed, and it was deemed desirable, in the absence of a sufficient quantity, to sacrifice the cotton grown by Mr. Shaw during the previous year for its seed, as there were no proper machines for cleaning it. This kuppas was, consequently, given to those ryots who consented to separate and sow the seed.

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[1] Revenue Consultations, vol. xxxvii. 1843, pages 61—69.

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In June 1843, Mr. Shaw issued a proclamation setting forth the advantages of the exotic cotton, offering instructions to those who would cultivate it, guaranteeing to them compensation for loss from bad seed, and urging the absolute necessity of improving the quality of native cotton, to enable the latter to retain a fair place in the market. [1] That season about 545 acres were sown with foreign seed, including 183 acres of the experimental farm. This farm was planted as follows :—

New Orleans	Cotton	80	acres.
Broach	do.	63	do.
Coimbatore	do.	16	do.
Abyssinian	do.	11	do.
Bourbon	do.	10	do.
Sea Island	do.	3	do.

All of these cottons thrived well at first, with the exception of the Broach kind, which, having been too thinly sown, owing to a scarcity of seed, did not look so well as the others. Mr. Mercer reported, in September, "At present the prospect is truly promising. I have seen most of the New Orleans cotton planted by the ryots, and it far exceeds their own in appearance, and they generally seem very much pleased with it." In October he wrote, "The rain during the first half of the month was very heavy, and I am very sorry to say our cotton has suffered in consequence. It has lost its healthy appearance in a good measure, and has shed, and continues shedding, a great many of the flower pods. It is, however, still better cotton than I have before seen in India, though greatly inferior to what I expected, a month ago, it would now be. It will not attain anything like the size I expected, but that is mostly the fault of the soil, for, where a spot occurs that has had a little accidental manure, the plants are a very good size indeed, and would, if all in the fields were equal, certainly yield not less than three hundred pounds per acre. * * * * The native cotton seems to have suffered as much as, or more than, the New Orleans." [2] In January this variety was attacked by disease, "a glutinous deposit, like sirup, covering the leaves with a shining coat that looked like dew," but, notwithstanding, the plants flowered and rapidly formed young bolls. [3]

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[1] Revenue Consultations, vol. xxxvii. 1843, pages 133—137.

[2] Revenue Consultations, vol. xxxvii. 1843, pages 35—41.

[3] Revenue Consultations, vol. xlvi. 1844, page 103.

The following statement[1] shows the details of the first year's experiment (1843-1844) on the Government farm, with the yield per acre of clean cotton :—

Description of Cotton planted.	No. of Fields.	No. of Acres.	Produce.		Quantity of clean Cotton per Acre.	Remarks.
			Seed Cotton.	Cleaned Cotton.		
			lbs.	lbs.	lbs. ozs.	
New Orleans..	No. 1	24	5,397	1,719	71 10	This field has not yielded equally throughout, some small portions being infested with grass, and one portion of it poor land. Rows planted 3 feet apart ; 2 feet would have been amply sufficient.
Do. ...	„ 2	23	3,337	1,068	46 7	Land of this field very poor throughout, also planted, at least, one foot too wide.
Do. ...	„ 3	18	2,538	813	45 0⅔	This land appeared to be very good, but has evidently been greatly impoverished by constant cultivation, for the plants are exceedingly small.
Do. ...	„ 4	8	1,168	374	46 12	Adjoining field; the above remarks are applicable to this field also.
Do. ...	„ 5	7	1,236	397	56 11⅔	A field of waste land containing 19 acres, but so much infested with grass, that 7 acres only of the cotton planted in it has been cultivated.
Total...	...	80	13,676	4,371	Average. 54 10½	
Broach.....	No. 1	16	1,788	586	36 10	A good field, planted in June ; the plants grew large, and were promising previous to October, but the heavy rains of that month completely stripped it of its first pods and leaves.
Do.	„ 2	4¼	964	318	74 13	Planted in July ; good land, and, from being much less advanced than the above, did not suffer so much from the rain during the month of October.
Carried over...	...	20¼	2,752	904	.....	

[1] Revenue Consultations, vol. xlvi. 1844, pages 132 and 133.

TABLE (*continued*)—

Description of Cotton planted.	No. of Fields.	No. of Acres.	Produce. Seed Cotton.	Produce. Cleaned Cotton.	Quantity of clean Cotton per Acre.	REMARKS.
			lbs.	lbs.	lbs. ozs.	
Brought over.	...	20¼	2,752	904	.....	
Broach.....	...	5¾	1,220½	405	70 6	Part of the same field; the missing places replanted with native seed.
Do.	No. 3	37	2,917	808	21 13	Planted last of June. This field had the appearance of first quality black soil, but, except a small ridge on the edge of a nullah, the plants throughout the whole field grew not more than 3 inches high, and produced nothing.
Total...	...	63	6,889½	2,117	Average. 32 0⅔	
Coimbatore ...	No. 1	6	1,489	355	59 2⅔	A piece of first-rate black land, bordering a nullah.
Do. ...	„ 2	10	2,184½	520	52 0	Good land.
Total...	...	16	3,673½	875	Average. 54 11	
Abyssinian ...	No. 1	11	362	89	8 1½	
Total...	...	11	362	89	8 1½	
Bourbon	No. 1	10	10	...	.....	
Sea Island ...	„ 1	3	...	...	.....	Has as yet yielded nothing.

It will be observed that the largest yield was obtained from the Broach and New Orleans varieties, to which Mr. Mercer recommended the future experiments to be principally confined. He stated that the average produce of good native cotton was 26 lbs. of clean cotton per acre, and when very superior 30 lbs. From 40 acres of New Orleans cotton, planted by the ryots at Koosighul, there were gathered 1,922 lbs. of clean cotton, equal to 48½ lbs. per acre.[1] Regarding the Bourbon and Abyssinian kinds, Mr. Mercer reported, "I am

[1] Revenue Consultations, vol. xlvi. 1844, page 127.

constrained *now* to say that I think they never can be cultivated with succcess here, though the matter cannot be fully decided till another year." He added, " I would strongly recommend that our efforts, for the present year, be entirely directed to the extension of the culture of the New Orleans cotton, which has so far proved entirely satisfactory, and whose superiority in every respect has been so decided, that, as far as I know, I believe every ryot who planted it has been well pleased, and is now desirous to increase his cultivation of it this coming season, besides many who have not planted being anxious to secure seed." [1]

After considerable difficulty, five saw-gins were procured from Broach and Coimbatore, and the whole crop of the farm, as well as the New Orleans raised by the ryots, was ginned at the rate of 300 lbs. to 350 lbs. of clean cotton, from each machine, per diem. [2]

Mr. Shaw expressed his confidence in the future success of the exotic cotton, in terms which have since been literally verified. " I have no fears," he wrote, " of the ultimate success of this experiment. The cotton of the Southern Maratha Country now stands at the very bottom, I believe, of the commercial lists of cotton circulated in the Bombay market, but, in the year 1845, I am sanguine enough to hope that it will place itself at the head of that report." [3]

Mr. Mercer stated, " The proportion of cotton to seed is greater (in the New Orleans cotton); above all, it has already got a hold among the native cultivators, who are highly satisfied with it, having in nearly every case reaped a larger crop from it, per acre, than they ever do from the native cotton, besides having realised more than 35 per cent. higher price for it in the market." [4] He stated that " the smallest average yield of the New Orleans planted by the ryots, in 1843-44, was 48¾ lbs. of clean cotton per acre," whilst " the largest quantity from native cotton was 30 lbs." [5]

Mr. Shaw mentioned, " On several occasions when I have visited the fields, I have given to the ryot who has paid the greatest attention to my instructions a small gratuity, the effect of which has been, that the best field of New Orleans cotton of the whole zillah is in the Dharwar Talooka, and I think that these same measures will induce the ryots to gather their cotton cleaner." [6]

Mr. Mercer was authorised, at Mr. Shaw's suggestion, to purchase New Orleans cotton to the extent of about Rs. 5,000, in case the ryots could not obtain

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[1] Revenue Consultations, vol. xlvi. 1844, page 117.
[2] Revenue Consultations, vol. xlvi. 1844, page 129.
[3] Revenue Consultations, vol. xxxvii. 1843, page 55.
[4] Revenue Consultations, vol. xlvi. 1844, page 127.
[5] Revenue Consultations, vol. xlv. 1844, pages 77—97.
[6] Revenue Consultations, vol. xxxvii. 1843, page 109.

a fair price in the market for any they might produce. To obviate the difficulty and expense of transporting kuppas, small gin houses were erected in various parts of the districts, in order to clean the exotic cotton grown by the ryots, without which it was evident that the cultivation must have been checked. Twenty-four churkas, costing each Rs. 2, were likewise sent to Dharwar from Broach at the superintendent's request. [1]

Mr. Shaw forwarded to Bombay small samples of New Orleans and native cotton cleaned by the saw-gin, and of country cotton cleaned by the Guzerat churka. He stated that his object was chiefly to ascertain their relative values when thus prepared. The Chamber of Commerce expressed the following opinion upon these points :—" The New Orleans is considered a fine sample, but of short staple, apparently cut by the gin, and weak and uneven. It is valued at Rs. 115 to Rs. 120 per candy. The sample of native cotton, cleaned by the saw-gin, is considered superior to the New Orleans in every respect, and to any native cotton yet produced in the Bombay market. That cleaned by the churka is also of excellent quality, well cleaned, and nearly equal to the ginned sample. It is valued at Rs. 10 to Rs. 15 per candy above the best Broach cotton in the market, or Rs. 118 to Rs. 122 per candy." [2] Mr. Shaw, however, stated, in contradiction of this report, that even in Dharwar the New Orleans cotton was realising higher prices than indigenous. [3] He thus enumerated the comparative advantages of the native and New Orleans cotton :—

" 1*stly*.—Its yield per acre is considerably greater than the native produce.

" 2*ndly*.—It is far more easily gathered free from dirt, &c., its calyx being tough and thick, while that of the native cotton is brittle, and becomes, when dried by the sun, mixed with the cotton. The native cotton when ripe is also more liable to fall to the ground, and thus become injured.

" 3*rdly*.—The proportion of wool in 100 lbs. of New Orleans is 33 lbs. wool, 66 lbs. seed, and 1 lb. waste, whilst in the native cotton it is 75 lbs. seed, 24 lbs. wool, and 1 lb. waste."

The Chamber of Commerce gave the following report upon the first year's produce of the experimental farm :—

" No. 3. *Broach*.—Good in colour, and very clean, but staple extremely tender ; value Rs. 80 per candy.

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[1] Revenue Consultations, vol. xxxvii. 1843, pages 201—222.
[2] Revenue Consultations, vol. xlv. 1844, pages 77—97.
[3] Revenue Consultations, vol. xlv. 1844, page 155.

"No. 4. *Mixed Broach.*—Very good both in colour and staple, and worth Rs. 95 to Rs. 100 per candy.

"No. 8. *Coimbatore.*—Coarse and uneven, and of rather weak staple, but clean and of fair colour; value Rs. 80 to Rs. 85 per candy.

"No. 12. *New Orleans.*—Fair in colour and well cleaned, with a fine but short and weak staple; value Rs. 85 per candy.

"No. 13. *Abyssinian.*—Good in colour, and well cleaned, but staple short and weak; value Rs. 85 per candy." [1]

In March 1844, Mr. Shaw wrote to Mr. Elphinston, who proposed to send to him some Bourbon seed, begging him not to do so: "I am fully convinced," he said, "that Bourbon cotton is not an article worth cultivating in these districts. * * * In consequence of the experiments made by Mr. Hadow, and the remarks published by the Chamber of Commerce, on a specimen of that cotton transmitted by Mr. Hadow, I was for a time doubtful whether it might not be desirable to increase the cultivation of Bourbon cotton, but the results of these experiments, coupled with all I have myself seen and heard, have fully satisfied me, and confirmed me in the opinion I formerly stated, that Bourbon cotton, however valued as an article of commerce, will hold out no encouragement to induce a ryot to cultivate it with a prospect of realising a profit.

"Mr. Hadow's experimental field did not pay its expenses the first season, and was made over to a German gentleman in its second year, when the crop is larger; but, even with this advantage, Mr. Hiller has determined to root up the plants, and, this season, to grow on the land Mexican or New Orleans seed.

"The great disadvantages under which Bourbon cotton here strives are—

"1*st.*—That its yield is very small.

"2*nd.*—That, although it is always bearing, and requiring cropping, yet it does not yield a sufficiency at a time to defray the expense of picking it.

"3*rd.*—That the cotton, when ripe, falls out of the bolls on the ground; an attempt, therefore, to introduce an article of this description might interfere with the success of the New Orleans cotton, which has succeeded beyond my expectations."

Mr. Mercer, agreeing entirely with this opinion, stated, in regard to Bourbon cotton, "My experience shows it to be even less productive than native cotton." [2]

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[1] Revenue Consultations, vol. xlv. 1845, page 73.

[2] Revenue Consultations, vol. xlv. 1844, pages 37, 39, and 57.

With a view to encouraging the production of good cotton in the Southern Maratha Country, by affording the ryots a ready market, Government proposed to establish an agency there for the purchase of the staple. Mr. Shaw, however, argued that it was not desirable for Government to enter into competition with private merchants, and that it was falacious to prop up either a trade or a cultivation that did not pay in the ordinary course of business. The project was consequently abandoned. [1]

The necessity of increasing the number of saw-gins was strongly represented, the introduction of the New Orleans cotton absolutely requiring the simultaneous provision of this machine for separating its seed from the wool. Mr. Shaw was allowed, at his own discretion, either to gin the ryots' cotton *gratis*, or to make a fair charge for doing so. At first he adopted the former course, but as the demand became great, he soon made the ryots pay the entire expense of ginning, and, subsequently, he refused to allow badly-picked kuppas to be cleaned at all by the Government gins, and always gave the preference to the parcels which had been most carefully gathered. The feeling with regard to the saw-gin at that time was thus described by Mr. Shaw:—"Two frivolous objections have been brought aganist the gins—1*st*, That they will throw a number of persons out of employ; and 2*ndly*, That they diminish the weight of the cotton, by rejecting a good deal of dirt and filth that is ground into the cotton when cleaned by the foot-roller. This last argument," he continued, "although, perhaps, inadvertently used by a single ryot or inferior merchant, will, I trust, tend to prove the necessity of some legislative enactment to prevent wilful injury being inflicted on the great staple of this country." [2]

In 1844-45 the cultivation of exotic cotton was extended to about 2,749 acres. A second small experimental farm of superior land was selected at Gurrug, and placed under the care of Mr. Hawley. The distribution of the two farms was as follows:—

Koosighul ..	New Orleans	150 acres.
	Broach	16 do.
	Bourbon	10 do.
	Abyssinian	11 do.
Gurrug	New Orleans	146 do.
	Broach	22 do.

The land this year was partly manured, and the plants were more thickly set, being only at intervals of 26 inches from each other, instead of three feet

[1] Revenue Consultations, vol. xliv. 1844, pages 179—204.
[2] Revenue Consultations, vol. xliv. 1844, pages 214 and 215.

apart, as in the previous season. Mr. Mercer reported, in September 1844, "The crop of New Orleans cotton is larger than any I have previously seen in India of the same age, and with healthier foliage, especially at Gurrug, where some fields which had manure would be creditable on the banks of the Mississippi. The general run of the ryots' crop of the same cotton is larger and healthier than last year." [1]

The crops on the Koosighul farm, however, were subsequently attacked by a species of bug, and also by caterpillars, which stripped off the leaves in many parts; but on the commencement of the cold nights, these enemies disappeared, and the plants partially recovered. [2]

The following is a tabular statement [3] of the result of the experimental culture on the farms in 1844-1845, in which, it will be observed, the superior yield of Broach cotton was again remarkable, and it will be remembered that upon several occasions this variety was classed above the New Orleans:—

Statement of Cotton produced on the Farms of KOOSIGHUL *and* GURRUG *in* 1844-45, *showing the yield of each variety to the Acre.*

	Number of Acres.	Clean Cotton.	Average per Acre.
Koosighul.	Acres.	lbs.	lbs. ozs.
New Orleans Cotton, 1st sort	75	1,101	14 10¾
Do. do. 2nd sort	75	624	8 5
Broach Cotton	16	1,010	63 2
Bourbon do.	10	220	22 0
Abyssinian do.	11	118	10 11½
Total..	187	3,073	
Gurrug.			
New Orleans Cotton, 1st sort	146	12,954	94 10½
Do. do. 2nd sort		867	
Broach do.	22	2,721	123 10¾
Total..	168	16,432	

[1] Revenue Consultations, vol. xlvi. 1844, page 167.
[2] Revenue Consultations, vol. xlvi. 1845, page 267.
[3] Revenue Consultations, vol. xlv. 1845, page 183.

At the beginning of 1845, Mr. A. N. Shaw, who had repeatedly been thanked, both by the local Government and the Court of Directors, for his unwearied exertions in the cause of agricultural improvement, was obliged to leave the district in bad health. The Bombay Government expressed much regret at "the necessity of his absence from the Southern Maratha Country at a time when his zealous efforts to further the improvement of cotton cultivation and its preparation for the market had begun to produce their effect." [1]

At the suggestion of the Court of Directors, as an encouragement to the ryots, the Bombay Government sent the following order to Mr. Goldsmid, who had succeeded Mr. Shaw as Acting Collector of Dharwar :—"Government are pleased to empower you, in conjunction with Mr. Mercer, to purchase from 500 to 1,000 bales of cleanly-picked and carefully-ginned New Orleans cotton, at a price so much above that of cotton in the state in which it is usually brought into the market as the differences of real value will justify. You should bear in mind that the object of Government is simply to demonstrate to the ryots the advantage of properly preparing their produce; that the Government does not enter into these purchases as a speculation for profit; and that, if the merchants will give the same prices which you may think it right to offer, you should withdraw from competition with them." [2]

Mr. Mercer had already made purchases of New Orleans cotton from the ryots, both on his own account and for mercantile firms, and he gave the following information regarding his operations :—

In 1845 he had paid at the rate of 10 annas a maund for kuppas, or about 35½ per cent. less than he had paid during the previous season. At 100 maunds to the Bombay candy of clean wool, this price made the first cost of that quantity Rs. 62½; adding expenses incurred to and in Bombay, together with freight and insurance to Liverpool, the cotton cost, laid down there, about 4¼*d.* per lb. For country cotton he had offered 7 annas a maund, the highest safe price, without success.

In purchasing New Orleans cotton, he deducted from 1 to 2 annas a maund for dirty or trashy parcels; but he seldom required to resort to this, as the kuppas was generally very fairly gathered. He stated, "I think such will always be the case with this description, for unless there is very great and intentional negligence, the ease with

[1] Revenue Consultations, vol. xlv. 1845, page 275.
[2] Revenue Consultations, vol. xlv. 1845, page 265.

which it is gathered free from trash will secure its being brought clean from the fields, and I think only in event of its receiving heavy rains after the pods burst is there any likelihood of the ryots bringing any large quantity dirty or trashy." [1]

The Bombay Chamber of Commerce reported upon the New Orleans cotton of the season as follows :—" The cotton in question has been examined by the members of the Chamber. * * * Though in other respects of fair quality, it has a short and weak staple, and on that account would not fetch more than Rs. 85 to Rs. 90 per candy; it would be very suitable for the China market, but is not at all adapted for exportation to England, and the Committee think that the expediency of putting it up to sale here, instead of shipping it to Liverpool, as they understand is intended, might be advantageously taken into consideration." [2]

Government, however, adhered to their resolution, and the cotton grown upon the farms, as well as the New Orleans purchased from the ryots, was shipped to Liverpool by the *Earl of Eglintoun* (19 bales), *Lucinda* (59½ bales), and the *Clarendon* (204½ bales).

The shipments per *Earl of Eglintoun* and *Lucinda* were sold, at the close of 1845, and the beginning of 1846, for 3¾*d.* per lb.,[3] the range of prices for the best Surats at the time being 4*d.* to 6*d.* per lb. A parcel of native cotton from Broach, of the season of 1844, by the former vessel, brought the same price.

The following report was made upon the cotton per *Clarendon*, by the Liverpool brokers, Messrs. Cunningham and Hinshaw [4] :—

153 Bales New Orleans cotton (purchased from ryots). " Pretty long in staple, but rather light and tender as compared with American cotton; good in colour, but a little leafy, valued at 6*d.* per lb." (sold at 6*d.* to 6¼*d.*)

29 Bales New Orleans cotton (produced on Government farms). Similar in character to the above, but rather closer and longer in staple (4 bales false packed), valued at 6¼*d.* per lb. (sold at 6*d.* to 6¼*d.*)

9 Bales New Orleans cotton (purchased from ryots). Clean and good in colour ; pretty good in staple, though rather light and tender (3 bales false packed), valued at 6½*d.* per lb. (sold at 6¼*d.*)

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[1] Revenue Consultations, vol. xlv. 1845, pages 278—297.

[2] Revenue Consultations, vol. liv. 1846, page 61.

[3] Revenue Consultations, vol. liv. 1846, pages 99 and 100.

[4] Revenue Consultations, vol. li. 1848, pages 42 and 43.

11 Bales Broach cotton (produce of Government farms). "Pretty long in staple, but wanting clearness and strength, valued at 6¼*d.* to 6½*d.*" (sold at 6¾*d.*)

½ Bale Bourbon cotton (produce of Government farms). "Long and fine in staple, but neppy, valued at 6¾*d.*"

1 Bale indigenous cotton. "Pretty good in staple, a little neppy, high coloured, with a little leaf, valued at 6*d.*"

1 Bale Abyssinian cotton. "Tender and neppy in staple; clean, fair in colour, valued at 6*d.*"

The shipment per *Clarendon* realised a profit of 32 per cent.

Mr. Mercer at one time expressed a belief that the New Orleans plants might be treated as perennials, but further experience proved that they were not productive the second season, and they were, consequently, rooted up.

There were, at the end of 1844, twelve saw-gins in the district; seven of these had been sold to private traders, and the remainder were set up at Koosighul and at Dharwar. The Collector had been allowed to dispose of gins to the ryots, the purchase money being considered as tuccavee advances, and repaid accordingly. Cotton was ginned for the ryots by the Government machines, when they were not required for the produce of the farms, the ryots finding labour and paying all expenses.[1] Mr. Mansfield, the Acting Collector, a short time afterwards stated, "No person will buy gins, at present, from Government, but numbers are willing to hire them, and if there were twenty more gins than we have at present, they would all be hired out."[2]

In consequence of the repeated recommendation of the Collector and Mr. Mercer, it was decided, at the beginning of 1845, to abolish the two experimental farms. They were no longer requisite, and, being cultivated precisely on the native system, they served no purpose of model farms. The sole deviation from the native system which had been introduced was, that although no ryot planted cotton two years consecutively on the same soil, Mr. Mercer did so on the Koosighul farm, and with very indifferent success. One great objection to the farms was, that they required the presence of the American planters precisely at the time when they could be most usefully employed in superintending the harvest operations of the ryots.

In lieu of these farms, the planters were allowed to contract with the ryots for the cultivation of New Orleans cotton under their own direction. They accordingly contracted for about 836 acres, at the rate of two rupees an acre

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[1] Revenue Consultations, vol. xlv. 1845, pages 237 and 238.

[2] Revenue Consultations, vol. liv. 1846, page 137.

in excess of the rent,—the picking of the crops to be at their expense, and the produce to belong to Government. [1]

In the season of 1845-46 the cultivation of New Orleans cotton increased to 11,176 acres, and Mr. Mansfield reported, "It is gratifying to be able to state, that wherever the season has been favourable for the native crops of grain, &c., the New Orleans plant has flourished very vigourously."

The following is a statement of the extent to which contracts were made with the ryots, and the amount of cotton produced per acre [2]:—

Talookas.	No. of Acres.	Clean Cotton.	Average per Acre.	
			Kuppas.	Clean Cotton.
		lbs.	lbs.	lbs.
Bunkapoor	532¼	46,322¼	261	87
Yanigul	304	4,823	47½	15¾

The contract system was confined to this one season, and was not renewed in 1846-47, when the increasing cultivation was left wholly in the hands of the ryots, with a virtual pledge on the part of the Government to purchase the crop if necessary. [3]

The cotton produced by the ryots in fulfilment of contract, and the quantity purchased from them on account of Government, amounted to about 563 candies, which reached Bombay in January 1847. Government were strongly urged to sell a portion in Bombay, instead of shipping the whole to England. It was represented that it was most desirable at once to fix the real value in Bombay, and thus influence the local demand, instead of leaving the result uncertain for at least a year, as would be the case if the cotton were shipped to England. Government hesitated to adopt this measure, with the order of the Court for 5,000 to 6,000 bales before them, especially as it had been given in order to remove, by so considerable a shipment, "the impression that all small consignments of East India cotton of good quality were of garden growth, or that they had had so much care bestowed on their cultivation, as to afford no criterion of what might be effected on a large scale." [4]

The representations of the Collector of Dharwar and of the Chamber of Commerce, however, decided them to sell a portion of the experimental

[1] Revenue Consultations, vol. xlvi. 1845, pages 173—201, and 329.
[2] Revenue Consultations, vol. lviii. 1847, pages 17—19.
[3] Revenue Consultations, vol. liv. 1847, page 133.
[4] Revenue Consultations, vol. liv. 1847, pages 1— 22.

cotton from each district in Bombay. 500 bales were, consequently, disposed of by public auction, and the following are the particulars of the sale [1] :—

No. of Bales.	Description of Cotton.	Names of Purchasers.	Rate per Surat Candy.
			Rs. a. p.
14	New Orleans, from Belgaum.....	Messrs. Bates & Co....	120 0 0
12	Broach Cotton, the produce of Belgaum.....	„ Lancaster & Co.	125 0 0
67	Khandeish Cotton, the produce of Dhurrumgaum	„ Peel, Cassels & Co.	107 0 0
58	Do. do. do. do....	„ Lancaster & Co.	124 0 0
42	Do. produce of Julgaum.....	„ Lancaster & Co.	132 0 0
307	Dharwar (indigenous) Cotton, the produce of that collectorate.	„ Higginson & Cardwell	113 0 0
500		Average...Rs.	120 2 8

"At the date on which the above cotton was sold, the market price of the best cotton was—

For Surat.....Rs.	100	0	0	per candy.
For Compta..... „	85	0	0	do.
For Oomrawuttee ..... „	87	0	0	do.
Average..Rs.	90	10	8	

which left a very large margin, viz. Rs. 29-8 per candy, or about 30 per cent. in favour of the experimental cotton."

In a letter which Mr. John Peel addressed to the *Manchester Guardian*, dated 21st February 1848, he mentioned that the 67 bales of Khandeish cotton, purchased by his Bombay firm as above stated, had been sold at 6½*d.* a lb., "giving a handsome profit on the transaction." Speaking of the New Orleans cotton, he thus stated its position:—"On the 15th of January its quotation was Rs. 114, whilst the highest quotations for Surats were Rs. 74. The return to the cultivator, upon an acre of ground, is thus doubled, for he gets 50 per cent. more weight of cotton, and an increase of 50 per cent. in value. One thousand bales of the Dharwar New Orleans cotton were shipped to Liverpool in the *Quentin Leitch*. At the suggestion of the Manchester Commercial Association, 500 bales of this consignment were forwarded to that

[1] Rev. Cons. vol. lvii. 1847, pp. 229—231; & Summary, 1830—1848, paras. 473 & 474.

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city for sale, samples of which were exhibited in the Exchange at the beginning of September. In the course of the day 314 bales were sold at 6¼*d.*, other 30 bales were sold on the 17th at 6¼*d.*, on the 30th 127 bales at 5⅝*d.*, and the remainder a month later at 4¾*d.*, the price of American cotton during all this time having been rapidly declining. The other 500 bales were sold at 4¼*d.* and 4½*d.* per lb. The shipment left a profit of nearly 23 per cent. [1]

The following are particulars as to the working qualities of the Dharwar New Orleans cotton by the *Quentin Leitch*:—

"*General character of the Cotton.*—Moderate staple, rather curled; not very regular in length. No. of yarn spun, No. 26 mule.

Loss as compared with common Surat.

	Dharwar Cotton.	Common Surat.
"Before carding, loss on 332 lbs.	21 lbs.	38¾ lbs.
"After carding, loss on 332 lbs.	16 lbs.	28⅞ lbs."

And a spinner stated, "The experimental cotton is very well suited for all Nos. of weft under 40s, and works quite as well as boweds of good middling quality, which will always regulate the price in this market." [2]

In 1846-47, the cultivation of New Orleans cotton was extended to 22,331 acres, and the produce was, in great part, bought by native merchants on their own account at about Rs. 15 the candy above the price of indigenous cotton. The use of the Government gins was granted to them, free of charge, as an encouragement to their enterprise. [3]

Mr. Hawley resigned in 1846, and Mr. Blount, another American planter, was transferred from Khandeish to replace him. Mr. Mercer likewise left the Dharwar Collectorate at the end of the same year.

In 1847, Messrs. G. S. King & Co. gave the following report of some saw-ginned Dharwar and Compta cotton, procured through Mr. Mercer, which had been practically tested by Lancashire spinners:—

Dharwar New Orleans Cotton.—"It is reported as of good staple and colour, and very clean, the staple not injured by the ginning. It was valued, on 17th July 1847, at 6½*d.* per lb., at which date the best Surat cotton was selling in Liverpool at 5⅞*d.* per lb., and the usual qualities shipped from here, say 'middling to fair,' at 4¼*d.* to 4½*d.* per lb. Our friends say that it is unexceptionable in every respect, and had been much approved of by all who had

[1] Revenue Consultations, vol. li. 1848, pages 80—82.
[2] Royle, Culture of Cotton, pages 104 and 105.
[3] Revenue Consultations, vol. liv. 1847, pages 91—96.

seen it. They have handed us the comparative result of the spinning of New Orleans cotton, and of what we had shipped to them, which is as follows :—

Description.	Produce.		Loss.		Per-centage of Loss.
	lbs.	ozs.	lbs.	ozs.	
50 lbs. 'ordinary' New Orleans cotton worth 6¾*d.*—					
When willowed	47	8	2	8	
When blown and lapped	45	6	2	2	
When carded and spun	41	4	4	2	
50 lbs. produced 41¼ lbs. yarn	....		....		17½
50 lbs. Dharwar New Orleans—					
When willowed	48	12	1	4	
When blown and lapped	47	1	1	11	
When carded and spun	42	8	4	9	
50 lbs. produced 42½ lbs. yarn	....		....		15

"The yarn was quite equal to that made from the ordinary Orleans cotton.

"We find the saw-ginned Compta full of small broken fragments of leaf. This is the glaring defect of it. The cotton is full of an infinity of minute particles, all adhering most pertinaciously to the cotton, so that it is utterly impossible to eject them. This is most unfortunate, as the cotton itself is about the best specimen of East India cotton we ever worked. In the carding and spinning it has given unqualified satisfaction ; but all these good qualities are rendered null by the impossibility of eradicating this small leaf-dirt, for the yarn exhibits so many specks of dirt as to be almost unsaleable." [1]

The number of saw-gins in the district had now increased to twenty-nine, and Mr. Mercer had been able to make up small machines at about one-half the cost of those imported from America. Mr. Mansfield made an urgent application for a supply of the saws and other parts of the gin, in order that they might thus be put together and cheaply sold to the ryots. He stated, "From 50 to 60 saw-gins, I have no doubt, would be immediately purchased by different sowcars, and, after the first season, the demand would continue for a very simple reason, viz. the facility with which they could throw cotton into the market with such machines in their own possession." [2]

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[1] Revenue Consultations, vol. lii. 1847, pages 233—235.

[2] Revenue Consultations, vol. lix. 1847, pages 47—60, 151.

About 20,502 acres of land were sown by the ryots with New Orleans cotton seed in 1847-48. The produce was at first expected to amount to about 2,050 candies, but the Collector afterwards stated, "Probably a third of this quantity may have been lost, owing to the unfavourable season." [1]

Mr. Goldfinch, the First Assistant Collector in charge, gave the following more detailed report in February 1848 [2]:—

"The fall of rain was very late, and the planting of the New Orleans variety was delayed to a later period than that which has been considered the most favourable time for planting it. The indigenous cotton is generally planted later, and does not, I am given to understand, require so much moisture. The cultivators consider the present failure to have been caused by the delay in planting, and scantiness of moisture, and in this opinion I am inclined to concur; but there are some circumstances connected with this partial failure which raise doubts whether there may not be some other causes besides those above noticed.

"To the eastward of Gudduck, in the Dummul Talooka, where the rain was very deficient, I am informed that the plant has not attained a greater height than five or six inches. This is doubtless owing to scanty rains. In the Raneebednoor neighbourhood, though there the rain was more scanty than usual, the plant came up well, and was apparently healthy, but about the middle of November, without any apparent cause, it withered and died in some fields; in others it did not die, but withered, and gave no flower, and consequently no cotton. In Bunkapoor, where the rains were heavier, and the soil naturally more moist, the New Orleans is better than in any other locality, but nothing like what it was last year. It is also remarked that the plants are very far apart, as if much of the seed was bad, and the bolls are not nearly so numerous on the plants as they have been hitherto.

"Whether I am right or not in anticipating a decrease in the cultivation of New Orleans," Mr. Goldfinch continued, "the event will show; but, at all events, I beg to deprecate any more 'persuasion.' So long as Government interferes about its cultivation, it will be considered an exotic—as something which belongs to the 'sirkar' and not to the ryot, while the cultivator of it, being liable to be continually sent for to the cutcherry to answer queries regarding the state of his crop, and to receive cautions about picking, &c., all of which inconveniencies are included in the word 'upudrao'* (constantly applied to it by the ryots), have not a little tended to create a prejudice against it."

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[1] Revenue Consultations, vol. lix. 1848, pages 219 and 220.
[2] Revenue Consultations, vol. liv. 1848, pages 297—306.
* Injury, annoyance, molestation.

The village authorities, as might have been expected, had exceeded the instructions of their superiors, and had attempted to gain credit for zeal, by imperatively prescribing the times of sowing, weeding, and picking. Mr. Bell, the Collector, stated, that in consequence of this injudicious interference, the ryots preferred cultivating the indigenous cotton, in regard to which they were not molested. [1]

The anticipations of a decline in the cultivation of exotic cotton in 1848-49 were, unfortunately, fully realised, and it actually declined from 20,502 acres, planted during the previous season, to 3,351 acres, as shown by the following table [2]:—

Statement of New Orleans Cotton cultivation in the DHARWAR *Collectorate during the years* 1847-48 *and* 1848-49.

TALOOKAS.	Extent of Cultivation in 1847-48.			Extent of Cultivation in 1848-49.		
	Beegahs.	G.	P.	Beegahs.	G.	P.
Dharwar	353	19	3¼	3	30	0
Nowlgoond	8,634	16	1	648	0	0
Dummul	6,276	6	4¾	465	31	0
Bunkapoor	1,467	16	0	1,016	15	0
Hangul	364	27	3¼	117	32	0
Hooblee	723	17	0	4	33	0
Raneebednoor	2,561	6	11¼	1,058	36	0
Kode	121	31	5	35	23	12
Total	20,502	20	4¼	3,351	0	12

Government ordered an inquiry into the circumstances mentioned by Mr. Bell, in order to ascertain whether any kind of compulsion had been employed to extend the cultivation of exotic cotton, as was implied by the application to it, by the ryots, of the term "Upudrao."

On examination, the following circular orders, issued to the Mamlutdars by former Collectors, were produced:—

Circular Order to the Mamlutdar.

"You and the mahalkurrees in your talooka are to take much pains, and cause the ryots to sow as much of the seed of the American (vilaitee) cotton as possible; and on the 1st September you are to report how many acres, and how much seed, has been sown in each village.

"Make the ryots understand that, if they will sow the seed early, it will be to their advantage.

3rd July 1847."

[1] Revenue Consultations, vol. lx. 1848, page 29. [2] Ibid, vol. liv. 1848, page 53.

Order to the Mamlutdar of Dummul.

In your charge there are to be sown this year 3,000 acres of land with American cotton seed, and in your mahalkurree's charge 2,000 acres. Mr. Mercer, superintendent of cotton experiments, will send as much seed as will be required to sow the above quantity of land. You are to receive it, and make arrangements for sowing it.

4*th June* 1846.

The native officials, in their injudicious zeal, had doubtless carried out their instructions in a very authoritative manner, and depositions taken from a number of ryots in different parts clearly demonstrated that they had cultivated the New Orleans cotton under the impression that the order to do so was imperative. [1]

In reporting the important decrease of cultivation which had taken place, Mr. Bell made the following statement:—

"I have delayed reporting this circumstance for a short time, in order that I might have the means of satisfying myself perfectly as to the causes of this sudden falling off, which, I feel sure, will be a subject of serious disappointment to Government, and to the home authorities. In order to obtain the fullest information, I have personally, and by writing, obtained the statements of the principal ryots in the cotton districts. I have consulted parties interested in the cotton trade, and I have had much conversation with the superintendent of the cotton experiments, Mr. Blount, who has lately visited the southern cotton districts. This gentleman promised me a report of his views and opinions of this matter, but, having waited for it for several days, I am now obliged to lay this subject before you without it. However, as I am acquainted with Mr. Blount's opinions, and generally concur in them, I hope the absence of his report, which shall be forwarded as soon as received, will not be considered an important omission.

"The chief cause of the decrease of cultivation this year is, there can be no doubt, the fact that the cultivators have, for the last two or three years, been in a great measure compelled to cultivate the New Orleans cotton. The mamlutdars, misapprehending the tenor of orders issued by the late Collector, and by Mr. Mansfield, when Acting Collector, have carried their interference with the cultivators in behalf of this cotton beyond mere persuasion, and the people have no hesitation in declaring that, having for several seasons cultivated the New Orleans cotton in obedience to the orders of the Government, and annu-

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[1] Revenue Consultations, vol. lxxviii. 1849, page 69.

ally suffered loss by so doing, they gladly abandoned it when they were given to understand that the cultivation of this cotton was optional with themselves.

"It is chiefly in the talookas of Dharwar, Hooblee, Nowlgoond, and Dummul that this cause has operated to check the cultivation of the New Orleans cotton; and from all I can gather, I am of opinion, in which Mr. Blount agrees with me, that the climate of these districts is not so favourable to the growth of this cotton as that of Raneebednoor and Bunkapoor. The crops have always, it would seem, been deficient in the Nowlgoond Talooka, and also, with a few exceptions, in Dharwar and Hooblee. The south part of Dummul is somewhat more favourable than the north, but the Raneebednoor Talooka is the most favourable in the whole zillah, and here the cultivators are, I understand, ready to cultivate the New Orleans cotton if they are insured a ready market for it.

"The variation of climate in the different parts of this collectorate, as respects its suitableness to the growth of this cotton, is caused by the difference of moisture. It is a matter of general observation that the northern districts receive a smaller supply of the early rains than those to the southward, and it is said that the New Orleans cotton requires a constant supply of moisture in the early stages of its growth.

"The next cause which has discouraged the growth of the New Orleans cotton, is the impossibility of freeing it from its seed by the employment of the same means as are used with the native cotton. The cultivators are, in consequence, greatly at the mercy of the dealers, who are in possession of saw-gins, and they complain that they are often kept waiting at a market for days before the dealers will give them a reasonable price for their cotton, which is not saleable to any but the few merchants who, having saw-gins, can profitably deal in the New Orleans cotton." [1]

Mr. Blount made the following report:—

"I have made frequent inquiries of the ryots and native officials as to the objections which exist against planting the New Orleans cotton. Much of their objections is mere prejudice in favour of their own plant, for, in many parts of the district, it is admitted that the one produces as well as the other, and the produce has been sometimes in favour of the New Orleans. In bad seasons, such as the last, they state both plants to be alike unremunerative; but, as the New Orleans has been introduced by Government, they seem to think it should grow with half cultivation, and whether there is rain or not. There are other objections to it, however, which appear to have some foundation, which are,

[1] Revenue Consultations, vol. liv. 1848, pages 437—443.

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they have no machines that will clean this cotton, and, if they grow it, must of necessity sell it to the gin owners. These men, they say, do not deal fairly with them, but use unfair weights, and otherwise annoy them when they bring it to market by not making an immediate purchase, but keep them waiting some time for days until they submit to take the price the dealer may think fit to offer. On inquiring if the same thing did not take place in the sale of native cotton, the answer was, not to such an extent, for that there was more competition, as they could clean the native cotton in their own families, and could always find a purchaser for the cleaned cotton; but that with the American, there were only a few men who dealt in it, such as were able to purchase the machinery for cleaning it; and that there was but little competition, and frequently none, for the purchase of this cotton. I then asked them, if Government would place a gin in the village for the use of the ryot, charging a certain price per maund for the use of the gin in cleaning the cotton, if they would then plant the American cotton, as they would then be able to clean the cotton themselves, when the dealers refused to give a satisfactory price, or if any of them were able to spend 30 or 40 rupees for a small gin which could be worked in their own families. The answer was, the placing a gin in the village, as proposed, would do away with their objection, and they would the next season plant American cotton, and that also there were many ryots able to own a gin at 40 rupees, and would purchase such gins."

Measures had already been adopted to provide a more plentiful supply of gins, and, as an encouragement to the ryots, Mr. Bell, at his own suggestion, was authorised to purchase the whole crop of New Orleans from them.[1]

In November 1848, the Collector reported of the growing exotic crop, "With all the advantage of a season as favourable as possible for its growth, I must state that the plant is not so strong in appearance as that of the native cotton. The seed of the former has invariably vegetated with less regularity than the latter, and there is a greater difference in the healthy appearance and size of the plants in different parts of the same field. In low, protected spots it has attained greater perfection than in the open parts, while the native cotton, in similar localities, is equally luxuriant throughout all parts of a field."[2] Mr. Blount wrote that the crop was a fair one, averaging, it was supposed, about 280 lbs. of kuppas per acre. "It produced in every instance equally as much per acre as the native, and in some instances much better." The purchases on account of Government he calculated cost, laid down in Liverpool, as follows :—New Orleans $3\frac{7}{16}d.$, and native cotton $3\frac{1}{2}d.$ per lb.

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[1] Revenue Consultations, vol. liv. 1848, page 457. [2] Ibid, vol. lxxviii. 1849, page 41.

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In 1849-50, the cultivation of New Orleans cotton again increased to 15,573 acres. The Collector of Dharwar reported to Government, "The cultivators in a large portion of this province are still disinclined to resume its cultivation, and my own opinion, based on past experience, is, that the climate of some of the districts, very favourable to the indigenous cotton, is inimical to the American plant, being too dry. * * * In other districts, however, where the American plant has succeeded excellently for two seasons, the plant is in high favour, and I have little doubt that the cultivation of it will increase considerably, and that, eventually, the American cotton will displace the indigenous plant; but it must never be forgotten that the cotton crop is not sufficiently remunerative to the cultivator to supersede the cultivation of other crops, indispensable for food for man and beast, to an extent which will sensibly contribute to supply the home market." [1]

The result of the season was highly satisfactory, and produced its natural effect in a considerable extension of cultivation the following year. The report given was, "The crop of New Orleans has been very abundant, and the prices have been highly remunerative; but what is most to be rejoiced at is the fact that the cultivators, by holding the staple, have obtained a large share of the profit." [2]

In 1850-51, about 31,668 acres were planted with New Orleans cotton, and the cultivation of this seed has, with slight occasional fluctuation, continued increasing up to the present time.

The progress of the exotic in each talooka may be observed in the following tabular statement:—

Statement showing the cultivation of New Orleans Cotton in each Talooka during the Seasons 1842-43 *to* 1851-52.

Talookas.	Seasons.									
	1842-43		1843-44		1844-45		1845-46		1846-47	
	A.	G.	A.	G.	A.	G.	A.	G.	A.	G.
1. Dharwar	4	0	70	0	693	0	350	10	510	11
2. Nowlgoond	....		....		109	0	3,660	5	6,995	24
3. Dummul	10	0	212	0	924	31	2,322	0	7,716	36
4. Bunkapoor	....		6	0	44	6	1,083	30	3,961	27
5. Hangul	....		....		14	1	158	0	690	21
6. Hooblee	10	0	256	0	924	6	2,908	9	1,168	32
7. Raneebednoor ..	3	24	....		20	20	375	32	1,014	12
8. Kode	....		1	0	19	16	317	34	273	4
Total..	27	24	545	0	2,749	0	11,176	0	22,331	8

[1] Revenue Consultations, vol. li. 1850, pages 5 and 6. [2] Ibid, vol. lvii. 1850, page 173.

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TABLE (*continued*)—

TALOOKAS.	SEASONS.									
	1847-48		1848-49		1849-50		1850-51		1851-52	
	A.	G.	A.	G.	A.	G.	A.	G.	A.	G.
1. Dharwar	353	19	3	30	8	28	18	0	6	25
2. Nowlgoond	8,634	16	648	0	2,715	32	3,602	38	3,773	29
3. Dummul	6,276	6	465	31	3,046	2	5,491	2	7,349	33
4. Bunkapoor	1,467	16	1,016	15	4,889	37	12,779	12	16,601	19
5. Hangul.....	364	27	117	32	712	10	2,435	14	3,851	36
6. Hooblee	723	17	4	33	1,064	37	1,290	0	1,698	19
7. Raneebednoor ..	2,561	6	1,058	36	3,054	19	5,393	19	8,034	25
8. Kode	121	31	35	23	80	36	658	31	1,330	39
Total..	2,050	20	3,351	0	15,573	1	31,668	36	42,647	25

The following is a return of the quantities of the New Orleans cotton purchased from the ryots by Government, and their estimated relative proportion of the crop of each season [1] :—

YEARS.	New Orleans Cotton purchased for Government.		Estimated proportion of the season's Crop.
	Cds.	lbs.	
1842-43	....		
1843-44	....		
1844-45	96	376	One-half.
1845-46	563	196	Two-thirds.
1846-47	....		
1847-48	165	243	One-third.
1848-49	326	341	Six-sevenths.
1849-50	569	19¼	One-third.
1850-51	803	313	One-fourth.
1851-52	347	17½	One-thirteenth.

When Government resolved to discontinue their purchases of cotton, after the exotic had become firmly established in popular favour, the experimental establishment was reduced, and its operations confined to the business of the gin factory, under the charge of Mr. Frost, the engineer. Mr. Frost resigned his appointment towards the close of 1854, and the establishment was then placed under the superintendence of Dr. Forbes.

[1] Revenue Consultations, vol. xlix. 1853, page 269.

The following statement contrasts the cultivation and value of the New Orleans and indigenous cottons, during the years 1850-51 to 1854-55[1] :—

Years.	Total extent of Land cultivated with Cotton.	Native Cotton.	Price of Native Cotton.	New Orleans Cotton.	Price of New Orleans Cotton.	Difference in favour of New Orleans Cotton.
	Acres. G.	Acres. G.	Rs.	Acres. G.	Rs.	Rs.
1850-51	254,983 25	223,314 29	75	31,668 36	88	13
1851-52	264,323 34	221,676 9	63	42,647 25	72	9
1852-53	279,124 15	251,113 25	60	28,010 30	75	15
1853-54	293,409 22	252,006 16	64	41,403 6	70	6
1854-55	273,559 2	210,260 21	80	63,298 21	90	10

Messrs. A. C. Brice & Co. established an agency in the Dharwar districts, in 1854, for the purchase and ginning of cotton, and materially assisted the development of the improved Dharwar cultivation. These gentlemen, on their arrival, proposed to Government to take over into their own hands the cotton experiment; upon conditions, however, to which Government did not consider it desirable to accede.[2] When Dr. Forbes became associated with the Dharwar establishment, he found the gin factory working to a loss, and its defective machines injuring the staple of the cotton cleaned by them. By energetic and intelligent management, he very soon made the factory a means of profit instead of a source of loss, and he has introduced satisfactory improvements into the machinery for ginning New Orleans cotton, as well as invented a simple, cheap, and portable roller-gin, on the principle of the churka, for cleaning the indigenous staple. Reference will hereafter be made to this machinery.

In 1857-58 an experiment was tried in the Dharwar districts with some Egyptian cotton seed, which, like a small attempt made during the previous season, proved unsuccessful. The Collector reported that the plants which grew "were remarkably fine, much more vigourous and large than the New Orleans and indigenous ones, but the pods rarely came to perfection: they did not open properly, and were attacked by insects. The First Assistant Collector tried the experiment late in the season, in irrigated land, without success."

Messrs. Brice & Co., who experimented with this seed at the same time, attributed the failure to the lateness of the rains, "which, instead of setting in during the months of September and October, fell only in the second week of October, lasting till the middle of November." They continued, "After the rains, the plants developed themselves steadily and vigourously, promising, in the beginning of March, an abundant crop on account of the numerous full pods on

[1] Revenue Consultations, vol. lx. 1855, pages 219—226.
[2] Revenue Consultations, vol. xxxviii. 1854, page 64.

every plant; but the drying influence of the hot season (March and April) proved too exhausting for the delicate nature of these trees." The Collector adds, however, "The heat which caused them to wither did not affect the indigenous and New Orleans cotton."

The following are some of the details of the experiments made by Messrs. Brice & Co., and by their agents at Gudduck and Bunkapoor:—

Gudduck.—7 lbs. of seed sown in a field of second quality of black soil; a number of plants came up, but died away before forming pods.

Bunkapoor.—7 lbs. of seed sown. On the 21st February their agent reported, "The plants are 6,800 in number, 3 feet in height, well grown, and they cover an extent of ground measuring 210 feet in length, and 50 feet in breadth. They are fully in pod, and will take 20 days more before being finally developed." On the 19th April he reported, "The first and second pickings are just over, and have only yielded one maund (26 lbs.) of kuppas. There is no third pick; and the ryots, having no hopes, have grazed the plants with bullocks."

Hooblee.—14 lbs., or about 64,300 grains, were planted by us on the 9th August in a field of black soil, 424 feet by 127 feet, equal to 53,848 square feet, or 1¼ English acre. Out of the 64,300 grains of seed, we found, on the 18th March, only 8,124 plants, but mostly well grown, and richly covered with pods, some bearing above 30, the remainder between 10 to 30 pods. The kuppas was picked at different times from the middle of March until the beginning of April, when, owing to the great heat, all the plants dried up, and with them the large quantity of pods then unopened, which, if come to ripeness, would have added 25 per cent. to the quantity of kuppas collected. The total of kuppas gathered from the above 8,124 plants consists of 106 lbs., yielding 30 per cent. of Egyptian cotton free of seed, or 32 lbs., and 70 per cent. of seed." They remarked, "We think it worth prominent notice that the small quantity of Egyptain cotton grown by us experimentally during the season 1856-57 was sown as early as the beginning of June 1856, and got ripe, as kuppas in the field, during January 1857, and we had the honour to forward to you a sample of that cotton on the 12th February 1857, when both the New Orleans and indigenous varieties were still hanging unripe on the shrubs. All the pods had come into blossom in January; none withered away, because not exposed to the hot season." [1]

[1] Revenue Consultations, vol. lv. 1858, pages 1—19.

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The following is a detailed statement showing the results of the Egyptian cotton seed sown during the season 1857-58 [1]:—

Districts.	Land cultivated.	Quantity of Seed sown.	Produce of uncleaned Cotton.	Yield of clean Cotton.	Of the Acres sown, how many			
					Yielded 1st sort.	Yielded 2nd sort.	Yielded 3rd sort.	Failed.
	A. G.	lbs.	lbs.	lbs.	A. G.	A. G.	A. G.	A. G.
Nowlgoond	44 35	408½	1,729½	432½	..	3 34	34 37	6 4
Dummul	21 1	137	1,456	413	1 20	7 30	8 15	3 16
Bunkapoor	38 8	315	811	270	9 17	8 0	10 11	10 20
Hooblee	39 38	316¾	2,074¼	689½	..	7 38	28 5	3 35
Raneebednoor ..	20 1	105	328¾	82¼	..	..	20 1	..
Savnore Estate. .	5 13	35	528	150	0 25	3 6	1 22	..
Total ..	169 16	1,361¼	6,927½	2,037¼	11 22	30 28	103 11	23 35

Abstract showing the average results of one Acre.

Variety.	Seed sown.	Uncleaned Cotton produced.	Yield of cleaned Cotton.	Seed produced.	Cost.				Produce.			Net loss.
					Assessment on Land.	Value of Seed sown.	Expense of Cultivation.	Total.	Value of yield of cleaned Cotton.	Value of Seed produced.	Total.	
	lbs. oz.	lbs.	lbs. oz.	lbs. oz.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Egyptian.	8 1	41	12 1	28 15	1 1 8	0 1 4	2 0 0	3 3 0	2 3 1	0 9 3	2 12 4	0 6 8

The progress made by the gin factory, under the management of Dr. Forbes, may be illustrated by the following extract from the report of its operations, dated 13th February 1858:—"It is only during the past year that the description of gins now constructed may be said to have been fairly introduced to the ryots and dealers, and their appreciation may be judged by the demand, which has far exceeded my most sanguine anticipations. Between the 1st of January and 31st of December 1857, the orders registered (upon each of which a deposit in advance has been paid) include 249 gins, amounting in value to rupees thirty-five thousand, four hundred, and thirty-five (Rs. 35,435). This considerably exceeds half of the demand upon the factory during the whole previous period of its establishment, extending over a space of more than

[1] Revenue Consultations, vol. lv. 1858, page 24.

thirteen years. In addition to these, many applicants appeared with money ready to purchase if they could be supplied at once, but this was not practicable, because the above accumulation of orders was five months in advance of the work which could be accomplished." [1]

In 1858-59 a further experiment was tried with fresh Egyptian cotton seed, but with an equally unfavourable result. There is a very unsatisfactory absence of details in the report, as to the time and manner of sowing. The Collector stated, "The plants came up vigourously, but, as the bolls rarely come to perfection, the climate would not appear to suit this variety of cotton. I fear that no advantage is to be expected from prosecuting the experiment." The failure was attributed more particularly to scanty rain and the ravages of insects. The only moderately good crop of cotton was obtained from the plants in the Dummul Talooka. There the seed was sown, on the 28th of August and 15th of October, in drills 1½ foot wide, and the crop ripened from the 5th of March to the 17th April 1859.

The Assistant Collector stated, that "all the district officers reported, from their own observation, in favour of early sowing." With the exception of the Dummul Talooka, he observed, "Everywhere else the failure was complete. * * * For myself, I have not seen one single instance of success with Egyptian cotton." The extent of land sown amounted to about 261 acres. The following is a detailed account of the experiment [2]:—

Statement showing the result of an experiment with Egyptian Cotton Seed in the Season 1858-59.

Districts.	Land cultivated.	Quantity of Seed sown.	Produce of uncleaned Cotton.	Yield of clean Cotton.	Of the Acres sown, how many			
					Yielded 1st sort.	Yielded 2nd sort.	Yielded 3rd sort.	Failed.
	A. G.	lbs.	lbs.	lbs.	A. G.	A. G.	A. G.	A. G.
Nowlgoond...	22 8	218	883½	305¼	0 20	18 22	2 26	0 20
Dummul.....	51 32	377	2,727¾	682¼	43 10	...	8 22	...
Bunkapoor...	82 26 1/16	843	5,603	1,425	1 18	9 37	55 31 1/16	15 20
Hangul	1 28	15½	95	23¾	0 31	...	...	0 37
Hooblee	61 29	353	5,244½	1,447	...	61 7	0 22	...
Raneebednoor	38 28	296	271½	88 1/16	...	...	22 8	16 20
Koad	2 16 1/16	29	...	...	...	...	...	2 16 1/16
Total...	261 8 1/16	2,131½	14,825¼	3,972 2/16	45 39	89 26	89 29 1/16	35 33 1/16

[1] Revenue Consultations, vol. lv. 1858, pages 135 and 136.
[2] Revenue Consultations, vol. liii. 1859, pages 109—116, and vol. xl. 1860, page 327.

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Abstract showing the average results of one Acre.

Variety.	Seed sown.	Uncleaned Cotton produced.	Yield of cleaned Cotton.	Seed produced.	Cost.				Produce.			Net loss.
					Assessment on Land.	Value of Seed sown.	Expense of Cultivation.	Total.	Value of yield of cleaned Cotton.	Value of Seed produced.	Total.	
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Egyptian.	8 3	56 12	15 3	41 9	1 2 7	0 1 5	1 15 0	3 3 0	1 15 10	0 5 11	2 5 9	0 13 3

Samples of this cotton, and of the New Orleans variety grown in the Dharwar districts, were forwarded to the Bombay Chamber of Commerce, by whom the following report upon them was given:—"The quality of these samples appears to the Chamber to be quite satisfactory, and they estimate the intrinsic value of the American at 6*d.*, and of the Egyptian at 1*s.*, per lb. in Liverpool, assuming the value of middling Orleans cotton at 7*d.*" [1]

No more encouraging result was obtained in 1859-60, when Egyptian seed was again planted. Mr. Goldfinch, the Collector, wrote, "I have the honour to report that the experiments, like the previous ones, have proved a failure. I am of opinion that this variety is unsuited to the climate of the country, and that no advantage will be derived from making any further experiments." [2]

In his report, dated February 1860, Dr. Forbes stated, that there were upwards of 600 gins in use in the collectorate. Of these one-half were of the new form of construction, and the remainder of the kind previously supplied. The latter, he observed, were in constant need of repair, and even the new gins now began to require inspection, from having been some years in work. The evil was, that trifling irregularities were allowed to go unrepaired, until the imperfect action of one part gradually injured the whole machine. The gins were principally in the possession of dealers and sowcars, whose business entailed the necessity of frequent absence. The work of the ginning was generally performed by coolies, by daily contract, at the rate of a certain quantity of kuppas to each gin. These labourers had discovered that, by tampering with the machine, removing screws, or loosening the grates, they allowed the seeds to pass through much more freely than they could be cleaned out, and, in this manner, they frequently got through their work in half the time which it ought to have occupied, and they had the remainder of the day to themselves. The injury thus inflicted upon the gins, besides causing loss to the proprietors, tended to bring saw-ginned cotton into bad repute.

[1] Revenue Consultations, vol. liii. 1859, page 123. [2] Ibid, vol. xl. 1860, page 332.

Dr. Forbes assembled a meeting of the gin owners, and proposed that the factory should undertake to keep all their gins in repair, in consideration of a contribution being paid upon each machine, which, in the aggregate, would suffice for the pay of the establishment required. He proposed that a portion of this establishment should be stationary at a branch factory, and that the remainder should be divided into itinerant parties, supplied with necessary tools, so that each gin might be inspected at least twice during each working season. Thus "the labour of the establishment would become the property of the subscribers, and they would have nothing to pay for the repair of the gins, except the value of the material consumed. Their accounts and money would be in their own hands under the care of a *punchayet* * appointed for the purpose." Dr. Forbes found that a contribution for each gin of Rs. 6 per annum would suffice, and the people readily agreed to raise the required sum.

Dr. Forbes thus continues his report:—"This employment will absorb the greater part of the present establishment, and reduce the operations and monetary transactions of the Dharwar head factory to a very small amount. I am taking every precaution to secure its being successfully conducted, and to the satisfaction of the people, because it may be looked upon as the first important movement towards leaving the country to provide for its own wants in this respect, and for relieving Government from the necessity of doing so. The districts to the eastward are not included in this arrangement, being too far distant, but the ryots and dealers of Guddug have settled amongst themselves for the building of a branch factory in that quarter, and, during my recent tour, I was asked by them to select the site and mark out the foundations. The building is now progressing rapidly, and will be covered in this season. Its situation is advantageous, as it will not only provide for the remaining part of the collectorate, but also for a considerable portion of the assigned districts in the neighbourhood, in which the cultivation of New Orleans cotton may now be said to have fairly commenced."[1]

The arrangement has worked well, and has since been extended to other parts of the district. The usefulness of the factory has thus been greatly extended, as the gin owners, having now a right to their labour, avail themselves much more freely of the services of the workmen.[2]

About two years ago Dharwar saw-ginned cotton sank in public estimation, and lost a considerable portion of its superior relative position in the market. This was ascribed by Dr. Forbes to the adulteration and mixed cultivation of

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* A Committee or Board.

[1] Revenue Consultations, vol. xl. 1860, pages 179—186.

[2] Revenue Consultations, vol. xl. 1860, pages 179—186.

New Orleans cotton with the indigenous, the latter of which suffered from the action of the saw-gin, and deteriorated the whole.

The Bombay Chamber of Commerce attributed the deterioration rather to the result of hybridising, than to the wilful admixture of native with American seed. But, without entering upon this question here, the following quotation from their letter of the 30th November 1859 illustrates the actual fluctuation of Dharwar New Orleans cotton :—"The greater the adulteration, the lower the price will be, and the general standard of the article will be lowered accordingly. To exemplify this more clearly, it may be useful to point to the relative positions of the different descriptions of cotton at different periods; thus the prices in Liverpool at the following dates were as follows :—

Dates.	Middling New Orleans.	Fair Dharwar saw-ginned.	Fair Broach.	Fair Compta.
	d.	*d.*	*d.*	*d.*
1st August 1850.	8	7	6⅛	5⅜
Do. 1851.	4½	4¼	3¾	3¼
Do. 1858.	7⅛	5⅞	5¾	5⅝
Do. 1859.	7⅛	5½	5½	5¼

It will be seen, therefore, that, while in 1850-51 the difference in value between Dharwar saw-ginned and Compta cotton was 1*d.* to 1⅜*d.* per lb. in 1859, in consequence of constantly increasing adulteration, this difference had fallen to ¼*d.* per lb." [1]

In the report of February 1860, however, Dr. Forbes confirms a previous statement, that considerable improvement in the cultivation of pure American cotton had taken place. He enclosed the following reports, received from Messrs. Nicol & Co., on parcels of New Orleans seed cotton cleaned by the saw-gin, and of Broach cleaned by the Macarthy gin :—

No. 1. Cotton produced from seed supplied by the Cotton Supply Association, and forwarded to Dr. Forbes by the Bombay Chamber of Commerce.

Report.—"This cotton is beautiful in colour and cleanliness; staple even and regular, but open and weak, and this reduces its value considerably, and is, we think, incidental to the climate; value 6*d.* to 6¼*d.*, but, if strong and close in staple, it would have been worth 6¾*d.* to 7*d.*"

No. 2. "New Orleans cotton of the description ordinarily produced in the Southern Maratha Country, but with which an admixture of native cotton had been carefully prevented by weeding the fields."

[1] Revenue Consultations, vol. liv. 1859, pages 288 and 289.

Report.—"Equal in colour to the last, but not so clean, and the staple is very short and uneven, as well as weak; value 5¾*d.* to 6*d.* per lb."

No. 3. Broach cotton, cleaned by Messrs. Nicol & Co. with the Marcathy gin.

Report.—"This is a beautiful quality of cotton, but badly cleaned; small seed and broken leaf; staple is fine, strong, and silky; value 5¾*d.* to 6*d.*, but perfectly cleaned 6½*d.*"

No. 4. Dharwar New Orleans, consisting of two parcels, 3 bales (A.), being the produce of new seed fresh from America, and 8 bales (B.) of old seed ten years in the country, and which seed had been "taken from cotton grown in mixed cultivation, and which, therefore, should have carried with it all the defects that hybridation could realise." It was sent, indeed, to elicit some information upon that disputed question.

Report.—"Choice saw-ginned, clean, well got up, good colour, and fair staple; *the best cotton we have seen for a long time*; value A. 3 bales 6½*d.*, B. 8 bales 6¼*d.*" [1]

That the improvement reported by Dr. Forbes has continued, and the reputation of Dharwar saw-ginned been rehabilitated by his exertions, may be inferred by the following extract from a letter on the subject, addressed to Government by the Bombay Chamber of Commerce on the 26th August 1861 :—"A few years ago the cultivation and ginning of this description had gradually sunk to so low a grade, that the quotations in the English market presented but a small advance over the common native Compta, which is the produce of the same collectorate. It was then pointed out that the decline in value was owing to two special causes: the careless sowing of mixed American and native seed, and the want of attention in keeping the saw-gins in good working order. The letters of Dr. Forbes show that about this time he directed his attention to these important points, and, by taking every opportunity of explaining to the chief cultivators the desirability of weeding out the native cotton, and by organising a system by which the saw-gins were preserved in good repair and efficient working order, he has evidently succeeded in bringing about a marked improvement in the quality of the cotton, which now promises to compete on fair terms with the produce of the United States. The object of the present communication, while only doing justice to Dr. Forbes' exertions, is to point out what may be done by individual influence perseveringly and temperately brought to bear against native apathy and indifference, and to urge upon Government the importance of maintaining, by similar means, the high character which this description of cotton is now steadily acquiring.

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[1] Revenue Consultations, vol. xl. 1860, pages 186—192.

"The relative prices of saw-ginned Dharwar contrasted with Broach and Compta may be seen from the following quotations :—

Dates.	Middling Orleans.	Fair Dharwar.	Fair Broach.	Fair Compta.
	d.	*d.*	*d.*	*d.*
1st August 1850.	8	7	6⅛	5⅜
Do. 1851.	4½	4¼	3¾	3¼
Do. 1858.	7⅛	5⅞	5¾	5⅜
Do. 1859.	7⅛	5½	5½	5¼
Do. 1860.	5⅞	4½	4½	3¼
Do. 1861.	8½	7¼	6¼	5½

"It will thus be seen that the superiority of Dharwar saw-ginned was indicated—

In 1850 by 1⅜*d.* over native Compta, by ⅞*d.* over Broach.
In 1851 by 1*d.* do. by ½*d.* do.
In 1858 by ½*d.* do. by ⅛*d.* do.
In 1859 by ¼*d.* do. by *nil.* do.
In 1860 by 1*d.* do. by ¼*d.* *less* than Broach,
In 1861 by 1¾*d.* do. by 1*d.* over Broach,

showing the extreme variations in relative values brought about by carelessness and indifference at one period, and by attention and perseverance at another." [1]

The following tabular statement exhibits the fluctuations of the cultivation of New Orleans and indigenous cotton, in each talooka, from 1854-55 to 1859-60:—

Statement exhibiting the fluctuations of the cultivation of New Orleans and Indigenous Cotton in each Talooka from 1854-55 *to* 1859-60.

Talookas.	Area of Cotton cultivation.									Area capable of Cotton cultivation.
	1854-55			1855-56			1856-57			
	Indigenous.	Exotic.	Total.	Indigenous.	Exotic.	Total.	Indigenous.	Exotic.	Total.	
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Dharwar	11,455	23	11,478	8,004	17	8,021	10,743	15	10,758	37,680
Nowlgoond	78,174	4,088	82,262	64,136	2,653	66,789	70,027	7,367	77,394	111,544
Dummul	67,257	8,949	76,206	61,028	9,119	70,147	63,691	19,823	83,514	104,453
Bunkapoor	9,722	29,557	39,279	17,277	20,146	37,423	12,382	26,644	39,026	68,900
Hangul	4,857	5,652	10,509	5,926	4,446	10,372	5,744	4,958	10,702	17,461
Hooblee	14,969	4,493	19,462	8,922	3,982	12,904	10,542	5,339	15,881	35,946
Raneebednoor	16,818	9,328	26,146	18,749	9,619	28,368	16,382	16,416	32,798	58,198
Kode	7,008	1,209	8,217	7,154	821	7,975	7,420	1,789	9,209	22,053
	210,260	63,299	273,559	191,196	50,803	241,999	196,931	82,351	279,282	456,235
Nurgoond Jaghire	13,574	..	13,574	10,158	..	10,158	..	..	..	10,024
Sawanoor do.	1,489	3,898	5,387	1,489	2,959	4,448	..	..	..	..

[1] Revenue Compilations, No. 1102, pages 2 and 3.

TABLE (*continued*)—

TALOOKAS.	AREA OF COTTON CULTIVATION. 1857-58 Indigenous.	1857-58 Exotic.	1857-58 Total.	1858-59 Indigenous.	1858-59 Exotic.	1858-59 Total.	1859-60 Indigenous.	1859-60 Exotic.	1859-60 Total.	Area capable of Cotton cultivation.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Dharwar	13,284	135	13,419	13,132	156	13,288	15,323	589	15,912	37,680
Nowlgoond	80,661	8,404	89,065	69,517	8,917	78,434	75,200	17,903	93,103	111,544
Dummul	81,282	22,257	103,539	68,305	24,798	93,103	61,518	43,797	105,315	104,453
Bunkapoor	13,562	33,951	47,513	13,806	35,613	49,419	13,239	40,418	53,657	68,900
Hangul	7,681	4,895	12,576	8,896	5,306	14,202	8,990	6,131	15,121	17,461
Hooblee.....	13,505	6,658	20,163	13,246	7,312	20,558	17,114	9,730	26,844	35,946
Raneebednoor	17,275	18,763	36,038	16,214	17,055	33,269	14,449	27,719	42,168	58,198
Kode	7,793	2,243	10,036	9,254	2,593	11,847	10,523	5,686	16,209	22,053
	235,043	97,306	332,349	212,370	101,750	314,120	216,356	151,973	368,329	456,235
Nurgoond Jaghire ..	..	..	..	..	..	..	10,897	27	10,924	10,924
Sawanoor do. ..	17,807	3,508	21,315	1,286	3,655	4,941	1,186	4,226	5,412	..
Hooblee do. ..				1,337	..	1,337	2,226	99	2,325	..

The statistics of cotton cultivation in the Dharwar Collectorate from 1842-43 to 1860-61 are collected in the following table, and their contrasted fluctuations are represented in the annexed diagram:—

Statement showing the total amount of land under cultivation for the past nineteen years in the DHARWAR *Collectorate, and the portion cultivated with Cotton, Indigenous and Exotic, and the total area capable of producing Cotton.* [1]

YEARS.	Total Acres under cultivation.		Of which cultivated with Cotton: Indigenous.		Exotic.		Total.		Total Acres capable of producing Cotton.	
	Acres.	G.	Acres.	G.	Acres.	G.	Acres.	G.	Acres.	G.
1842-43	634,874	12	184,236	16	27	24	184,264	0	....	
1843-44	587,692	24	178,411	0	545	0	178,956	0	....	
1844-45	570,319	20	182,437	0	2,749	0	185,186	0	....	
1845-46	601,415	34	164,591	0	11,176	0	175,767	0	....	
1846-47	685,324	8	167,502	2	22,331	4	189,833	6	....	
1847-48	729,867	4	179,228	32	20,502	20	199,731	12	....	
1848-49	799,844	25	201,578	35	3,351	0	204,929	35	....	
1849-50	873,920	35	225,685	16	15,573	1	241,258	17	....	
1850-51	917,818	10	223,314	30	31,668	36	254,983	26	....	
1851-52	994,187	2	221,676	9	42,647	25	264,323	34	....	
1852-53	1,022,062	9	251,113	25	28,010	30	279,124	15	....	
1853-54	1,028,899	37	252,006	16	41,403	6	293,409	22	....	
1854-55	1,076,350	4	210,260	21	63,298	21	273,559	2	....	
1855-56	1,144,614	16	191,196	4	50,802	36	241,999	0	....	
1856-57	1,230,740	0	196,930	23	82,351	34	279,282	17	....	
1857-58	1,265,543	6	235,042	39	97,306	39	332,349	38	....	
1858-59	1,297,725	22	212,370	19	101,750	11	314,120	30	....	
1859-60	1,362,675	33	230,667	11	156,326	5	386,993	16	....	
1860-61	1,406,712	18	234,452	29	153,969	1	388,421	30	479,589	7
1861-62	....		200,491	15	178,682	39	379,174	14	....	

[1] Returns, Dharwar, No. 1177 of 1861.

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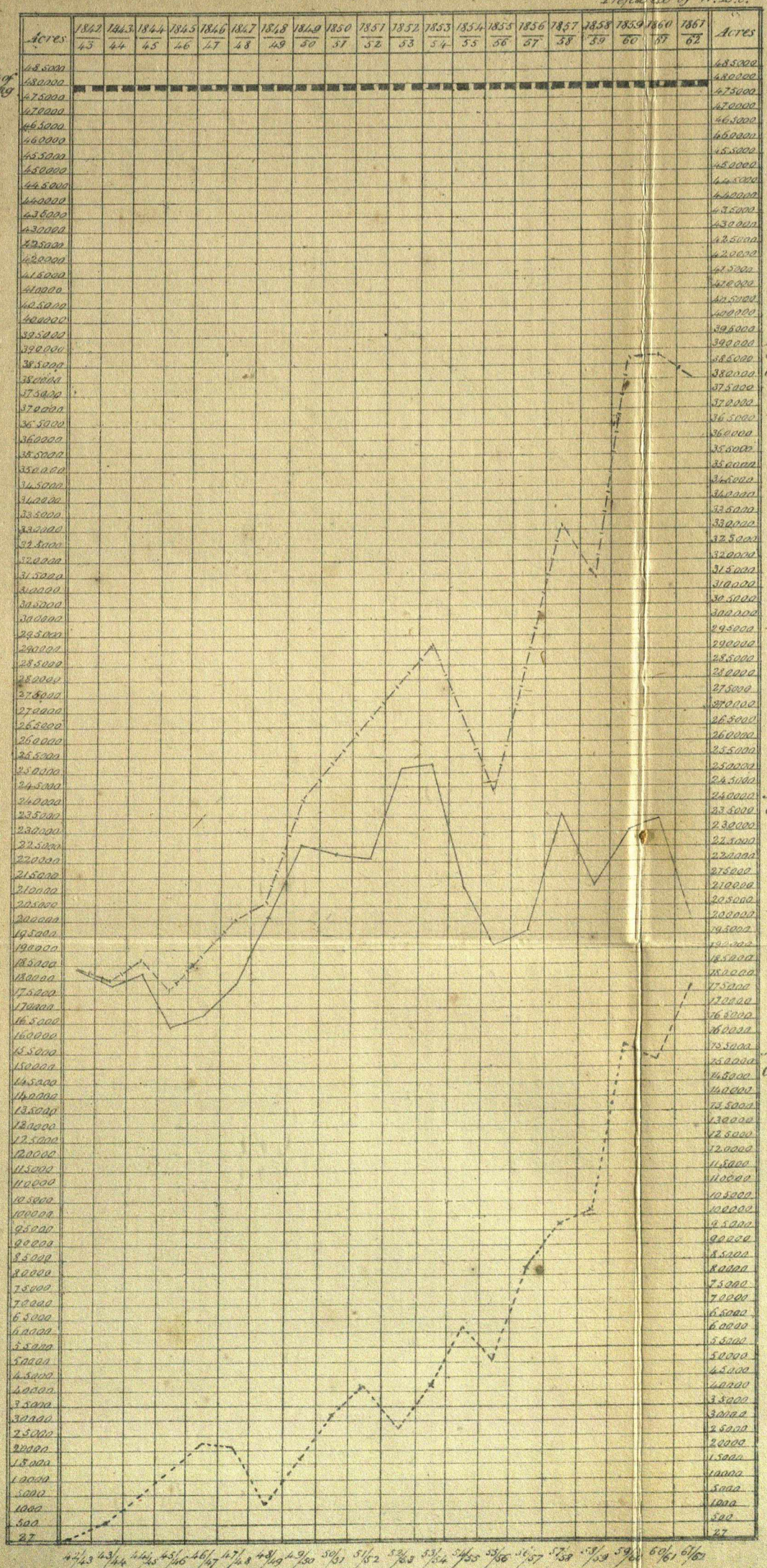
Diagram showing the Cultivation of Indigenous _____ and Exotic Cotton - - - - - the total Area planted with Cotton -.-.-.- and that which is capable of producing it ▬▬▬▬ in the DHARWAR Collectorate from 1842-43 to 1861-62.

Prepared by W.R.C.



ROUTE MAP
of the
SOUTHERN DIVISION
of the
BOMBAY PRESIDENCY

Scale 20 Miles to an Inch.

10 5 0 10 20 30 40 50 60 70 80 90

References

I Dhárwar Collectorate	
II Belgaum ... Dº	
III Kaladgee ... Dº	
IV Sholapoor ... Dº	
V Poona ... Dº	
VI Ratnagherry ... Dº	
VII Tannah ... Dº	
VIII Ahmednuggur ... Dº	
IX Kolapoor Territory	
X Sawuntwarree	
Turnpike roads	
Cleared ... Dº	
Fair weather ... Dº	
In Progress	
Surveyed	
Railways Open	
... Dº ... in Progress	

Copied and Published at the Office of Chief Engineer &c. &c.
Bombay, 17th December 1861.

70° 71° 72° 73° 74° 75° 76° 77°

19° 18° 17° 16° 15°

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CHAPTER XII.

EXPERIMENTAL CULTURE IN SIND.

Report of Captain Postans on Cotton cultivation—Failure of exotic Cotton in 1846—Report of Sir H. B. E. Frere, 1851—Cotton cultivation in the Hydrabad districts—Cultivation in Upper Sind—Cultivation in the Kurrachee Collectorate—Cultivation in the Jerruck Collectorate—Cultivation in the Sehwan Collectorate—Report on Sind Cotton—Mr. Prince appointed Superintendent of Cotton Experiments in Sind—Report of his first tour of inspection—General failure of Egyptian Cotton—Operations and unsatisfactory results of the season 1853-54—Renewed failure in 1854-55—Abolition of Experiments—Mr. Dalzell's Report—His statistics of Cotton cultivation in Sind—Observations on the causes of failure—Further experiments with, and failure of, Egyptian Cotton 1860-61—Prospects of Cotton in the Province—Statement of cultivation.

In 1842 Captain Postans, Assistant Political Agent in Sind and Beloochistan, gave a report upon cotton cultivation in Sind, of which the following is a *resumé*:—

The cultivation is of two kinds, known as "*Boosoh*" and "*Peeawah*," the former being land watered by the overflowing of the Indus, which inundates it for a period of three or four months. On the retiring of the river, about the month of September, the land is ploughed, and otherwise prepared for seed, but not manured, and it is thus allowed to remain fallow until the March or April following, when, being previously well saturated, the seed is sown, the weeds cleared, and no further irrigation employed, the moisture retained in the ground being found sufficient. The crop ripens for plucking about the month of July, and the plants being cut down and well tended, produce a second crop the following year. The "*Peeawah*" or "*Poko*" consists of *dry* land irrigated by wells or water-wheels from canals. The sowing is effected at the same time as in the "Boosoh" lands, but the soil being dry, regular irrigation is employed.

The cotton of the country is of two kinds—"Bugrah" and "Suttriah," the plant of the former being very large, and lasting over two or three seasons, the latter being an annual. The seed is separated from the wool by a machine on the principle of the churka, but of very rude construction, consisting of an iron and wood cylinder, about a foot in length, and worked by two men.

Although a considerable quantity was produced in the districts to the west of the river, near Shikarpoor, and especially in the pergunnas to the east of the Indus, all the cotton not exported to Cutchee and Khorassan was used for home consumption. Captain Postans forwarded specimens of cotton produced, which were laid before the Chamber of Commerce for report.

The samples of Oobah and Shikarpoor cotton were considered "very deficient in staple, and, on the whole, inferior cotton, and would not be likely to sell to any extent at a remunerative price in the Bombay market." The staple of Jeysulmere was described as "tolerably good, but neither of them could be considered as a favourable specimen of Sindian cotton." [1]

The attention of the Collector of Shikarpoor was turned to the improvement of cotton in 1846, and he applied to the Bombay Government for a supply of New Orleans seed, to test its suitability for the Shikarpoor and Mehur districts.

The experiment did not prove successful in the Roree districts, where a small quantity of Sea Island cotton was planted. The ryots "were decidedly of opinion that it was not so profitable as the ordinary seed." Major Goldney, the Collector of Shikarpoor, stated—

"The produce of the foreign seed, in two separate patches, averaged 18½ seers; whereas the country seed in the same neighbourhood averaged above 4½ maunds of 40 pukka-seers per acre."

The Deputy Collector of Mehur gave an equally unfavourable report. He stated—

"I have the honour to report that very little of the American cotton seed sent to Mehur has been made use of by the zemindars; and the produce of that sown has turned out so small, that I can find none who wish to cultivate any more.

"The best crop that has been raised was on a piece of land, five beegahs in extent, by Hajee Saleah, zemindar of Mehur, in Peshrus, 1258; but even this only yielded at the rate of 80 lbs. of cleaned cotton, and 200 lbs. of seed per beegah; while, from 105 lbs. of the same seed, sown in other parts of Mehur, some of the plants were cut off by the hot winds, and the rest, though they grew to a good size, never flowered. The five beegahs above mentioned yielded no cotton the second year.

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[1] Revenue Consultations, vol. xxxiv. 1842, pages 86—98.

"The natives have probably understated the produce; but it is evident, from their refusing to sow more of the American seed, that it does not succeed with them; and, with a view to ascertain the real produce, I last year had a beegah of land sown, under my own superintendence. The first plants, on growing to about six inches high, were cut off by the hot wind. More seed was put in, and this time the plants grew most luxuriantly, and to three or four times the size of the native plants, giving every appearance of bearing a most abundant crop; but just before they were ready to pick, the pods were attacked by the worm, which destroyed so much jowaree and other autumn crops last season, and only about 20 lbs. of damaged cotton were produced.

"These small pieces of land were sown at Doobee last year, but destroyed by the worm, while the Sind plant was very little affected.

"The cotton yielded by the American seed, when uninjured by the worm, is very superior to the Sindee, which is probably the worst in the world; but, as far as has been here ascertained, the American yields less, is liable to be injured by the hot winds, is more subject to the ravages of the worm, and, yielding no cotton the second year, is not calculated for growing in the manner usual here—namely, to sow the seed late, mixed with the jowaree, the cotton plants growing to about a foot high, but yielding no produce till the second year." [1]

Major Blenkins, C.B., in charge of the Kurrachee experimental garden, reported—

"I would beg to observe that the cotton seed sent up was found not to answer in the Kurrachee garden, from the attacks of an insect resembling the common weevil, of a very offensive smell,—these insinuating themselves into the pods, and there depositing their eggs, greatly to the injury of the cotton."

In 1850, Government endeavoured, but without success, to secure the services of a gentleman well acquainted with cotton cultivation in Egypt, to conduct experiments in this Presidency. During the correspondence on the subject, the similarity of the climate of Sind to that of Egypt was pointed out, and it was suggested that probably the Egyptian varieties of cotton might be successfully introduced there. Sir H. B. E. Frere, the Commissioner, applied, in 1851, for seed of all descriptions, to renew experiments with a view to test their suitability to the soil and climate of the province. He subsequently, on the 19th April 1851, in addressing the Bombay Government, stated—

"I take this opportunity of mentioning the few facts which I noted bearing on this subject (cotton cultivation) during my late visit to Upper Sind.

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[1] Revenue Consultations, vol. lxxxiii. 1849, pages 108—120.

"The plant and mode of culture seem both to differ from those usual in India; but on these points, Dr. Gibson, who gave much attention to the subject when lately in Sind, will be able to give better information than I can.

"I would observe, however, that, as artificial and constant irrigation is the rule of cultivation in Sind, and not, as in India, the exception, many varieties may, perhaps, be profitably cultivated here, which have been abandoned in India, owing to the impossibility of cultivating them without irrigation.

"The production of cotton in Sind is not equal to the demand, chiefly for the local manufacture of coarse cloth. This is especially the case in Upper Sind, where upwards of 13,500 acres are cultivated. The deficiency is supplied by cotton imported from India by sea and up the river, besides a very considerable quantity brought across the desert from Jesulmere on camels, and sold at Kotree. There is a considerable exportation of raw cotton and coarse yarn to Cutchee and the other Khelat provinces.

"To the question, 'Why, with such soil and water, both well adapted to cotton, and able to produce cotton whenever they chose to sow it, they did not grow and export it instead of grain, which is with difficulty saleable?' the cultivator's usual answer was—1*st*, 'That they preferred grain, because they could partially subsist on it while green, and before it was sold, whereas the cotton was of no use in feeding them till it was picked and sold;' and 2*dly*, 'That the system of assessment, by a division of the produce, operated more unfavourably to the cultivator, when the crop was a small quantity of a high-priced commodity like cotton, than when it was a large quantity of cheap grain,' the former being the usual reply.

"My own impression was, that under a good system of assessment, the production of cotton in Upper Sind would rapidly increase. A moderate and fixed assessment will, I am of opinion, do more than measures like that alluded to at the end of Captain Partridge's report.

"Dr. Gibson judged that the appearance of the Delta promised very favourable results to the cultivation of cotton, considering that it manages to exist even in the arid salt land and clay of Kurrachee; and it will be seen that Captain Stewart, who has been long in charge of those districts, concurs with him." [1]

The Collector of Hydrabad stated, "Cotton grows wild in Sind all along the range of hills at the back of Kotree. This fact proves the theory * * * that Sind has a climate naturally adapted for the growth of the

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[1] Rev. Cons. vol. lxxxiii., pp. 59–62; and Returns, E. I. Cotton, 1857, p. 1520.

plant." He gave the following report of cotton cultivation in his district to the Commissioner :—

" I have the honour to acknowledge the receipt of your letter, No. 1770, of the 25th instant, with enclosure, on the subject of cotton, and, in reply, to submit, that the cost of cotton cultivation here does not exceed that of the ordinary grain cultivation, and, exclusive of the purchase of cattle and implements, may be taken at about a rupee and ten annas a beegah over and above the land rent, which is for the beegah one rupee and six annas.

" The produce in a fair season is stated to be about two maunds (160 lbs.) of pod per beegah, and the yield of that on cleaning would be half a maund (40 lbs.) of cotton fit for use.

" Very little cotton, however, is grown here,—not perhaps more than a thousand beegahs in all, and that chiefly in very small patches, by cultivators, for their own use. The reasons for this are two—*first*, that the few cotton cloths made in Sind by professional weavers are chiefly made of imported yarn, and there is, consequently, very little demand for the raw material ; and, *secondly*, that the crop is a precarious one, owing to the species of cotton plant cultivated here being one wholly unsuited to the climate of Sind.

" The species cultivated in Sind appears to be the *Gossypium herbaceum*, a kind which is unable to bear any great amount of cold, and the consequence is, that the cutting winds of the cold season invariably kill it. Whenever, therefore, these commence at all earlier than usual, the crop is lost ; and, indeed, a chopping round of the wind to the northward, at a less advanced period of the year, often creates considerable damage to it.

" But while this species is unsuited to Sind, the Egyptian cotton, which I take to be a variety of the Sea Island kind, and to belong to the species *Gossypium barbadense*, seems to be admirably fitted for it. The hottest weather does not affect it, and the northern blasts of winter, instead of injuring, appear to give it additional life and vigour. It is longer, to be sure, in coming to perfection : the first year it does not yield cotton at all, and the second year but a scanty crop ; but after that, the yield is far greater than that of the common cotton ; the fibre is much longer, and the texture of it more silky ; there is double the proportion of fibre to seed in it. The expense of the cultivation would be less, and the wool, being fitted for the finest fabrics, would, of course, command a much higher price. The only point required is, that it must be grown in a situation to admit of irrigation throughout the year.

" Such is the information I am able to afford on this subject from observation of the Egyptian cotton plants that have been grown here. These, however, are few in number, not exceeding a dozen, and have been cultivated in

gardens as curiosities, and not with a view of deriving profit from them. Indeed, the wool, which is much prized, has always been given away. They are the produce of some seeds I got from Egypt about seven years ago, and the oldest of them have borne a considerable quantity of cotton annually after the first and second years for that period." [1]

Mr. G. Inverarity reported of the cultivation of Upper Sind as follows:—

"The extent and cultivation of this article in Upper Sind, during the last two seasons, has been as follows:—

In 1848-49 ..... 27,780 beegahs,
In 1849-50 ..... 27,091 do.,

the beegah being 2,500 square yards, or little more than half of the English acre, and assessed at Rs. 1-9-6 for the crop.

"In the absence of the periodical rains elsewhere known throughout India, the cotton here is grown from irrigation, which is of two kinds—either water raised from wells or canals by wheels, or from the direct overflooding of the Indus; the former description is confined principally to the Shikarpoor and Larkhanah districts, and the latter to those of Sukkur and Mehur. In both cases the plant is biennial; but, in very favourable situations, a crop has been taken from the same plants for three successive years,—an occurrence, however, which is by no means common.

"Cotton grown from canals or wells is usually, in the first season's planting, sown about the end of April, and plucked in the beginning of August, that grown upon inundated lands being sown and gathered about two months earlier. In both cases, after the pods are picked, the plants are left to themselves, until, when the spring again comes round, they are pruned, trimmed, and made ready for the second yield, which seldom fails of being nearly as abundant as that obtained the first season.

"There is no doubt that the facilities for cotton cultivation in this part of Sind are very great, and, in the event of a never-failing supply in the periodical inundation, that the article might be grown to any extent required, the general cheapness of labour, and the little expense attending the growth of the plant during the second season of its existence, affording facilities for such a result not so universal in other parts of the Presidency. The chief, and, in the event of the irrigation being insured, the only evil which the plant has to contend against, and in respect to which little or no provision can be made, is the hot winds, which prevail in their greatest severity during the period it is in flower, and whereby much damage is at times occasioned by the latter being

[1] Rev. Cons. vol. lxxxiii., pp. 11—14; and Returns, E. I. Cotton, 1857, pp. 1514 & 1515.

scorched up and perishing. The evil might be guarded against, and perhaps mitigated, by the cultivation being limited to sheltered situations ; but this could only be partially successful, and would, moreover, confine the culture of the crop within a limit little commensurate with the expanded sphere over which it is desired it should extend.

"It has been a matter of much difficulty to ascertain, with any degree of exactness, the general cost of cultivation, and the average amount of produce realised, as none of the parties whom I have consulted agreed in the opinions they expressed, and even the results of experience gained from the zemindars themselves vary considerably according to the division of the collectorate within which they reside. I am disposed, however, to consider that the following may be taken as a very fair specimen of a favourable year :—

	Rs.	*a.*	*p.*
Cost of cleaning one beegah	0	12	0
Ploughing	1	4	0
Seed	0	2	0
Watering	4	0	0
Weeding and hoeing	0	8	0
Gathering	2	0	0
Government rental	1	9	6
Total cost..Rs.	10	3	6
Produce of one beegah in a good season, one maund or 80 lbs. of *rooe* or clean cotton, at 11½ rupees per maund	11	8	0
Profit..Rs.	1	4	6
Value of three maunds of seed, at ten annas per maund..	1	14	0
Total profit per beegah..Rs.	3	2	6

"Taking, therefore, this as a result of a good crop in a good season, and for the sake of average in good and bad seasons, and the different varieties of land under tillage, diminishing it by one-third, the out-turn and profit on cultivation may be considered satisfactory, and sufficient to warrant our giving the subject every attention; for there is no doubt the Sind cotton, though, perhaps, at present the worst in the world, and very inferior to that of Hindoostan, would, under increased care, and an improved system of agriculture, turn out a very superior quality to the article it now is.

"Some American cotton seed was received in this collectorate in 1846, and, in the spring of 1847, a field of about ten beegahs was sown with it near Mehur, and the result was favourable; for the zemindar to whom the seed was given, and who is more likely to under than over-rate the produce, admits that it yielded about 320 lbs. of kuppas per beegah, which would give nearly 80 lbs. of cleaned cotton, and this was of a staple very superior to the indigenous growth of the country. Subsequent experiments from the same seed proved entire failures, owing to worms having attacked the pods, while the native cotton remained uninjured. These trials cannot, however, be considered in any way conclusive, as, from the little trouble bestowed upon cotton cultivation here, it has never received fair play; and Mr. Lester, at Sukkur, informs me, that some American seed which he had sown in his garden there came up most luxuriantly, the shrubs being about six feet high, and the yield most abundant. I have, however, as far as that is concerned, passed through fields of the indigenous cotton with the plants as high as my shoulder." [1]

The Collector of Kurrachee, in his report to the Commissioner on the subject of cotton cultivation, made the following observations:—

"Captain Stewart, Deputy Collector of Gorabarree, reports that cotton cultivation has not as yet had a trial in the districts under his charge, and as these compose the greater part of the delta of the Indus, it is impossible at present to institute a comparison as regards their fitness for the culture of cotton between the Sindian and Egyptian deltas. Captain Stewart, however, states that he has made arrangements for interesting some of the principal zemindars of his districts in the question, and that he hopes, with their assistance and his own exertions, to be able to test, by actual experiment, the capabilities of the soil for the produce of the cotton during the ensuing season. He expresses himself sanguine of success.

"A great similarity has been frequently remarked in point of climate, formation, and mode of irrigation, between the deltas of Egypt and of Sind; but as regards its adaptation to the culture of the cotton plant, I fear that on trial the latter will be found very inferior to the former. In the first place, the soil deposited by the Nile is considered by Dr. Wilson, and other competent judges, of a richer quality than that deposited by the Indus. The delta of the former is of more ancient formation, and has been under culture from time immemorial, from which causes, and others hereafter mentioned, the soil would appear to be far less impregnated with saline matter than that of the Indus. In point of position, the former has greatly the advantage: its shores have merely

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[1] Rev. Cons. vol lxxxiii. 1851, pp. 21—27; & Returns, E. I. Cotton, 1857, pp. 1516 & 1517.

to repel the comparatively placid and tideless waves of the Mediterranean; whereas those of the latter, along their whole extent, are exposed to the full forces of the ocean, which at every tide overflows a considerable portion of the soil, while its waters rush for miles up the numerous creeks and smaller branches of the river, rendering the fresh water contained in the latter brackish, and the soil salt, and altogether unfit for agricultural purposes during the greater part of the year. Heavy dews, which are considered by the natives as highly prejudicial to the cotton plant, usually fall at night, and these, combined with the dust-storms during the day, disqualify, in my opinion, this part of Sind for the successful culture of the cotton plant. The Sea Island variety, which is said to thrive well in the neighbourhood of the sea, might, perhaps, succeed in this locality, and I would beg to recommend that a good supply of seed of this description be procured for trial.

"The soil of Middle and Upper Sind, extending on both sides of the river from Kotree upwards, is considered by the natives as best adapted to cotton cultivation. The greater part of the cotton grown in Sind is produced in those districts, and it is there that I would beg to recommend that efforts be made to extend the culture of the plant."

Captain J. B. Dunsterville gave the following report on the cost and out-turn of cotton cultivation in the deputy collectorate of Jerruck:—

"There are two methods of cultivating cotton—one on land irrigated by wheels, and the other on low land flooded by the inundation. The former is the plan chiefly adopted, principally because its results are more certain, and because a far greater quantity is produced; but at the same time its expenses are proportionably greater: 20 beeghas of land irrigated by the wheel (which is as much as one wheel is capable of) will, it is calculated, exhibit the following result:—

	Rs.	*a.*	*p.*
Produce about 15 maunds of cotton (of 80 lbs.) at 14 rupees per maund	210	0	0
And about 25 maunds of cotton seeds, at 2 rupees per maund ..	50	0	0
Total.. Rs.	260	0	0

Expenses.	*Rs.*	*a.*	*p.*	Produce. *Rs.*	*a.*	*p.*
Cleaning the 20 beegahs of land, at 4 annas per beegah	5	0	0	260	0	0
One maund of seed.....	2	8	0			
Carried over.. Rs.	7	8	0			

Brought forward..Rs.	7	8	0			.. ..	260	0 0
Excavating the ground for fixing the churka, and digging channels for feeding the same	1	0	0					
				8	8	0		
Churka expenses.								
Petty repairs by carpenters	0	8	0					
Petty repairs by smith	0	8	0					
Pots	1	0	0					
Ropes, &c.	1	0	0					
				3	0	0		
Three months' food and fodder for four bullocks	24	0	0					
Pay of labourers for three months, 48 rupees, and expense for picking, &c., 16 rupees.....	64	0	0					
Ginning	8	0	0					
Land rent	29	2	4					
				125	2	4		
							136	10 4
Profit..Rs.							123	5 8

"On sailabee land the expenses are much less, but the produce usually falls short of that raised by the churka. Assuming the same extent of land, viz. 20 beegahs, the produce, under very favourable circumstances, with a good soil, and abundance of moisture in the ground, will amount to the same as the above, or about 15 maunds of cotton, and 25 maunds of five seers, which are equal to.....Rs. 260 0 0

"The expense attending which are as follows:—

	Rs.	*a.*	*p.*			
Clearing the 20 beegahs of land.....	5	0	0			
One maund of seed	2	8	0			
Petty expenses for repairs to ploughs,&c. fourahs &c.	0	8	0			
One month's food and fodder for four bullocks ..	4	0	0			
Pay of labourers for three months, 48 rupees, and expenses of picking, &c., 16 rupees	64	0	0			
Ginning	8	0	0			
Land rent	29	2	4			
				113	2	4
Profit..Rs.				146	13	8

"The cultivation of cotton in the districts under my charge is considered of minor importance by the zemindars, who prefer the immediate and substantial return yielded from the cultivation of rice, jowaree, and bajree, in which they are principally engrossed. In the interior of the districts the demand for cotton is very trifling, and the zemindars have no funds to speculate with, nor can they wait until their produce finds a good market. I think that it could be produced in quality equal to that of any other country, for I have seen very superior specimens of it; but, in order to raise it to that standard, its cultivation would necessarily require European superintendence and careful management. Its chief enemy appears to be the dew, which in my southern districts falls very heavily." [1]

Captain Partridge, the Deputy Collector of Sehwan, made a very elaborate report of the cotton cultivation in his district, of which the following is the conclusion:—

"From this detail, which is necessarily lengthy as regards figures, to show the capabilities of each district, it will be seen that the pergunnas of Boobuk and Dadoo are the most profitable, the former, after deducting cost of cultivation, giving Rs. 7-8-5 per jureeb,* and the latter Rs. 4-2-11. In the former the cultivation is scanty, but the ground is highly manured and taken care of; hence the double produce in Dadoo; likewise the water is plentiful, and more labour used. The produce of the submerged land in the Turtee Pergunna, giving Rs. 6-2-2 per jureeb profit, is no fair criterion to judge of, as it is planted in the jowaree cultivation, and the expenses of irrigating that suffices for the cotton; hence the item of irrigation in the pukka land of the same pergunna (225 rupees) is not included in the cost, which perhaps, however, it ought to be. With only ordinary care, and taking the average of seasons, I am inclined to think that the profit may amount generally to 2½ or 3 rupees per jureeb; but, although it is a favourite crop with the ryots, you are aware it is a precarious one, more especially in the Phooljee and Mullar pergunnas, where the cultivation is principally dependent on rain and the uncertain periodical freshes of the Gaj River. One great obstacle to an extension of the cultivation, in addition to this precariousness, is the prohibition of remissions, except in total failures. According to the present rules, if one jureeb out of twenty only is productive, the whole has to be paid for; and amongst the poorer classes of cultivators it is sometimes downright ruinous, and I know not a more disagreeable and distressing duty than having to enforce it.

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[1] Rev. Cons. vol. lxxxiii. 1851, pp. 79—81; & Returns, E. I. Cotton, 1857, pp. 1522 & 1523.

* About the same as the Sind beegah: equal to 2,500 square yards.

"The extent of land fit for cotton in this zillah is enormous; but, except in the Dadoo and Santanee pergunnas, and small spots of the others, the means of irrigation are wanting. In the Phooljee and Mullar pergunnas the plant might be cultivated to any extent if water was forthcoming. On the Gaj River it might also be extended, with remissions for bad crops and a rent of one rupee per jureeb; in the Dadoo pergunna a plan of extension invites attention: it is the lessening the rent, say 2 annas a jureeb, on all land cultivated in excess of the previous year; this was a mode pursued in the late reign. It is a small premium, which, added to the profit of the speculation itself, would be an encouragement, and a very trifling loss to Government.

"As regards cotton cultivation in Sind, I believe more is not produced than is required for the wants of the people; but, with reference especially to this zillah, enough is not produced, and the deficiency is supplied from Kurrachee. Without, therefore, better means of irrigation, and a greater degree of enterprise and labour than the Sindee gives to it, I am afraid it will be a long time before this becomes an exporting country." [1]

The extent of land capable of cultivation in the various pergunnas of the district, and the proportion devoted to cotton in 1850, are arranged in the subjoined tabular form from the data supplied in this report [2]:—

Pergunnas.	Area capable of cultivation.	Area of Cotton cultivation.
	Jureebs.	Jureebs.
Shamtanee	88,531	251
Boobuk	1,905	50
Turtee	17,555	250
Dadoo	22,000	916
Phooljee	245,293	373
Sehwan	12,171	46
Lukkee	32,074	300
Mullar	57,070	780
Total..	476,599	2,966

In 1852 a consignment of 125 bales of Sind cotton, the produce of Sehwan, was sent to Bombay, in order to ascertain the value of the article. Two bales were forwarded to the Chamber of Commerce, who expressed the following

[1] Rev. Cons. vol. lxxxiii. 1851, pp. 93—96; & Returns, E. I. Cotton, 1857, p. 1528.

[2] Revenue Consultations, vol. lxxxiii. 1851, pages 83—93.

opinion as to the quality :—"This cotton is somewhat harsh, short in staple, and not well cleaned, but free from seed, and valued at present at Rs. 70 to Rs. 75 per candy." At that time the prices of cotton in the Bombay market were as follows :—Broach and Surat Rs. 94 to Rs. 96, Dhollerah Rs. 89, Oomrawuttee Rs. 90, Compta Rs. 90, per candy.[1] Sir H. Bartle Frere remarked of the cost of the parcel—

"It will be seen from these papers that the cotton has cost more than the Broach cotton sells for in Bombay, and, being inferior in quality, cannot, unless the price be greatly reduced, ever be useful cotton in the Bombay market.

"I have little doubt but that the production will extend and the cost be reduced. At present the production being very limited, the selling price is probably regulated by the price which imported cotton bears on the spot."

Mr. Young stated to the Commissioner that, while in charge of the Mehur districts, he "had several trials made with New Orleans seed (produced in India) in the mode described as 'bagur' cultivation, and in every instance it failed."[2]

The small experiments with exotic seed made by various Collectors were of a very desultory character, and never exceeded mere garden culture. In 1852, Sir H. B. Frere represented that no definite or useful result was likely to follow from such experiments, and he urged that some practical and intelligent man should be appointed to devote himself actively and entirely to the object. Mr. T. G. Prince, who had been engaged in cotton cultivation at Coimbatore, was, therefore, appointed to superintend cotton experiments in Sind.

Mr. Prince, after having made a tour through the districts, reported that "the soil throughout Sind appears to be much of the same character, being a strong unctuous clay loam, in some places mixed with sand, and almost everywhere impregnated, more or less, with salt, though in a few places not so much so as to be unfit for growing foreign cotton, especially the long-stapled sorts, as the soils to which they are indigenous were, in many cases, lands reclaimed from the sea, and, from the best accounts we have of their habits, they thrive well on brackish soils.

"The plants that I saw," he continued, "both Egyptian and New Orleans, had, with very few exceptions, grown luxuriantly in every part of the country, where only an ordinary degree of care had been bestowed, but only the New Orleans had yielded cotton.

"The Egyptian in Central and Upper Sind had almost entirely failed from blight and insects in the bolls. In the delta the specimens that I saw of this cotton were so few, that they hardly afforded ground for an opinion."

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[1] Revenue Consultations, vol. lxi. 1852, pages 239—241.
[2] Revenue Consultations, vol. lxi. 1852, page 313.

Mr. Prince attributed the failure "to the want of the sea air, which, from all accounts, appears to be an indispensable requisite with all long-stapled cottons for properly maturing the crop."

In endeavouring to ascertain why cotton was not more generally cultivated, the answer which he received from several intelligent zimindars was, "that the crop was a profitable but precarious one, and that cultivators were unwilling to incur the risk and outlay required for its being grown in considerable quantities."

He stated, "The native cotton in general cultivation is a variety of the *Gossypium indicum*; the staple is shorter, and the fibre coarser and harsher than in any other sort I am acquainted with; it is inferior to the native cotton of the Peninsula of India."

The following are very condensed memoranda of the results of exotic culture in the various localities visited by Mr. Prince, collected from his report, dated 2nd June 1853 :—

Leilo, Bahrung, Luna-ka-kote.—Egyptian seed sown. The greater part did not come up, and the plants produced from the rest were destroyed by insects at the roots.

Tattah.—Five or six patches were sown with foreign seed; they were destroyed by the grub, and produced nothing.

Hillya-ka-kote.—The kardar stated that only one patch of Egyptian cotton had been sown, and that was destroyed by insects at the roots.

Jerruck.—Four or five patches of a few square rods each of foreign cotton sown in March; the plants remarkably large and strong. A field of nearly two acres sown with Egyptian seed, also sown in March. The plants were fully six feet high, strong, and bushy, and just what plants ought to be; they appeared to have been properly treated in all respects. They had, however, yielded little or nothing; the plants had flowered and bolled three times successively. As each immature crop of bolls fell off, the plants threw out fresh flowers, and other bolls were formed. The bolls were not of the size they should have been, and most of them were infested with the boll-worm and bug. There were a good many native cotton plants mixed with the foreign which had not suffered in any way, and had yielded a good crop.

Kotree.—Nine patches of land, of a few rods each, planted with Egyptian seed in the preceding July and August. All total failures, the plants being destroyed by the grub at the roots, when three months old In Dr. Mill's garden at Kotree 10 rods of ground were planted with Egyptian cotton about the middle of April. The plants were strong

and healthy, like those at Jerruck, but, like them, they had produced little or nothing. They had plenty of bolls, which, when about half grown, withered and fell off.

Pettarah.—A patch of Egyptian seed, sown in July. The plants strong and healthy. Produced nothing at all, the bolls being blighted.

Oomerapoor.—Half an acre of Egyptian cotton. The seed sown in June. Plants 9 or 10 feet high, strong, and bushy, but they had produced nothing, two or three successive crops of bolls having withered and fallen.

Beea.—A dozen of patches of Egyptian cotton planted in June and July. All strong and healthy. The best cultivated by Hindoos. In one place of about 40 rods, the plants were nearly 12 feet high. They had yielded nothing, the bolls having been blighted like the preceding.

Kanoot.—An adjoining village. 14 patches of Egyptian cotton, "which need no description, being like the former." In two or three of the patches of Egyptian cotton, there were some plants of New Orleans growing, which were still bearing a few pods. These were not damaged by insects, although the bolls of the Egyptian were destroyed by them.

Majundia.—One patch of foreign cotton, looking unhealthy.

Merhana.—A patch of Egyptian cotton growing beside the best piece of native cotton Mr. Prince had yet seen. The native had produced abundantly, while the Egyptian had been blighted in the bolls and yielded nothing.

Lukkie.—One piece of exotic cotton blighted like the others.

Sehwan.—All the foreign cotton destroyed by floods, except one patch, which looked sickly from immersion in water.

Beber.—All destroyed by floods, except one field of Egyptian sown in July, which looked healthy, but had produced nothing.

Mehur.—An acre and a half of Egyptian plants sown in March, by the Deputy Collector, and two other fields by Mr. Wright, sown at the same time. The plants all looking well, eight feet high, bushy, and strong. They had produced plenty of flowers and bolls, but no cotton, the bolls having been destroyed by blight and insects."

Many pages might be filled by continuing these extracts from Mr. Prince's report. He enumerates a great many other places in which he observed precisely the same unvarying failure of the Egyptian cotton. In no single instance had it proved successful. The New Orleans cotton had, in a few places, yielded a trifling crop.[1]

[1] Revenue Consultations, vol. liv. 1858, pages 91—157.

Mr. Prince describes the worm, which so frequently destroyed the young Egyptian plants, as "a large grub that eats into the plant just below the surface of the ground; it eats its way upwards in the heart of the stem, and the plant dies for want of nourishment."[1]

The following is Mr. Prince's report of his first season (1853-54), dated 17th June 1854:—

"On my return from the districts, in April last year, I planted in that and the following month, in the Government garden, and in an enclosed field in the neighbourhood, about 10½ acres of land, with New Orleans and Egyptian seed, partly imported and partly naturalised.

"The acclimatised seed grew well, and produced a fair stand of plants, but three successive days of hot winds, when they were in the third leaf, and again three more days of similar weather, when the plants were about three weeks old, so effectually stunted them, that they never recovered it, and produced, in consequence, only about 1½ maund of inferior cotton.

"The New Orleans imported seed, of which I planted about five acres, did not come up at all. This seed I had tried, in November 1852, previous to its distribution, and found it good; but in the interval of six months that ensued before it was planted, it had greatly deteriorated, though kept in a dry and airy place. Evidence of this I subsequently found in all parts of the country; in many places it had not grown at all, in others only partially.

"In September last, 6,000 lbs. of Sea Island seed were received from Bombay, which on trying I found to be good,—nearly every seed germinating. Of this seed I sent, in November, 4,800 lbs. to the Deputy Collectors of Shah Bunder and Ghorabarree, and about 250 lbs. to the Political Agent at Cutch. In December, 14,000 lbs. of New Orleans seed were received from the Deccan and the Southern Maratha Country, and in January 2,000 lbs. of this seed were sent to the Chief Commissioner of the Punjaub, 5,000 lbs. to Shikarpoor, 5,000 lbs. to Hydrabad, and 2,000 lbs. for the Kurrachee Collectorate. This seed was fresh and good, being the produce of the last harvest, and has grown well wherever it has been planted, as I learn by late advices from different parts of the country.

"*Ghorabarree.*—On my proceeding to the districts, I found that in the Ghorabarree district a number of small patches of land of a few rods each had been planted late in the season with New Orleans and Egyptian seed. Much of this seed had failed to come up, and where it had grown from the lateness of the planting, and from carelessness and neglect, little or no cotton had been produced.

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[1] Revenue Consultations, vol. liv. 1853, page 102.

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"In the Sacra kardarate I found some ten or twelve of these patches on the bank of the Bagar. They had been planted in August with New Orleans seed, and, though small, the plants were looking healthy and well, and were tolerably well loaded with bolls. Little damage had been done by insects or dews, though the plants were overrun with weeds. The Egyptian seed that had been sown had all failed to grow.

"In the Tatta kardarate about an equal extent of land had been planted in August in still smaller patches. The plants, though small, being cropped by cattle, and every way neglected, bore a reasonable quantity of fair-sized bolls. No damage had been done by insects or otherwise.

"In the Jerruck kardarate several patches had been planted in the Dubbiar in the beginning of August. The plants here, as in the other kardarates, had been neglected, and were in several patches damaged by cattle. They were, however, healthy and green, and, though scarcely 18 inches high, were bearing an abundance of as large bolls as ever I saw; in fact, the bolls could not be finer. Some slight damage had been done among the plants by the grub at the root (mooraee). Much of the seed sown in this as well as in the Tatta kardarate had not grown. Mr. Cole, the Deputy Collector, had planted about half an acre in a field near his premises, in July; these plants were large, and had been properly treated. Mr. Cole has since informed me that he picked an abundant crop from this field of plants.

"In the Ghorabarree kardarate nothing was produced. The kardar's report says the principal part of the seed sown was flooded.

"The canals in this district and throughout the province filled unusually late, and the seed was planted late in consequence.

"I found most of the cultivators of this district entirely averse to plant the American cotton this season. They plead poverty from losses, by floods and bad harvests during the two past seasons, as the reason for their unwillingness. Only the cultivators of the Sacra kardarate engaged to plant 53 beegahs of land with Sea Island seed on the banks of the Bagar, in the beginning of April, on the terms proposed by Government.

"The large landholders in this district, though engaging to make the trials themselves, have, in almost every instance, given the seed to their 'harris,' or sub-tenants, to plant. These are generally small holders of from 10 to 50 beegahs, who can only plant in small patches. I have this season stipulated, in the written agreements, that the seed be planted throughout the province in fields of not less than an acre of land, and in a few instances of not less than a beegah.

"A belief exists among some of the zemindars and others, that the heavy dews that fall in the Delta are injurious to cotton, and they allege this as one reason why more native cotton is not grown there. I have as yet, however, seen only one instance where they have done any damage to the foreign cotton, and, in that one, the plants were surrounded on three sides by tall sugarcane crops and trees, so that neither the sun nor air had free access to the plants, and, as a necessary consequence, the cotton in a few of the opening bolls was discoloured, and otherwise injured.

"Where the foreign cotton is planted in open situations, freely exposed to the action of the wind and sun, I am of opinion that little or no damage will be done by the heaviest dews. The only effect produced by these dews would be one similar to that produced by a light rain or Scotch mist. In general they are no doubt beneficial, and the only time at which they could be injurious to the cotton would be when the bolls are opening, and the crop is being harvested; and as at that season the sky is mostly unclouded, and the sun bright and powerful, I am persuaded that little need be feared from the dews, and that this (as regards foreign cotton) is a prejudice which a few good crops will soon dissipate.

"*Sehwan.*—In the Sehwan districts only a small quantity of New Orleans cotton had been produced. Much of the seed distributed, the kardar's reports say, had failed to grow, and some was destroyed by inundation. Some fine plants had been produced from New Orleans seed in Beea, Oonerapoora, and the neighbouring villages. These were in small patches of ground, planted in August, and the plants seemed remarkably healthy and flourishing, and were well laden with large bolls. On one plant, about 2½ feet high, I counted 33 large bolls, six of which had been pierced by the boll-worm; the rest had not been injured by insects, though foul with grass and weeds. Some Egyptian plants of the previous season had been pruned, and had grown well, but produced nothing. About a beegah of New Orleans plants, also of the year before, had been pruned, and were looking healthy, though they had been neglected, and were choked with weeds; they were well laden with bolls, but smaller than those on the annual plants.

"The largest and most respectable cultivators of this district have engaged to plant 85 beegahs of land with New Orleans seed this season—50 beegahs to be planted on well lands in February and March, and the rest whenever the water is available.

"*Mehur.*—In the Mehur districts no cotton had been produced, except by Mr. Wright, the apothecary there, who had sown a beegah and half in March, April, and May, which had yielded 5 maunds 16 seers of 'phootie,' or seed

cotton, and 1 maund 25 seers of clean cotton. These plants were of average size, and had been properly dealt with in most respects; no damage had been done by insects or blights. Mr. Wright informs me that he had these plants pruned in February; that they have grown up stout and healthy, and are now full of flowers and bolls, and promising a good crop this season.

"Much of the seed (New Orleans) sown in this district did not come up; several patches are reported by the kardars as having been eaten by the grub at the root in the Tiggr kardarate; the plants were blighted by the hot winds. The principal zemindars of this district have agreed to plant 57 beegahs this season, with New Orleans seed, as soon as the water in the canals is available.

"*Larkhana.*—In the Larkhana districts, about 4 maunds of seed cotton had been produced from New Orleans seed planted in April; this cotton was good, but picked in a slovenly way, and mixed with trash of all sorts. Much of the seed planted did not grow; some few plants had been destroyed by the grub, and some withered by the hot winds, particularly in the Kumbar kardarate. A small quantity of Egyptian seed had been planted in the Nusseerabad kardarate, contrary to my directions, and had yielded nothing.

"The principal zemindars of this district signed an agreement to plant 123 beegahs with New Orleans seed this season. Of these, 57 are to be planted on well lands, in February and March, and 66 when the canals fill.

"*Shikarpoor.*—In the Shikarpoor and Boordeka districts, some 12 maunds of New Orleans cotton had been produced, of good quality mostly, but it had been harvested in the native manner, and was very dirty. Much of the seed planted had failed to grow, and white-ants had done damage among the plants in the Nowshera, Abra, and Meerpoor kardarates; little damage had been done by the boll-worm; and some few patches of plants had been withered by the hot winds.

"In the Boordeka district, from Abad northwards, the river has encroached much. What was formerly a fine cotton country, was last year flooded entirely, and above 800 beegahs of native cotton destroyed. The zemindars say they have abandoned sowing cotton entirely. The foreign cotton planted here was all destroyed by the floods.

"I regret to say that I succeeded in getting only 55 beegahs of land signed for. Of these, 36 beegahs are to be planted on well lands in February and March, and the rest when the water in the canals serves.

"*Sukkur and Left Bank.*—In the districts of Sukkur and the Left Bank, about 45 maunds of New Orleans seed cotton had been produced, chiefly in the Gotekee and Roree kardarates. This cotton was good, and had been carefully harvested, but it was a good deal discoloured. Most of this seed had been

planted early in the season, and the plants had been fairly treated. From the partial failure of the seed, it is difficult to compute the yield; about 350 lbs. of seed cotton per acre is an approximation for the fields that produced the cotton.

"Some of the best samples I proposed to purchase, but the growers were unwilling to part with any, as they intended to have it all manufactured for their own use.

"Some little damage had been done by the boll-worm in a few of the fields; most of the plants, however, had escaped without injury; the grub at the root had also destroyed a few plants here and there. The Aboura kardar's report says that the hot winds had withered many of the plants there; a good deal of the seed planted all over the districts had failed to come up.

"The principal cultivators of these districts have engaged to plant 50 beegahs of land this season, in February and March, with the imported New Orleans seed. About 27 maunds of the seed raised last year in the districts, Mr. Cowper, the Deputy Collector, informs me, he is sanguine of having all planted. This quantity of seed is enough for 200 beegahs of land.

"*Sabitee.*—In the Sabitee districts only about two maunds of cotton had been produced. The kardar's report says they had only a small quantity of seed supplied to them, much of which did not grow, and that the grub at the root had destroyed many of the plants. At Taroosha, in Mr. Jamieson's, the Deputy Collector, garden, about half a beegah of fine New Orleans plants had produced a plentiful crop of good cotton; these plants had not suffered in any way.

"The principal cultivators of this district agreed to plant 250 beegahs of land this season with the New Orleans seed—150 beegahs on well lands in February and March, and 100 beegahs as soon as the water in the canals is available.

"*Halla.*—In the Halla deputy collectorate only a few seers of New Orleans cotton had been raised. The cultivators told me that the canals filled late in the season, and that the water remained only for a short time, and that their trials failed in consequence, as the plants had perished for want of water. There are very few wells used for cultivation in this district.

"The principal cultivators agreed to plant 116 beegahs of land this season with the New Orleans seed—110 beegahs as soon as the water is available in the canals, and 6 beegahs on well lands in the beginning of March.

"*Dooba.*—In the Dooba about a maund and a half of New Orleans cotton had been secured. This cotton was good, but much discoloured and dirty; it had been picked in a slovenly manner. Some of the seed sown had failed to grow, and some little damage had been done by the boll-worm. The principal cultivators of the district agreed to plant 50 beegahs with New Orleans seed this season—20 beegahs in March, and 30 beegahs when the canals fell.

"*Meerpoor, Mahomed-Khan-ka-Tanda.*—In the Meerpoor and Mahomed Khan-ka-Tanda districts no foreign cotton had been produced from the great scarcity of water. This was a universal complaint. The cultivators informed me that the water was very scanty in the canals, and remained only about two months, in some places even less time, and, in consequence, that not only the foreign seed had failed, but the native cotton also. This Mr. Lambert, the Deputy Collector, assured me was the case in his districts. On this account, only 20 beegahs of land were engaged to be planted with New Orleans seed in both these districts, the cultivators asserting that it would be useless to plant the seed, as, from the defective state of the water-courses, the supply of water was insufficient for their crops.

"*Shah Bunder.*—In the Shah Bunder districts no foreign cotton was produced; about 10 beegahs planted in May, on the banks of the Puizarree, were totally destroyed by the hot winds. In other parts of the district the trials failed chiefly from the floods.

"The principal cultivators of this district have engaged to plant 187 beegahs with foreign seed this season—12 beegahs with New Orleans, and 150 beegahs with Sea Island seed, as soon as the water is available, and 25 beegahs with Sea Island seed on good 'silabee,' in the latter end of October.

"I have been led to give this experiment of planting on 'silabee' a trial, partly from the representations of several intelligent zemindars, who assure me that it will do well, and because I consider that the foreign plant will stand as much drought as the native, and that the moisture of both soil and climate in the Delta will be sufficient to raise good sized, though not, perhaps, large plants. Should this method of culture succeed, it will be a great advantage, as it is attended with little expense and no risk from the floods, for the crop will be harvested before the inundation sets in. If only middling crops be got, I have no doubt that a good deal of cotton will be produced this way.

"Written agreements have been made with the principal zemindars to plant this season 1,046 beegahs of land with the foreign seed, on the terms proposed by the Government. These, together with land planted with the seed won in Upper Sind last year, will make in all about 650 statute acres planted this year throughout the province—about 120 acres in the Delta with Sea Island seed from America, and the rest with New Orleans seed naturalised in India.

"The experiments hitherto can hardly be said to have been voluntarily made; the cultivators generally have undertaken to plant small patches more because the Government wished it, than from any interest they themselves took in the cultivation, and have regarded the endeavours used to induce them to plant rather in the light of commands than persuasion, so that, if the planting was not

compulsory, it was seldom taken in hand with a good will and a desire to succeed. This has been the case especially in Lower Sind; the planters here, in most instances, did as little as they could towards the culture consistently with showing that anything at all had been done, and the experiments generally have been neglected in most respects.

"From all that I have hitherto seen, the foreign plant is not liable to more disasters, nor are there greater permanent obstacles to its well-doing in Sind than in other countries. The chief of these that have shown themselves up to the present time are hot winds and insects, the boll-worm, the grub at the root, and the white-ants.

"Written instructions for planting have been furnished to each Deputy Collector by me, and translated copies supplied to all the kardars and tuppedars, with directions to give them all the publicity in their power among the cultivators; 450 lithographed copies have also been given out among the principal zemindars of the province.

"All the cultivators who have engaged to plant the foreign seed this season have done so voluntarily. I took care to impress on them that nothing like compulsion was intended, and that they were free to accept or refuse the terms offered by the Government. I also ascertained that they perfectly understood the terms on which they engaged to plant before they signed the agreements.

"From this season's operations, therefore, I look forward for satisfactory results in Upper and Middle Sind, particularly where the cultivators have taken most pains, and consequently succeeded best, and, in spite of bad seasons and bad seed, are evidently taking an interest in the New Orleans cotton, and are fully aware of its superiority to their own, both in yield and quality, though they are cautious of expressing themselves too much in its favour as yet.

"The cultivators of the Delta are not so tractable as those of the Upper Province; the Delta, they say, never was a cotton country, and it is very difficult to persuade them that it may become one. Their prejudices are strong against it. I trust, however, that they will do justice to the experiments this season, and that the results will tend to convince them that the American cotton will, if fairly dealt with, yield them good returns, and prove a profitable crop." [1]

The operations of the ensuing season were not more successful, as may be learnt from Mr. Prince's second report, dated 4th June 1855:—

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[1] Returns, E. I. Cotton, 1857, pp. 1553—1556; & Rev. Cons. vol. xxxviii. 1854, pp. 321—338.

"I have the honour to submit a report of my proceedings and observations during my recent journey through the province, and of what has been done in the cultivation of foreign cotton since the date of my last report.

"In the Delta, as also in the Doaba, little or no cotton was produced, from the causes stated in my report on those districts, dated 26th August 1854: the experiments had failed entirely from late sowing, and neglected and careless cultivation.

"Of the seed sown on 'silabee,' in the Shahbunder district, in October last, the kardars report that the plants had all perished, when quite small, from the cold, and other causes.

"In the Halla deputy collectorate 66 beegahs had been sown with foreign seed in numerous small patches of a few biswahs each, in the Halla and Shadadpoor kardarates; many of these had been sown late in isolated spots, or amongst bajree and other crops, and were neglected and good for nothing; other patches had been planted beside, and at the same time as, fields of native cotton, and had been treated exactly the same as the fields to which they were annexed; these had produced excellent plants, that had borne, and were still bearing, abundantly; about 30 maunds of seed cotton had been yielded from these, and some larger patches on the river bank, and much more would doubtless have been produced, had not the cultivation been so neglected, this district having escaped the ravages of the boll-worm. In the Lukkrund and Ghoramurree kardarates little or nothing had been done. The principal zemindars of this sub-collectorate agreed to plant 110 beegahs with foreign seed this season; those who had bestowed proper care on their cultivation had got good returns, and expressed themselves satisfied and pleased with the results of their work.

"In the Nowshera deputy collectorate 160 beegahs were sown with the acclimatised seed, of which the greater part, planted in the Mora and Nowshera kardarates, had been destroyed by the inundation. The crops in the Kundara kardarate were very much damaged by the boll-worm; and from these causes, together with late planting and neglected cultivation, little or no cotton was produced. The zemindars of the Mora kardarate agreed to plant 30 beegahs with foreign seed this season. Those of the other kardarates were wholly averse to planting this year; they, however, promised to prune and cultivate the plants on the ground for a second crop.

"In the Rohree deputy collectorate 160 beegahs of foreign seed were planted, which yielded only about 27 maunds of seed cotton. The boll-worm was the principal cause of the failure of the crops in these districts, though other causes also contributed, as excessive moisture, of which there were many

complaints in the Ooboura and Meerpoor Mattalee kardarates, late planting, and neglected and careless cultivation. The seed sown on the 'bosee' lands generally produced good plants, but they had yielded nothing on account of the boll-worm and too much wet.

The cultivators here were entirely averse to plant this season, except two or three, who promised to sow the seed they had won last year; they had, however, no objection to cultivate last year's plants for a second crop.

"In the frontier districts 14 beegahs of foreign cotton had been planted, which had yielded about three and a half maunds of seed cotton. Boll-worm had greatly damaged the crops here, and some few patches had suffered from hot winds. The cultivators, with whom I spoke, were mostly unwilling to plant this season.

"In the Shikarpoor deputy collectorate from 72 beegahs sown with the seed from India, only about six maunds of seed cotton had been gathered. The boll-worm had been even more destructive in this district than in others; all the early-sown and best plants had yielded nothing in consequence of its ravages; a few of the late-sown fields and patches had been somewhat less injured. Little or no damage had been done by the floods, nor had the crops suffered, as far as I could ascertain, from any other cause than the boll-worm. Two only of the principal zemindars of this district promised to plant a few beegahs; all the rest objected to sow the foreign seed this season, but they were all willing to prune and cultivate last year's plants for a crop this year.

"In the Larkhana deputy collectorate 112 beegahs of the imported seed had been sown, from which, owing principally to the boll-worm, only about five maunds of seed cotton had been secured. On the low lands, in the neighbourhood of the river, several beegahs had been inundated, and there was also a good deal of late planting and careless cultivation, in the Kumber kardarate particularly. Many fields of excellent plants in these, as well as in the Shikarpoor districts, had been utterly destroyed by the boll-worm, the cultivators having assured me that not a pound of cotton had been picked from the most promising of the fields. The zemindars here promised to cultivate the plants on the ground, but were generally averse to plant afresh this season; five or six promised to sow this year the seed they won last, but the rest were quite unwilling.

"In the deputy collectorate of Mehûr 18 maunds of seed cotton are reported to have been produced from 90 beegahs of seed sown, and this failure is attributed chiefly to the destruction of the crops by the boll-worm. Some of the seed sown is reported as not having come up, and several beegahs towards the river as having been destroyed by the inundation. The plants had been pruned throughout the district, and the zemindars, though generally

unwilling to plant this season, promised to cultivate with care the plants on the ground for a second crop.

"In the Sehwan deputy collectorate 80 beegahs of land were reported to have been sown with foreign seed, and only about six maunds of seed cotton to have been produced, greater part of which was from the Kotree kardarate; 16 beegahs are returned in the kardar's reports as having been destroyed by the floods; and on about 14 beegahs in the Sehwan kardarate the seed is said to have failed to come up.

"The boll-worm had done great injury to the Kotree and Dadoo kardarates, where the best cultivation was. Last year's plants had been generally pruned, and in many fields where water had been given, the plants had thrown out fresh shoots, and were looking well.

"Many growers of the foreign cotton last year, more particularly those of the districts on the left bank, complained of damage done to their crops by excessive moisture; 'sake' is the native term for it. This, I have no doubt, is a well-grounded complaint. The low-lying lands, though not flooded, were thoroughly saturated by the inundation, and retained the moisture for a long time, and too much moisture at the root cannot be otherwise than injurious to the maturing crop. In many of the fields on this description of lands, the plants were from this cause far too lusty, and had all run to wood.

"The damage done to the foreign cotton crops by the floods throughout the province was inconsiderable, in comparison with that occasioned by the boll-worm, except in the Sahitee districts, where between 60 and 70 beegahs are reported to have been inundated, on which the seed was sown early, and the plants were swamped when in full flower.

"The seed sown in July and August produced only very small plants, and little or no cotton. No representations of the disadvantages attending late sowing avail with some cultivators, nor is it easy to make them sensible that good crops cannot be expected where the seed is put in the ground six weeks or two months after the proper time for planting.

"The foreign cotton produced throughout the province was generally a bad sample, from the damage done by the boll-worm; where this was not the case, it had been picked native fashion, and was full of impurities.

"Throughout Upper and Central Sind, with the exception of the Halla district, the boll-worm had almost entirely destroyed the crops of foreign cotton, nearly all the first-formed bolls having perished. As the cold weather set in, its ravages were less destructive, and the bolls then yielded an inconsiderable quantity of inferior cotton towards the close of the season. The plants that had thus suffered were generally speaking good; in many instances very

good indeed, several of the principal zemindars in each district having sown early, and taken great pains with the cultivation; and this unfortunate failure is the more to be regretted, as, from the promising appearance of the plants up to the time the boll-worm attacked them, the planters expected to realise good crops, and their disappointment is commensurate to their previous expectations. They are now generally much disheartened, and, with few exceptions, strongly object to plant this season; they are almost all, however, quite willing to prune and to cultivate the last season's plants in the same way that they are accustomed to do with the native cotton; and, if the season prove favourable, I am in hopes that they may get good crops, the foreign plant, like the indigenous, answering well as a biennial, though not yielding so much cotton the second year as the first."[1]

Before this report had been forwarded to Bombay, Mr. Prince died, and Sir H. Bartle Frere stated that he had, even before that event, determined to recommend the abolition of the experimental establishment. It was consequently abandoned.

In 1858, Mr. P. M. Dalzell addressed to the Commissioner an elaborate report on the cotton cultivation of the province. He pointed out that "the cultivation of native cotton in Sind seemed gradually falling off." Exclusive of Jacobabad, which grows very little cotton, he stated the area devoted to cotton as follows:—

In 1854-55	32,156	acres.
In 1855-56	28,590	do.
In 1856-57	24,696	do.

He added, "Taking the latter year's extent of cultivation, and the average yield of clean cotton at 62 lbs. per acre, it gives little more than ¾ of a lb. to each inhabitant of the province,—a consumption so small, where cotton is used not only in manufactures, but generally for bedding, quilts, &c. &c., as considerably to shake my faith in the correctness of the returns of cultivation rendered by the revenue officers. The produce and extent of land under cultivation must, I think, be much greater than it is shown to be, or Sind imports cotton to a much greater extent than I have any idea of. By sea the imports are very trifling."

Sir H. Bartle Frere remarked, "With regard to the discrepancy noticed between the extent of cotton cultivation in the province and the probable consumption, I would observe that much cotton is now produced in the Khelat portion of what was once the desert near Jacobabad, and considerable quantities

[1] Rev. Cons. vol. lxi. 1855, pp. 131—141; & Returns, E. I. Cotton, 1857, pp. 1561 & 1562.

are imported overland from Rajpootana across the desert, and from Mooltan and the Punjaub and Bhawulpoor districts by river."

Mr. Dalzell prepared elaborate tables of cultivation, cost, and assessment which are here extracted. It is right, however, to mention the remark made by Sir H. Bartle Frere with regard to the average yield of cotton per acre in Sind, that "all such general returns must be received with caution. * * * As to the result apparently deducible from the return of the indigenous cotton in the Shikarpoor collectorate, that the cultivation entails loss on the cultivator, I have no doubt that the produce is very much understated. The zemindars in Upper Sind all readily admit that cotton pays well, when they are able to cultivate it, which depends much on the season and the early rise of the river." [1]

Statement showing the average yield of Cotton per Acre in SIND *in the years* 1854-55, 1855-56, *and* 1856-57, *and the proportions of Clean Cotton to Seed Cotton, or Kuppas.*

COLLECTORATES.	NATIVE.						EXOTIC.					
	With Seed.			Cleaned.			With Seed.			Cleaned.		
	1854-55	1855-56	1856-57	1854-55	1855-56	1856-57	1854-55	1855-56	1856-57	1854-55	1855-56	1856-57
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Mehur	119	106	140	28	24	29	17	14	..	4	3	..
Larkhana	121	127	119	30	32	30	4	7	..	1	2	..
Rohree	137	154	147	34	39	36	25	30	..	6	8	..
Shikarpoor	148	157	132	37	39	32	23	8	..	6	2	..
Shikarpoor Collectorate..	131	143	133	32	35	32	16	17	..	4	4	..
Hydrabad	640	641	613	159	160	154	121	..	784	..	..	98
Nowshera	369	277	230	91	71	55	..	..	..	..	..	..
Halla	333	313	198	85	81	69	37	..	..	12	..	..
Meerpoor	439	883	571	110	224	149	..	..	..	..	..	..
Mahomed Khan's Tanda	266	390	455	75	110	119	..	..	..	..	..	..
Hydrabad Collectorate..	380	469	335	95	122	89	24	..	784	5	..	98
Jerruck	494	448	..	124	112	..	2	3	..	0½	0¾	..
Shahbunder	271	263	..	108	118	..	..	23	..	..	15	..
Schwan	141	693	612	31	128	159	42	51	..	11	12	..
Kurrachee Collectorate..	142	684	612	32	128	159	16	9	..	4	3	..

[1] Revenue Consultations, vol. lxi. 1855, pages 150—154.

Statement showing the per-centage of Cotton, rate of Assessment and cost of cultivation per Acre in SIND *in* 1854-55, 1855-56, *and* 1856-57.

COLLECTORATES.	PER-CENTAGE OF CLEANED COTTON.						RATE OF ASSESSMENT PER ACRE.						COST OF CULTIVATION PER ACRE.					
	Native.			Exotic.														
	1854-55	1855-56	1856-57	1854-55	1855-56	1856-57	1854-55			1855-56			1856-57			1854-55			1855-56			1856-57		
							R.	a.	p.	R.	a.	p.	R.	a.	p.	R.	a.	p.	R.	a.	p.	R.	a.	p.
Mehur	24	23	21	24	21	..	2	3	3	2	3	3	2	3	0	3	12	9	3	12	9	2	6	0
Larkhana	25	25	25	25	29	..	2	3	3	2	3	3	2	3	3	3	12	9	3	12	9	1	15	0
Rohree	25	25	24	24	27	..	2	3	3	2	3	3	2	4	2	3	12	8	3	12		5	2	3
Shikarpoor	25	25	24	26	25	..	2	3	3	2	3	3	1	15	5	3	12	9	3	12	9	5	4	0
Shikarpoor Collectorate	24	24	24	25	24	..	2	3	3	2	3	3	2	3	8	3	12	9	3	12	9	3	10	10
Hydrabad	35	35	25	..	..	12	3	0	0	3	0	0	3	0	0	15	0	0	15	0	0	12	0	0
Nowshera	25	26	24	..	..	..	2	14	8	1	10	0	3	2	0	12	0	0	5	8	0	8	14	0
Halla	26	26	35	32	..	..	1	7	4	3	0	0	3	0	0	10	0	0	5	14	8	8	9	0
Meerpoor	25	25	26	..	..	..	2	14	8	3	0	0	3	0	0	10	0	0	5	2	6	6	0	0
Mahomed Khan's Tanda	28	28	26	..	..	..	1	7	4	3	0	0	3	0	0	8	0	0	3	7	3	8	7	0
Hydrabad Collectorate	25	26	27	20	..	12	2	5	7	2	11	7	3	0	5	11	0	0	7	0	1	8	12	5
Jerruck	25	25	..	25	25	..	2	14	0	2	14	0	..			12	0	0	12	0	0	..		
Shahbunder	40	44	..	..	65	..	2	14	6	2	14	6	..			8	7	6	9	6	7	..		
Sehwan	22	18	26	26	24	..	3	2	0	2	15	8	0	14	10	19	12	2	10	0	6	3	5	4
Kurrachee Collectorate	23	19	26	25	33	..	2	15	6	2	12	8	2	14	10	13	6	6	10	8	4	3	5	4

Statement of cost of cleaning, and price of clean Cotton.

COLLECTORATES.	COST OF CLEANING.												Average price of clean Cotton per Candy of 784 lbs.								
	1854-55				1855-56				1856-57				1854-55			1855-56			1856-57		
	Per Candy.			Per lb.	Per Candy.			Per lb.	Per Candy.			Per lb.									
	R.	a.	p.	R. a. p.	R.	a.	p.	R. a. p.	R.	a.	p.	R. a. p.									
Mehur	12	6	6	0 0 3	12	6	6	0 0 3	12	13	9	0 0 3	93	3	3	93	3	3	103	3	3
Larkhana	12	6	6	0 0 3	12	6	6	0 0 3	12	12	0	0 0 3	93	3	3	93	3	3	96	0	6
Rohree	12	6	6	0 0 3	12	6	6	0 0 3	13	10	0	0 0 3	93	3	3	93	3	3	94	0	4
Shikarpoor	12	6	6	0 0 3	12	6	6	0 0 3	12	8	0	0 0 3	93	3	3	93	3	3	94	13	4
Shikarpoor Collectorate	12	6	6	0 0 3	12	6	6	0 0 3	12	14	10	0 0 3	93	3	3	93	3	3	97	0	4
Hydrabad	18	0	0	0 0 4	18	0	0	0 0 4	18	0	0	0 0 4	80	0	0	80	0	0	95	0	0
Nowshera	9	9	0	0 0 2	9	8	0	0 0 2	18	0	0	0 0 4	103	0	0	98	0	0	96	8	0
Halla	5	0	0	0 0 1	3	5	1	0 0 1	16	5	0	0 0 4	81	0	0	76	6	0	90	0	0
Meerpoor	24	0	0	0 0 6	7	11	2	0 0 2	21	11	0	0 0 5	114	0	0	78	15	9	77	5	4
Mahomed Khan's Tanda	5	0	0	0 0 1	4	14	4	0 0 1	10	12	0	0 0 3	99	0	0	76	11	6	94	8	0
Hydrabad Collectorate	12	3	2	0 0 3	8	10	11	0 0 2	16	15	2	0 0 4	95	9	7	82	0	5	90	10	8
Jerruck	17	8	0	0 0 4	17	8	0	0 0 4	..			..	69	0	0	69	0	0	..		
Shahbunder	10	2	0	0 0 2	8	1	0	0 0 2	..			..	83	0	0	91	12	0	..		
Sehwan	2	10	0	0 0 1	9	13	9	0 2 2	7	4	5	0 0 2	80	0	0	82	8	0	88	15	8
Kurrachee Collectorate	10	1	4	0 0 2	11	12	11	0 0 3	7	4	5	0 0 2	77	5	4	81	1	6	88	15	8

Major Preedy reported, regarding these cotton experiments, "In places where the indigenous and American plants had been sown together, the former exhibited a healthy condition, while the latter had been almost entirely destroyed by the worm." He continued—

"Two reasons are assigned by the natives as the probable causes of injury to the latter—1*st*, The indigenous plant they say pods and ripens earlier in the autumn than the foreign species, and thus escapes the worm, which generally appears in the damp, warm weather of October; 2*nd*, That the foreign cotton, being more luxuriant in its growth, appears particularly to attract the insect.

"If the former be the real cause, the evil might, perhaps, be prevented by planting the American cotton at an earlier period of the season, so as to admit of its ripening a month earlier. Some good might possibly result from mixing lime with the soil at the time of ploughing, or by afterwards sprinkling it on the young plants. The experiment has never been tried in Sind, but in England, I believe, the fly which does so much injury to turnips is prevented by these means."

In forwarding these documents to Government, Sir H. Bartle Frere remarked—

"How far these suggestions, if acted on, may prove of practical utility, I am unable to judge; but it is clear from the success which with careful cultivation attended the operations of Mr. Wright at Mehur, that in many places the soil is well adapted for the luxuriant growth of the plant, and that the ravages of insects is the only evil for which a remedy has to be discovered, which it will be, I have no doubt, in time, when private agriculturists of intelligence direct their attention to the matter." [1]

The Bombay Government, addressing the Court of Directors at the close of these experiments, made the following comments:—

"We regret the failure of the attempts to cultivate New Orleans cotton in Sind, which the Commissioner attributes entirely to adverse local causes," and expresses "his hope that, when private enterprise is directed to the same object, it may yet be found possible to render exportable cotton a staple of this province." We trust that this may not prove a too sanguine expectation on the part of Mr. Frere. From the reports of the late Mr. Prince, it appears that the main causes of failure were the excessive moisture, and, in some cases, inundation of the low-lying lands, and the injury done to the bolls by insects. The latter was also found to be extensively the case in Lower Bengal, and we shall be glad to learn that some measures have been devised for preventing

[1] Rev. Cons. vol. lx. 1857, pp. 62 & 63; & Returns, E. I. Cotton, 1857, p. 1562.

the ravages of insects. We fear that it may prove an insuperable bar to the general cultivation of New Orleans cotton in this province." [1]

It appears from subsequent reports that almost every experiment since made with exotic cotton has proved a complete failure.

In May 1860 the Bombay Chamber of Commerce, by the direction of the Manchester Cotton Supply Association, forwarded five bags of Egyptian cotton seed to the Commissioner in Sind, for experimental culture in that province. In 1861 he gave the following account of the result:—

"From Shikarpoor the Collector reports as follows:—

"From all parts of this collectorate there was the same complaint, viz. that the seed arrived at too late a period of the season. I would beg particularly to impress upon the attention of the Chamber of Commerce, or Cotton Supply Association, that, to succeed, foreign cotton must be in the ground not later than 15th March.

"The seed sent to Roree failed, and the Deputy Collector reported, in June 1860, that only three sickly plants had been raised from the whole quantity of seed sent to him, as the remainder had not germinated. From these plants, Mr. Surtees now informs me that one seer of excellent seed has been obtained, which has now been sown partly at Sukkur and partly at Gotekee.

"The Deputy Collector of Sukkur and Shikarpoor reports that the seed was sent too late for trial last year, and that it has only lately been sown.

"In the Larkhana and Mehur districts the seed failed: the greater portion did not germinate, and that which did come up did not arrive at maturity.

"I am of opinion that the seed suffers from being sent out in 'bags,' as the damp generated in the ship's hold on the voyage destroys the germ of the plant. If sent in light casks, I think that this misfortune would be remedied.

"The seed to Hydrabad was sown in two separate fields near Tarooshah during the first week in July, and the Collector reports that—

"It grew luxuriantly, and came into blossom in September; but, as the seed-pods began to form, they were attacked by an insect, which prevented the formation of fibre and seed. About this time, too, the white-ants attacked the roots, and in a few weeks the plants withered away. The Sindee cotton, which grew alongside, did not suffer from these insects.

"In the Kurrachee Collectorate the seed arrived too late to be sown in the Sehwan districts, but it will be tried there this year, and the result reported. In the Jerruck districts the Deputy Collector reports that—

"The seed germinated well, but when the plants became a few feet high, they were attacked by a kind of blight, and perished. He tried the experiment in

[1] Revenue Consultations, vol. lx. 1857, page 59.

his garden at Jerruck, where the plants turned out tolerably well, but there was nothing to denote marked success.

The following is an extract from a further report received from the Collector of Shikarpoor:—

"I have received a further report from the Deputy Collector of Larkhana, that one beegah of the Egyptian cotton sown last year at Ruttadhera, in his district, did not wholly fail, but produced 240 lbs. of raw cotton (or 60 lbs. of clean wool). A sample of this is also sent by this opportunity. The seed has been saved, and will be sown immediately.

"I received this information after the despatch of my cotton report No. 132, of 17th ultimo. Mr. Daley tells me that this small field of cotton was saved, owing to the great care and attention paid to the crop by the cultivators, but I cannot discover why the seed of the same description, distributed last year, should not have germinated in other places.

"The Political Superintendent of the Frontier of Upper Sind informs me that the Egyptian cotton seed sown in his districts proved a total failure, owing to its having arrived too late in the season."

The Bombay Chamber of Commerce gave the subjoined report on the cotton produced; and, although the quality of the sample was such as to leave doubt whether it actually was Egyptian cotton, on further reference, it was declared that there was no mistake, but that the wool was the produce of Egyptian seed:—

"The sample presents none of the usual characteristics of Egyptian cotton, the fibre being extremely short, while that of the latter is at least twice the length, and different in character; indeed, so much so that the Committee are induced to believe that some mistake must have been made in picking up the sample.

"The description of the staple in question would be as follows:—

"Sample No. 33. *Sind Cotton.*—Good colour, and clean; very short staple, similar in character to middling fair Oomrawuttee; value by last dates from Liverpool 5¼*d.* to 5⅜*d.* Middling Orleans was then worth 7¾*d.*, and middling Egyptian 8¼*d.*"

The quantity of indigenous cotton produced is still barely sufficient for home consumption, and so little is the staple at present likely to become an article of export from Sind, that its cultivation, instead of having been stimulated by the recent increased demand and advanced prices, has actually decreased, in 1861-62, under the depressing influence of an advance in the local value of grain.

The following is a statement of the extent of cotton cultivation in the principal producing districts of Sind :—

Districts.	1852-53		1853-54		1854-55		1855-56		1856-57		1857-58		1858-59		1859-60		1860-61		1861-62		Extent of Land capable of producing Cotton.
	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	Native.	Exotic.	
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Bgs.	Bgs.	Bgs.	Bgs.*	Bgs.	Bgs.	Acres.
Mehur Deputy Collectorate..	522	5	893	6	1,945	43	2,581	9	1,584	..	2,301	..	2,854	..	9,028	..	8,233	3	7,000	..	
Larkanah ditto. ..	7,948	15	4,969	15	8,361	65	3,313	6	5,062	..	4,576	..	8,517	..	20,820	..	22,009	24	17,957	..	29,000
Left Bank (Rohree)	4,836	21	3,946	10	5,604	75	6,380	27	4,648	1	4,306	..	5,829	..	17,070	..	15,617	23	13,450	..	
Shikarpoor, Sukkur	6,648	14	4,721	19	4,250	40	4,458	30	3,217	..	4,083	..	3,388	..	11,235	..	7,333	13	8,134	..	
Hydrabad	11,258	96	8,895	58	8,879	166	10,361	40	9,481	1	Jerbs. 22,154	..	Jerbs. 30,600	..	29,394	25	27,962	11	..	..	109,821
Frontier districts of Upper Sind	Bgs. 1,780	Bgs. 1	Bgs. 727	Bgs. 12	Bgs. ..	Bgs. ..	Bgs. ..	Bgs. ..	Bgs. ..	Bgs. ..	Bgs. 3,219	..	Bgs. 2,960	..	6,336	..	5,852	..	..	..	Beegahs. 26,291
Kurrachee	1,466	163	1,703	83	3,117	105	1,605	123	703	..	5,150	..	3,503	..	2,108	15	4,463	4	..	..	6,098

* The foreign cotton seed was a general failure, except in the instance of one beegah at Ruttadhera.

CHAPTER XIII.

EXPERIMENTAL CULTURE IN BERAR AND THE NIZAM'S DOMINIONS.

Account of Berar by Major Meadows Taylor—Varieties of Cotton—Geology and Topography of North Berar—Climate—Cotton culture—Yield—Diseases and noxious Grasses—Rotation of Crops—The Cotton Marts—Transit dues—Cotton in the Valley of Berar—Cost of cultivation—Experimental culture—Report on Samples—Area of cultivation, and estimated produce—Means and cost of transit—Cotton cleaning—Waste lands—Colonisation—Roads—The Godavery.

ALTHOUGH the province of Berar is not under the jurisdiction of the Bombay Government, it is, commercially, so intimately connected with this Presidency, that no account of our cotton trade would be complete without some notice of it. It is unnecessary here to state that, of the large assigned districts once in the hands of the Government of India, the greater part has been restored to the Nizam, the Raichore Doab and the Dharaseo district having been surrendered very recently, and the rich valley of Berar is the only portion which is still retained.

The following interesting and comprehensive account of Berar, and its cotton culture, was furnished to Government, in 1858, by Major Meadows Taylor, Deputy Commissioner for North Berar :—

" There are two kinds of cotton grown in North Berar locality, termed 'Bhunnee' and 'Jherree.' The former is most esteemed by the native merchants, as being of a stronger fibre than the other, and bears a somewhat higher price, that is, three to four rupees more per candy of 400 pounds. The best 'bhunnee' in North Berar is produced at a village called Boldi, of the Akote Talooka, near the foot of Nernalla, and in the villages around it. The soil at Boldi is very deep, but is not black; on the contrary, brown, grey, and yellowish soils seem to predominate, and are all of a lighter or less consistent quality than the regur or black soil of the tracts more distant from the hills. The cotton at

Boldi was very fine this year, and one specimen showed 321 pods and flowers on it, which is forwarded among those for America. In general, the plant was from 5 to 6 feet high in well-tilled fields, and the weight of produce must have been very considerable.

"I found that in the Burroor Talooka, which lies between the mountains and the River Wurdah, 'bhunnee' cotton is also exclusively sown. The soils appear to me of a similar quality to those about Boldi, that is, of higher colour and less tenacity, intermixed near the hills with stones and gravel; but they are not so deep, and there is much of the land which has very shallow soil, and on which the crops are by no means luxuriant.

"I assume, therefore, that the 'bhunnee' cotton likes a light, rich soil, and that it is best suited to the localities in which it is grown—namely, those bordering upon and below the hills. The whole of this soil lies upon basalt, which, in the Burroor Talooka, is near the surface. The depth of the soil at and near Boldi I could not ascertain in the fields themselves, but by the side of wells, it appeared from 10 to 15 feet deep, after which is a greyish-white or yellowish clay, or friable conglomerate composed of basalt pebble, rough agates, and chalcedonies, joind by a tafaceous deposit of lime. These clays and conglomerates are seen also occasionally in Burroor; but the basalt itself is within 3 to 10 feet of the surface, frequently cropping out or appearing in the beds of streams or bottoms of wells.

"I may briefly here describe the geology and topography of North Berar. It is a valley 40 to 60 miles broad, between two ranges of basalt and trap mountains. On the north side, the Satpoora range rises to a height of 3,400 to 3,600 feet above the sea. On the north side the range varies from 300 to 600 and 800 feet in height, the plain of the valley being from 800 to 900 feet above the sea. The Satpoora range is much broken by deep vallies as far as the Taptee River; in fact, the tract from the plain of Berar to the Taptee is entirely composed of high basaltic mountains, intersected by narrow and deep ravines, heavily clothed with jungles, and having a sparse population. On the south side the range is merely the summit of one of the great Deccan plateaux, which slopes gently to the southward and eastward, the streams falling into the Wurdha, and eventually into the Godavery.

"The basalt on both sides of the valley is occasionally prismatic and columnar,—more so on the north side than the south, where amygdaloid trap is not unfrequent, which does not appear in the Satpoora range. Opposite to Ellichpoor, and continuing eastwards for about 30 miles, prismatic sandstone composes the lower or outer range of hills, through which it is evident the basalt has been forced upwards. At the junction of the sandstone and basalt,

the sandstone strata is found to be irregularly disturbed, and in some instances changed in texture and quality by partial vitrification. The sandstone is of various colours—grey, yellowish-white, and grey, pink, with purple streaks, assuming the character of bunter sandstone.

"From the plain on the north side of the valley the mountains rise very abruptly, and with steep scarped faces, in many parts of prismatic and columnar basalt. On the south side the ascents are more gradual, and spurs from the plateau extend into the plain for some miles.

"From both sides the basalt appears to descend to the centre, where it is not visible or generally traceable at all. The depth of the soil increases with the declination of the substratum rock, and at the salt wells of the Dyhimda Talooka, in the centre of the valley, the shafts of the wells pass through from 90 to 120 feet of black earth and yellowish-greyish clays, almost without a pebble of any kind, till the brine is reached, which appears, if I may use the expression, to be a subterraneous salt lake, about 50 to 60 miles long, and 5 to 15 broad; brine wells are at least used in this area at different localities.

"It may be judged, therefore, that the soil, being of such depth, without stones or gravel, and being tenacious of moisture, is very rich and fertile. The soils, indeed, towards the centre of the valley require little or no manure, and, once broken up from waste or jungle covered land, require, it is stated, no further ploughing for from 10 to 20 years. After this, they are again reploughed, or intermediately, if over-grown with grass, as frequently happens. The natives declare that more frequent ploughing would injure the land by altering the quality of the soil; that manure makes it too rank, and also alters the quality, and that experience shows them that the ancient custom is the best—of not reploughing till the surface soil shows unequivocal signs of being exhausted.

"It is in these deep rich soils that the 'jherree' cotton is grown for the most part; but I have observed it also on poorer and more gravelly soils, where it was evidently out of place, and 'bhunnee' would apparently have done better.

"The difference of quality appears to me as follows:—'Bhunnee' is a shorter and stronger fibre. The native definition and test of the best 'bhunnee' is, that a handful squeezed at the ear ought to give out a crisp sound in compression. The 'jherree' gives no sound, and is softer, and perhaps weaker, in fibre.

"There is no question, on the lighter kinds of soil, that manure and early ploughing is necessary. Those fields that have been ploughed and manured, or where cotton has been grown after turmeric, sugarcane, vegetables, or other garden produce which had required rich manuring show very differently to those

where no manure or ploughing has been applied. 'Bhunnee' and 'jherree' are both grown as after-crops to sugarcane and turmeric, &c. But the richest and most productive fields are those which are of newly cleared and ploughed land; and in this the 'jherree,' particularly where the soil is black and deep, as in the centre of the valley, is very luxuriant, attaining a height of upwards of 8 feet, and, if the plants are not crowded, bearing side-branches of three to four feet, covered with pods and flowers.

"The general nature of the soil has been already adverted to as a deep alluvium, that near the hills being probably disintegrated trap and basalt rocks. All the soil is more or less retentive of moisture. The rains cease in October, or very early in November, and the sky then becomes clear and open, and the sun is powerful, but the soil does not dry beyond a few inches from the surface, or as much as has been disturbed by the large hoe-plough used. Below that the ground remains moist, and in the deeper soils opens in large fissures from the evaporation. This moisture, in fact, never leaves the sub-soil, even in the hottest weather, and at three feet below the surface there is always moisture enough in the sub-soil to sustain vegetation. On the first heavy fall of rain, it is absorbed by the deep fissures into which it runs; very little escapes till the surface is saturated. The ground then swells, and the fissures close up entirely. The surface is so soft, that, in wet weather, it is impossible for carts to move about; but as it dries sufficiently for a seed-plough to be used, the cotton is sown as fast as possible.

"The geological and topographical description of the district has already been given.

"It is, as will have been understood, a wide plain between two ranges of mountains. The drainage is carried off by the Poornah or Pywooshnee River; no intermediate range nor undulations break the character of the country, and it appears a dead, unbroken level to the eye, though it has a gentle and uniform slope from the side to the centre. The whole has sufficient slope to prevent stagnation or lodgement of water in any part, and yet is sufficiently flat to allow of absorption of moisture, while the surface soil is not reduced or carried off by heavy rains.

"The climate of Berar is salubrious in general, though hot. There is no jungle so to speak, except at the very foot of the hills, and in the hills themselves, cultivation being carried on as far as there is soil, and to the verge of the rocky region. Here and there there are patches of thorny brushwood in the plain, but it is rapidly disappearing under cultivation. The cold weather, which begins in November, lasts till the end of February. The lowest temperature I have seen this year in the open air is 39° at day-light in December. The usual

range minimum at day-light for November is from 45° to 55°, for December 40° to 50°, January 40° to 60°; February has occasional cold mornings, but, for the most part, the temperature sensibly increases. In March the temperature continues to rise, and it reaches its maximum in April and May, when violent hot winds blow. The thermometer rises to 110° in the shade, the minimum in the mornings being 80°. There are sometimes showers in February and March, accompanied by hail-storms; but these are of no use for cultivation. Light showers fall frequently towards the end of May, which are acceptable to cultivation, as softening the surface for the large hoe. About the 5th or 10th of June, the first rain of the south-west monsoon falls, and the rains continue till the 15th October, or, in some instances, till the 15th November; but a late monsoon is prejudicial to all crops. If rain ceases in October, there are usually a few heavy showers in December, which are esteemed favourable for late crops; but if the rain continues till November, there is no rain again till the occasional showers in February or March. The amount of rain for a good average monsoon is abont 30 inches, and since the cession the falls have been—

	Inches. Cents.
In 1853..	No register of rain kept in this year.
In 1854..	Do.
In 1855..	21·59
In 1856..	37·93
In 1857..	32·75

"The prevailing winds are north-east and north from November to January, —dry and cold. The wind comes round to the westward, being west north-west, and north—north-west in January and February, and may be said to be variable in March, April, and May. In June the south-west monsoon opens, and continues from west, south-west, south south-west, and occasionally north-west, till the close of the rainy season. Irrigation is not employed in the district to cotton. It is considered prejudicial to the plant, and the natural rain is sufficient, for in most seasons opium, sugarcane, plantains, turmeric, betel and vegetable gardens, are irrigated, as also the late wheat and barley. The irrigation is from wells, the water being raised by the mote, or leather-bucket, drawn by bullocks.

"The seed sown is obtained from the produce; there is no change. Occasionally, and when crops are not good, the people get seed from a village in which the crop has been good, or from a different pergunna or country. They seem to be aware that a change of seeds is sometimes requisite. American (New Orleans) seed has not yet been tried; but at Akote there are a few

beegahs sown (too late, however, to produce much this year), which were healthy when I saw them, and I consider that the Dharwar seed would be found to answer, and would be liked by the people.

"The cotton plant is exclusively herbaceous. It is an annual. There is no tree cotton in the district of any kind.

"The average height of 12 plants of 'bhunnee' cotton is 5 feet 6 inches, of 11 plants 'jherree' cotton 7 feet 3 inches. The average spread of branches 'bhunnee' 1 foot 10 inches, and of 'jherree' 2 feet 4¾ inches. The seed is well rubbed with a mixture of cow-dung and earth, allowed to dry, and sown with a drill-plough, and the seeds fall generally from 4 to 6 inches, or one foot at the utmost, from each other. It would improve the yield, I think, if the plants were well thinned, as, when close, they run up to stalk. The native farmers do not appear to be aware of the advantage or necessity of thinning.

"The average length of tap roots of 12 specimens of 'bhunnee' cotton is 1 foot 5 inches, of 'jherree' 1 foot 8¾ inches; and of 12 specimens of 'bhunnee' 2 feet 2 inches, and of 'jherree' 1 foot 10 inches.

"The ground is ready by the end of May, whether newly ploughed waste land, old land, or land from which sugarcane or turmeric has been taken. If the former, no manure is required, nor if the field has been under garden cultivation, as sugarcane, &c. For old land the manure is village sweepings and refuse from cattle-sheds, but comparatively little dung of animals, as cow-dung is made into cakes, dried in the sun, and used as fuel, and there are few horses. The quality of the manure is very indifferent, and shows, practically, how very mild a stimulus the land requires. It is laid on the land in small heaps, at regulated intervals. The large, heavy, two-bullock hoe, which is weighed by stones, besides the man standing on it, is then worked through the field lengthways and breadthways; all the stubble, dead leaves, weeds, manure, &c. is thus mixed up, and falls into the cracks and fissures caused by the hot weather. This operation is repeated twice—once before the rain falls, and once after the ground is wetted sufficiently by the rain to sow the seed, to clear away any weeds that may have sprung up, and to soften and mix the soil. This hoe, though apparently rude, is a very efficient agricultural implement, and answers the purpose perfectly. The seed is sown directly the ground is moist enough, and the criterion of the moisture is the thorough wetting of all soil which has dried, till the sub-soil moisture is reached. Should very heavy rain have fallen in May, seed is sometimes in the ground by the end of that month; but otherwise the whole breadth of the crop is sown between the 15th June and 1st, or, at the latest, 15th July. If there is a heavy drought in June and July, as happened this year, sowing is unavoidably delayed till August; but the crop

is not nearly so good. In the Shorapoor district, where I was before, the cotton sowing did not begin before August, and the plant was much later in ripening; but the soil there, lying on limestone and trap, is no doubt more retentive of moisture than generally in Berar. The plant is generally weeded twice; but this depends on the state of the ground. In old fields, and in manured fields, there are more weeds and grass. In newly-ploughed land, or land well kept, no weeds or grass appear; if any, they are eradicated by the large hoe before sowing, and do not spring up again. There are two weedings. The first is done by a small hoe when the plant is a month old. Two are used attached to one yoke and pair of bullocks, a man or boy to each hoe to direct it. The hoe is from 6 to 8 inches broad in the blade, and penetrates about 4 inches below the surface. This not only weeds the field, but throws up earth on each side of the plants, leaving a small furrow in the centre. After this, when the plant is two months old, or whenever necessary, the field is weeded by hand, generally by women, and all grass and weeds carefully removed from the furrows, as well as more particularly about the roots of the plant. No further weeding is necessary, and it is all finished before the plant comes into flower, which is usually the middle of October, though delayed occasionally by late rains to November. The first picking depends, of course, upon the time of sowing. In good seasons it is finished by the 15th to 30th December, in which case the second picking is a month later, or 15th January. This year the first picking commenced from the 20th to 30th December, and the fields will continue to yield for another month. There are only two pickings in Berar. It is done by women and children entirely, and they receive about one-sixteenth part of the produce as payment for their labour. By this means an active woman can gather about 15 seers, or 30 lbs., of cotton a day. It would be much better if the cotton were picked oftener; for, exposed as it is in the pod, or hanging from it ripe, it gathers dust and dry leaves, or is blown from the pod to the ground. I am informed that since the cotton has been so largely in demand for the English market, it is picked more cleanly than before; but there seems still large room for improvement. The yield of cotton from a beegah of 3,600 square yards is estimated as follows.* The seed is included:—

	Seers per Beegah.	Pounds, English.
1st rate crop	45 to 60	90 to 120
2nd do.	35 to 40	70 to 80
3rd do.	20 to 25	40 to 50

The proportion of seed to cotton fibre is usually as one-third, and occasionally

* "Newly ploughed virgin soil is known at times to yield 120 to 140 lbs. per beegah; but the above are given as unexaggerated averages."

one-fourth, of the total weight of the yield. The weight of fibre, in proportion to seed, depends entirely on the quality of the land. The rate seldom varies, except in very poor land, where the weight of seed predominates over that of produce in good land, and is equal to one-fourth. The cotton is ginned in the common churka, which is two wooden rollers of about an inch in diameter, or one wooden above and one iron below, turning in opposite directions. This simple machine is worked by the hand; and two active women, feeding and working by turns, will clean 40 lbs. of raw cotton per day. The cleaning is done almost exclusively by women. The iron foot-roller and stone is not used in this country at all. For a separation of the seed from the fibre, the village churka is sufficient, nor does it cut the fibre at all; but it does not clean the cotton of dirt, and is a slow process in comparison with the saw-gin.

"The manure used has already been noticed. It is of very inferior quality. No cotton seed is returned to the soil. The seed is used occasionally for oil and oil cake, and to feed cattle with, especially milch-cows and buffaloes, and is considered very nourishing. The stalks of cotton are not removed by the farmer. If large and fine, they are used, and sold as they stand, for thatching houses and outhouses, mixed with grass, or sugarcane leaves; or to a tribe of people (basket-makers), who make large cylindrical basket-work frames for holding grain, and rough baskets for field work in general. In some cases they are pulled up, and used for firewood to boil sugar pans, or, if not wanted or very short, are left in the fields, and ploughed in or removed by the hoe, and left to rot. But in all cases, directly the cotton is picked, cattle are turned into the fields, with sheep and goats, which eat off the green leaves that are left.

"Cotton appears to be subject to few ravages by insects; the people do not speak of them as if they were common; when they have occurred, it is by an insect which punctures the boll, lays its eggs therein, the larva from which destroys the soft fibre, and the boll never opens. I can find no trace of this insect this year, and it is stated to be known only when the rains continue to a very unreasonably late period, and the plant remains unusually green, by the ground being wet. In this case, the pods do not ripen. The rain which causes this affection falls in the middle of November, and is considered very unfavourable. Occasionally also a blight appears, if the cold, dry, easterly winds set in violently, as is sometimes the case in the *early* part of November, or late in October. The plant is not strong enough to withstand them—the tender leaves blacken and curl up, the buds and flowers fall off, and the tender upper shoots are withered altogether. The plant seldom recovers a blight of this kind, and if it puts forth new leaves or flowers, they are small and abortive.

"I have forwarded a bundle of the most ordinary weeds found in the cotton. I do not know their botanical names. But weeds in general do not appear mischievous; the worst is one with a light-blue flower, which grows thickly, and, as the seed soon ripens and scatters, is not easy of eradication. The worst enemies to cotton are the grasses, and of these, the four most usual specimens are forwarded as follows:—

"*Seepee.*—A light, soft, annual grass, which grows about the roots of the cotton and between the plants. It has a rapid growth to about a foot in height, spreads laterally, and chokes the cotton if not removed in time.

"*Lona.*—Another light annual grass of the same description.

"*Hurrialee.*—A perennial grass, which has long roots, and spreads very rapidly; the growth is not over a foot high, but the roots speedily become matted, and, once a field becomes infested with this grass, it is generally thrown up,—allowed to be fallow for a year or two, and then ploughed up again. If the grass is light, it can be removed by the weedings already detailed—by the hoe and hand.

"*Koondah.*—The specimens sent will show how formidable this grass is in regard to its roots, which become matted together, and cannot be eradicated but by the heavy plough, or, as is often employed, the pickaxe, in digging the whole out to a depth of two feet. The grass appears first in small patches in the fields, and a careful farmer has it eradicated at once; but poorer people, who cannot afford the labour, allow it to spread till the whole field is covered and becomes useless. Nothing will grow in this grass, and neither the hoe nor surface-weeding has any effect upon it. The masses must be broken up by the plough, or dug out, and roots left for a whole hot season exposed to the sun before their vitality is extinct.

"The cotton crop is strictly in rotation with other crops, and the produce of the district besides cotton on unirrigated land is—

Local name.	*Botanical name.*
Bajree	Panicum specatum.
Jowaree	Holcus Sorghum.
Wheat	Triticum æstivum.
Gram	Cicer arietinum.
Ambaree	Hibiscus cannabinus.
Til	Sesamum indicum.
Moong	Phaseolus Mungo.
Oorud	(pulse).

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Local name.	*Botanical name.*
Mussoor	Ervum Lens (pulse).
Toor	Cajanus indicus (pulse).
Lakh	
Batana	Pisum sativum (pulse).
Kurrud	Carthamus tinctorius (safflower).
Erundee	Ricinus communis (castor-oil).
Rajgeera	
Karel	Guizotia oeifera (niger seed).
Aal (madder)	Morinda citrifolia.
Jowus	Linum usitatissimum (linseed).
Mukkye	Zea Mays (Indian corn).
Sunn	Crotalaria juncea.
Raee	Sinapis sps: (mustard).

"There is no precise rule as to the rotation of these crops; they are taken as the farmer has occasion for them; but it is a general rule that cotton is not sown for two years running in the same land, and generally every third or fourth year." [1]

In Berar, to the west of the River Wurda, are the two great cotton marts (Oomrawuttee and Kamgaum) from which the cotton known in Bombay as "Oomrawuttee" is received.

"The cotton which supplies the Oomrawuttee market is produced in the following pergunnas in Berar, viz.:—Bunnerea Beebee, Durgaopore, Soorjee, Anjungaum, Ellichpore, Chandoor, Togaum, Kolapoor, Nadgaum, Koora, Mungrool, Tullygaum, Dussesur, Hewurkair, Buroor, Morchie, Jooso, Serrisgaum, Manna, and Moortuzapore.

"The cotton which supplies the Kamgaum market is produced in the undermentioned pergunnas in Berar, viz.:—Akote, Argaum, Jamode, Jelgaum, Bunneria, Booljee, Mulkapore, Bulapore, Akolu, Dehinda, and Punnajé.

"There are also three smaller cotton markets in the territory of Berar, viz.:—Larka Karinja, Busmut, and Byrag Barsee. I have not been able to ascertain in what purgunnas the cotton which supplies these markets is produced.

"There are two considerable cotton markets to the east of the Wurda River, in the territory of the Rajah of Nagpore, viz. Hingunghat and Arvee. The cotton brought to the Hingunghat market is produced in the following pergunnas belonging to the Nagpore Rajah, viz.:—Hingunghat, Maungaum, Andorie, Wyegaum, Kamgaum, Pohna, Natchengaum, Deolie, Ponar, Seyboo, Kelzer, Scindee, and Bela.

[1] Revenue Consultations, vol. lii, 1858, pages 69—99.

"The cotton brought to the Arvee market is produced in the Nagpore Rajah's pergunnas of Arvee, Seyloo, Ashtee, Amnair, and Kaondalee, and some of it is produced in the Nizam's pergunnas to the west of the Wurda River, which are near the Arvee." "Barsee" cotton is the produce of the district north of the Bheema.

This cotton used formerly to be exported by the following routes:—

"The cotton from Oomrawuttee and Arvee was taken to Bombay by Larka Karinja, Bassein or Wassein, Reshare, Nursee, Bamunnee, Purtoo, Amba, Ahmednuggur, Seroor, Rosur, Khandalla, Panwell, and from thence by boat to Bombay.

"The cotton from Kamgaum was taken to Bombay by Mulkapore, Boda, Chalisgaum, Nassick, Colsette Bunder, and from thence by boat to Bombay.

"The cotton was taken from Hingunghat to Mirzapore, *viâ* Nagpore, Seonee, Jubbulpore, Myheir, and Rewah, and from Oomrawuttee and Arvee to Mirzapore, *viâ* Amnair, Chindwarah, Rewah, Jubbulpore, Myheir, and Reewah." [1]

Of these kinds, the Hingunghat is considerably the best, but of the quantity produced only a small part comes to the Bombay market.

At present, of course, a large part of the cotton traffic is arrested at Chalisgaum by the G. I. P. Railway, and thence brought direct to Bombay. An extension of this line will, before very long, run through the Valley of Berar to Nagpore, and, aided by a judicious system of feeders, will no doubt rapidly develop the resources of this fertile province, and carry much of its produce to the western coast.

One of the great obstacles to the expansion of the trade with Berar has been the heavy transit duty levied by the Nizam. The manner in which, under the former "complicated system of extortion," the merchant contrived to get his cotton to market was described by Captain Reynolds in his evidence as follows:—

"There is a system in force in Central India which is called *hoondakuree;* in fact, it is a farming of the transit duties on particular roads. There is a great firm established at Oomrawuttee, which is one of the greatest markets in the Berar valley, and from which roads diverge in every direction, where much cotton that is cultivated in the Berar Valley and in Nagpore is collected, and from thence sent off either to Calcutta or to Bombay. It consists of a firm of bankers under the term of hoondakurs; they send out messages yearly, as soon as the transit duties have been farmed by the native government, to the contractors, on the various roads, to make arrangements; for instance, on the

[1] Returns, East India Cotton, 1857, page 52.

road to Bombay, a man starts from Oomrawuttee and goes to the first district to the transit duty contractor, and says, "I shall have the means of passing 500,000 bullock-loads of produce through your district during the next twelve months; at what rate will you levy *sayer* duties on the various commodities?" If the terms are satisfactory, a bargain is at once struck; but if unsatisfactory, he diverges to the right or left, and tries the contractors in the two neighbouring districts, and he ultimately frames his agreement with the one or the other, and by this means he eventually arrives at Bombay by a circuitous route; but he is able to strike an average of what he has to pay on every description of produce between Oomrawuttee and Bombay. Supposing that the cotton crop has been collected, and is in course of transit to Bombay or Calcutta, the owners of the crop go to this firm and ask them, "At what rate will you pass me 100,000 bullock-loads of cotton from hence to Bombay?" They state at once the rate which they demand; this rate has no reference whatsoever to the time to be occupied in the transit, because the time of transit has to be regulated by the bargain that may be made with the hereditary carriers (the *Brinjarries*), who alone have the carrying trade in their hands, and who undertake to deliver at Bombay as many bullock-loads of cotton as may be made over to their custody; but they will never allow themselves to be restricted to time; they restrict themselves to the road, because they are obliged to adopt roads that the *hoondakurs* have previously established." [1]

The transit dues have, however, within the last few months been abolished.

Mr. Mercer, the American planter, gave the following account of the north-western parts of the Valley of Berar:—"There seem to be three kinds of soil devoted to cotton in Berar: the black *regar*, or basaltic soil, the *rankur*, or grey *kunkur* (nodular limestone) land, and a brown *kunkur* soil. The produce of the black soil stands first in the Oomrawuttee market. The *rankur* produces a small plant, and a harsh, weak staple. The brown soil produces the finest looking plants, apparently a larger produce than either of the others, and the staple is scarcely inferior to that from the black land. All these soils seem to me of a mellower nature than soils of a similar description in Bundelcund. * * * There is no irrigation used for cotton, nor manuring, except when it is accidental, by the bringing in a piece of ground used as an encampment by the passing Brinjarries (carriers), or by the villagers as a herding place for their cattle; when this does happen, the superiority of the cotton is very remarkable." He stated that the merchants of Oomrawuttee accounted for the superiority of the cotton of Hingunghat by the greater care in

[1] Minutes of Evidence, Select Committee, House of Commons, 1848, on Growth of Cotton, pages 416 and 417.

gathering and cleaning, as well as the very superior land, in that district. "The cotton is planted," he continues, "without admixture of other crops, and is sown in rows of a cubit or little less in width, thinned to a single stalk in a place. There is nothing, however, like ridging, and the same complaint I heard in the Valley of the Nerbudda, of too much rain, is also made here. From the omission of that one single process, the crop is at the mercy of every shower that falls." [1]

Of the soil and climate of Berar, Colonel Cuthbert Davidson, C.B., the Resident at Hydrabad, reports as follows:—

"The soil in West Berar is of a rich, black loam, and the extremes of heat and cold are not so great there as in many other parts of India.

"In East Berar the soil is of all descriptions—from the deepest black loam to the lightest red soil in the undulating talookas to the south of the district. In the Raichore Doab, if 16 be assumed as representing the different qualities of soil in the district, 10 may be taken as black soil or fitted for the cultivation of cotton. It is of the same nature as the black soil of Berar, but inferior in richness and productiveness. The Raichore Doab has the benefit of two monsoons, but only the end of each, and there is constantly a deficiency of rain. The climate is mild and pleasant, with the exception of three or four months in the hot season." [2]

The comparative cost and profit of cotton and other cultivation in Berar are estimated as follows:—

"From inquiries made of the cultivators, it appears that, by growing cotton on good and suitable soil, which is called *naguttee*, some considerable profit is realised. It is, however, to be observed that the above remark is only applicable in cases where the cultivation is carried on by the ryots' own means and appliances; when they have recourse to the 'usurer,' little or no profit accrues to themselves.

"*Statement showing the expense of cultivating one beegah of new land with Cotton, and its yield in Berar.*

No.	Detail of Expense.	Rs.	A.
	Government land tax	2	0
4	ploughings, at Rs. 2 each	8	0
	Digging up stumps	5	0
	Clod crushing	1	8
	Levelling the ground	1	0
	Carried over.. Rs.	17	8

[1] Royle, Culture of Cotton, pages 325 and 326.
[2] Revenue Department, No. 390 of 1861.

No.	Detail of Expense.	Rs.	A.
	Brought forward..	Rs. 17	8
1	maund of 10 seers cotton seed	0	8
	Sowing the seed with the drill plough	2	0
	Weeding seven times, at one rupee	7	0
	Hoeing	2	0
	Wages for gathering cotton	4	0
	Carriage to local market	1	0
	Total..	Rs. 34	0

Yield.

½	candy, or 30 maunds of cotton, price varies from Rs. 30, Rs. 36-8 to	Rs. 45	0

"*Remarks.*—The seed is sown between the 15th of June and the 3rd of July, and the cotton gathered in six months from the time of sowing.

"It is to be observed that, if the labour and cattle employed are the ryot's own, he is benefited by the cultivation; if they are paid for, and the cultivation carried on by borrowed means, he derives little or no advantages whatever.

"*Estimate of cost and yield of three beegahs of cultivated land sown with 'Toor.'*

No.	Detail of Expense.	Rs.	A.
	Government land tax	6	0
	Levelling the ground	2	0
	Cutting bushes	0	4
16	seers of seed	0	11
	Weeding four times, at one rupee	4	0
	Sweeping off worms from plants	1	12
6	coolies for cutting the crop	1	2
	Carriage to the barn	2	0
	Husking	1	4
	Winnowing	1	8
	Total..	Rs. 20	9

Yield.

2	candies of toor, price Rs. 14 to	15	0
	Stalks, husks, &c.	9	11
	Total..	Rs. 24	11

" Estimate of cost and yield of three beegahs of cultivated land sown with Jowaree.

No.	Detail of Expense.	Rs.	A.
	Government land tax, at Rs. 2 per beegah	6	0
	Levelling the ground	2	0
	Cutting bushes	0	4
14	seers of seed	0	8
	Drilling the seed	2	0
	Weeding five times, at one rupee	5	0
	Storing	2	0
	Pruning	0	8
	Cutting the crop	1	2
	Carriage to the barn	3	0
	Treading the grain	0	12
	Winnowing	1	8
	Total.. Rs.	24	10

	Yield.		
3	candies of jowaree, price Rs. 16 to	17	0
400	bundles of stalks, at Rs. 3 per 100	12	0
	Total.. Rs.	29	0

" *Remarks.*—Estimate of moong or green gram same as jowaree, with this exception, that it produces no kurbee or stalks, but husks to the value of one rupee.

" Estimate of cost and yield of three beegahs of cultivated land sown with Wheat and Linseed respectively.

No.	Detail of Expense.	Rs.	A.
	Government land tax	6	0
	Levelling, &c. seven times	7	0
	Cutting bushes	0	6
80	seers of seed (wheat)	3	8
16	seers of linseed	1	4
	Drilling the seed	2	0
	Reaping, paid in kind	..	
	Carriage to barn	3	0
	Threshing, paid in kind	..	
	Carriage to market	1	0
	Total.. Rs.	24	2

No.	Yield.	Rs.	A.
2½	candies of wheat or linseed, price Rs. 25 to	26	0
	Husks, &c.	2	0
	Total.. Rs.	28	0

"*Remarks.*—Sown during Deewallee and Dussurah, or in November, and comes to maturity in six months.

"*Estimate of cost and yield of three beegahs of cultivated land sown with Chenna and Lak.*

No.	Detail of Expense.	Rs.	A.
	Government land tax	6	0
	Clearing bushes	0	6
	Levelling the ground five times	5	0
112	seers of seed	5	0
	Drilling the seed	2	0
	Reaping, paid in kind	..	
	Carriage to barn	3	0
	Threshing, paid in kind	..	
	Carriage to market	1	0
	Total.. Rs.	22	6

	Yield.		
2½	candies of chenna or lak, price Rs. 22-8 to	23	12
	Husks, &c	2	0
	Total.. Rs.	25	12

"These statements fail to impress upon one that farming is at all a profitable employment when under the necessity of engaging hired labourers; but the cultivators are generally in possession of their own bullocks, ploughs, &c., and many of them have large families, so the price set down as hire under the several heads enumerated in the above statement of cost must be included in the farmer's profits. Their cattle also cost them little or nothing, as, after the cotton has been cleaned, the seed is available as food for them; and when jowaree and other grains are sown, they invariably retain sufficient forage for the consumption of their cattle for the year. The remainder is sometimes sold, and very profitably so, when any high-road passes near their villages; what remains at the end of the year is scattered about the fields, burnt, and made use of for manure." [1]

[1] The *Englishman*, 8th October 1861.

Although these calculations seem to be reasonable and trustworthy, with the exception of the estimated yield of seed cotton, which is probably excessive, it is necessary to state that they are not authoritatively advanced.

The only steps which Government have yet taken to improve the cultivation of cotton in these districts has been the distribution of exotic seed to the cultivators. The following is a brief account of the experiments made with the various kinds:—

At the close of 1857 a supply of 4½ bags of Egyptian seed was sent from the Government of India to Colonel Davidson.

East Berar.—A portion of the Egyptian seed was sown in a garden at Mursee, "but the plants, though irrigated, withered a few days after they had sprung up. Another small quantity was tried by the Deputy Commissioner in his garden at Hingolee, but it likewise failed—only one or two seeds sprouted, and then died off. Other trials were also made, but, as a general rule, afforded no good result."

West Berar.—"The report from West Berar of the sowing of the seed from this supply shows that the trials there also ended in a similar result."

Dharaseo district.—"The Deputy Commissioner of the Dharaseo district states that, from the reports received by him from the tehsildars, the plants died when they were a few inches high; and that trials made by himself in his garden were never successful; that about three-fourths of an acre were sown, but, probably from the seed being old, did not come up very regularly; but the bushes were healthy, and attained a height of from four to five feet. The produce in clean cotton was 31 lbs., which gives about 100 lbs. to an acre: the crop would have been larger had the plants come up regularly. The soil is stated to have been a deep rich one, thrown up by a river, and was manured. Half the crop was watered several times, but there did not appear to be any material difference between the irrigated and unirrigated plants. The proportion of seed to cotton was about two to one. The cotton plants were left in the ground, and the produce in the year 1859 promised to be larger than that of the preceding year. Some of the seed grown in 1858 was sown at the commencement of the monsoon in 1859, and, in consequence of its being fresh, the whole of it germinated. The plants were about two feet high, and the crop promised to be a good one."

The Deputy Commissioner stated—

"The report from the Raichore Doab shows that the results of the sowing of first supply in that district has not been satisfactory." [1]

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[1] Colonel Davidson's Report, 18th May 1860.

At the beginning of 1859, a second supply of Egyptian and Brazilian cotton seed was received from Calcutta, and the following report was given, by the Officiating Deputy Commissioner, of the experiments in East Berar in 1859-60:—

"The two descriptions of seed, which were forwarded for experiment last season, reached the district in good order about the commencement of the monsoon; ground had been previously prepared in different localities, and of different descriptions, so that every precaution had been taken for ensuring the seed a fair trial on its arrival.

"The results, I have no doubt, would have been more favourable had the seed reached the district a month earlier than it did.

"The monsoon rains set in early, and the season at first promised to be a favourable one, but the seed did not reach till after the first fall of rain. Long breaks in the monsoon took place, and the crops, from want of sufficient moisture, did not attain their average size, the cotton generally being more than usually stunted.

"The Brazilian cotton seed failed in a very unaccountable way. The plants sprang up well, and looked very healthy, until they were about six inches high, when they became blighted and withered away.

"The Egyptian cotton seed has been more successful; but some plants in the same field having succeeded while others failed, leads to the impression that the seed was either not all of one season, or was not quite fresh; some of the seed succeeded remarkably well, the plants being strong and healthy, nearly four feet high, and bearing very large pods, and not having that degenerated appearance which the cotton has assumed in many places this season.

"I have forwarded to Messrs. Robert Strong & Co., Bombay, for transmission to the Secretary of the Cotton Supply Association at Manchester, two parcels containing five packets of cotton, marked Nos. 1 to 5, each parcel containing one pound of cotton, carefully cleaned and separated from the seed.

"Parcel No. 1 A. contains a specimen of the Egyptian cotton grown in first-class garden land, but not irrigated. The plants grew of two heights—three feet, and two feet; the pods were one and a half times larger in size than that of the country cotton, but were fewer in number than the pods of the country cotton plants; this is accounted for by the seed having reached a month later, and the plants not having attained their full size in consequence. The plants, which grew three feet high, had from 15 to 22 pods each; the two-feet plants had only from eight to ten. The experimental cotton produced on an average 10 to 12 pods less than the native cotton in the same locality. The smallest quantity of pods may be well accounted for by the seed arriving rather late, and two descriptions of plants would seem to show that the seed was mixed.

"No. 2 A. is a specimen of Egyptian cotton from first-class black soil. The field in which this was tried was one-half manured, and one-half without manure. In the manured portion the cotton grew three feet high, and in the other portion two feet. The pods of the large plants were, as in the former case, one and a half times larger than the country cotton pods, and each plant had from 15 to 20 pods; the smaller plants became blighted, and bore only eight or ten small pods each; the large plants produced about ten pods fewer than the native cotton under similar circumstances. The report which accompanies this specimen from the district shows that the seed did not come up regularly; in many places not at all. Of seven or eight villages in which it was tried, it succeeded in one only, and there very partially.

"No. 3 A. is a specimen grown in second-class black soil. The plants attained the heights of two and three feet; the plants bore, on the average, the same number of pods as the native cotton grown in similar situations; but the report states that the plants had a dried-up appearance; the large plants had from five to fifteen, and the smaller from three to ten pods; but the pods were one and a half times larger than those of the country cotton. In one instance, an eighth part of the seed sown succeeded, the rest failed entirely; while in another the plants came up well; but when the pods filled, half of them fell off the plant.

"No. 4 A. is a specimen of the cotton of the country known as 'jherree;' the pods are heavier than those of the other country cotton known as 'bhunnee,' and the cotton is rather whiter, and fetches a little higher price in the market.

"No. 5 A. is a specimen of the country cotton known as 'bhunnee,' and which is the sort most cultivated in the south of the district. The seed is sown in the commencement of the rains, and the crop is ready in the month of November.

"Another point which may be worthy of notice is, that the 'bhunnee' cotton produces a great quantity of seed to a very small quantity of cotton. On weighing a quantity of this description previous to, and after it had been separated from the seed, it was found that the seed weighed three times as much as the cotton, or that four pounds' weight of cotton taken from the plant produced three pounds of seed and one pound of cotton.

"The same experiment was tried with 'jherree' cotton and with Egyptian cotton, and it was found that three pounds taken from the plant produced on an average about two pounds of seed to one pound of cotton.

"From the experiments that have been made this year in this district, I think that were good fresh Egyptian seed to be imported at the proper time, so as to reach the district about the end of April, much better results might be expected than what have been above described.

"The cotton produced from the Egyptian seed appears to be of a superior quality to that grown in Berar, but it would require more attention paid to its cultivation than the natives pay to the indigenous cotton.

"Three cotton gins, known as Dunlop's gins, were received along with the cotton seed. It was some time before they could be properly adjusted, and when put into working order and tried, the results were by no means satisfactory. The gin frequently gets jammed, and all who have seen the cotton which has passed through the gin, state that the staple has been spoiled; and the opinion of all the natives who saw it was, that if they had their cotton passed through that gin, it would not fetch nearly so much in the market as when prepared by the native machines now in use."

The following report, dated 17th March 1860, was given of the experiment with exotic seed in West Berar, by the Assistant Commissioner:—

"The following descriptions of cotton seed were received for experiment in this district:—

"*Brazilian, Egyptian.*—From the Government of India.

"*New Orleans.*—From the Manchester Cotton Supply Association.

"*New Orleans.*—From Dharwar.

"The district officers, through whom the above descriptions of seed were supplied to the cultivators, report that, with the exception of the seed last-mentioned, only a few of the New Orleans seed received from England came up, but soon dried up. Small portions of the above descriptions of seed were also sown under my own observation, and that of Lieutenant Bushby, and I have further satisfied myself by testing the seed at different periods, the result being alike in every instance; and I am, therefore, of opinion that the whole supply had lost its germinating quality, and hence its complete failure in every part of the district.

"The seed from Dharwar last-mentioned, and which sprang up, was received from the Collector of Dharwar in September 1858, and, as the season for sowing cotton had past, and as cotton seed that is sown out of season rarely succeeds, it was distributed in the talookas in May last.

"The accounts received from all the talookas where the Dharwar cotton seed was tried, give the following particulars:—That the seed sprang up in seven or eight days, and appeared apparently healthy; that in about three months the plants were in blossom; that each plant bore three or four pods, and attained the height of about two feet; that after the first picking all the plants withered and dried up, and that the average quantity of cotton obtained per beegah was about 40 lbs.

"The seed was tried in both descriptions of soil in which the 'jherree' and 'bhunnee' sorts of cotton are grown in the district, and therefore may be said to have had a fair trial. But, notwithstanding, it is found that the quantity of cotton produced per beegah is only equal to about one-third of what is produced from the cotton seed indigenous to Berar, which fact greatly tends to discourage the introduction of this new cotton into this district. It is also the opinion of the ryots that the black soil of Berar is not well suited to the production of foreign cotton, as the plants generally present a stunted and poor appearance.

"I beg to send four small bales, containing samples of the produce from Dharwar cotton seed, as also of 'jherree' and 'bhunnee' cotton indigenous to Berar, as per margin :—

"No. 1 B.—Cotton produced at Akote, from New Orleans seed received from Dharwar.

"No. 2 B.—Cotton produced at Dewulghat, from New Orleans seed received from Dharwar.

"No. 4 B.—Bunnee cotton, grown at Dewulghat.

"No. 4 B.—Jherree cotton, grown at Akote.

"The average price of the Dharwar cotton in this district is two annas and six pies per pound, which is the same as for the description of cotton indigenous to Berar. The Dharwar cotton, it is admitted by all, is superior to that of Berar, but, as the quantity produced is small, no proper value is fixed on it."

Colonel Davidson states, "The experiments in the Dharaseo district, with the seed of the Sind supply, was likewise a failure."

He continues—

"No special report has been received from the Raichore Doab of the result of the sowings of the Brazilian cotton seed of the second supply; but, from a report by Captain Meadows Taylor, Deputy Commissioner of that district, it would appear that the Eygptian cotton seed succeeded remarkably well. A good deal of valuable seed, he states, will be saved this year (1860), and will be distributed for further trial. The cotton grown is fine in quality, and the plant grows and bears well, with every prospect of improvement. The Egyptian cotton seed, Captain Taylor observes, grows better, and is more productive, than New Orleans in the ordinary black soil. Of ten seers of cotton of this description produced in the Raichore Doab, the yield, when ginned, was two and a half seers of cotton, and seven and a half seers of seed, which is an average result.

"The following, however, taken from a report by Mr. Ricketts, Assistant

Commissioner in charge of the Raichore Doab, of a subsequent date, is not so satisfactory :—

"He observes that such experiments, as those reported by Captain Taylor, are not safe criterions to go by; that the yield in these isolated cases, where skill and labour are expended, is astonishing, not only in the case of exotic, but also of indigenous cotton; but these instances, though they may stimulate the ryots to follow the example set them, are, perhaps, useless in reporting on a staple product, which is to be grown and sold by the ryots in their own way. Mr. Ricketts' report, in fact, shows that the results of the experiments, in regard to the New Orleans cotton seed, have been more unfavourable than those of the preceding year, and that the Egyptian and Sea Island cotton was almost a total failure; but this want of success is attributed chiefly to the want of rain in the Raichore Doab during the year 1859. In a further report received from Mr. Ricketts, that officer states that the Egyptian and Brazilian cotton seed having been put down only experimentally, and in isolated parts of the district, no average statement of selling price can be given with any degree of certainty; that specimens grown in the cantonment of Lingasoogoor appear similar, even if not superior in fibre and staple, to New Orleans, though the general colour does not appear to be so good, as irrigation seems to discolour and blight a certain proportion of the pods. The selling price, however, he states, may be calculated at from one anna and seven pies to one anna and eight pies per lb.

"The report from the Raichore Doab shows that none of the New Orleans cotton seed received from Manchester vegetated in that district. The Deputy Commissioner, however, states that the average selling price of New Orleans cotton in the Raichore Doab, grown from seed procured by the ryots from Dharwar, is about five rupees per candy above the selling price of indigenous cotton. More extended sowings of exotic cotton will be made this year in the Government gardens and by tehsildars, so as to retain the interest in the matter, and keep in hand a good supply of seed.

"The Deputy Commissioner, Dharaseo district, reports that the New Orleans cotton seed received from Manchester has entirely failed in that division. He states that he had part of a garden at Nuldroog sown with it, but a small number only of the seeds germinated. The plants that did come up were stunted, and a very small quantity of cotton was produced. It seems clear, he states, that the seed was old, and, when endeavouring to introduce a new species of cotton, it is of the greatest importance that the seed should be good, for if it is not, it will be difficult to induce the ryots to expend their labour on it a second time. The Deputy Commissioner promises to forward a specimen of the cotton from this growth.

"I would here beg to take the opportunity of submitting the result of a trial made by Captain Meadows Taylor in the Shorapore district, in 1859, with New Orleans cotton seed obtained by him from Dharwar.

"Captain Taylor states that with this cotton he has tried a different soil, and a different period of sowing, than obtains in Dharwar, and it appears to him that the yield is more satisfactory, and the staple better and softer. In Dharwar this cotton is grown upon black soil exclusively, and sown in September. Captain Taylor's trial of the seed in this instance was in very ordinary red granite soil, of a sandy quality, unmanured, and irrigated, and was sown in June. The fall of rain, he observes, at Shorapore, was unusually scanty, yet the plants were healthy and bore freely.

"The cotton was gathered as it ripened, and was cleaned from the seed by a common native churka. It has not been specially cleared or picked.

"It will, he states, be of great importance to the ryots in the Shorapore district, if it is found that the New Orleans cotton grows and bears well on the red soil, in which the indigenous cotton does not answer at all. In the present instance, the sowings were of very limited extent, but he has no doubt that they can be very widely spread if the result continues as it now promises.

"Captain Taylor forwarded a sample of this cotton to Messrs. Robert Strong & Co., Bombay, for transmission to the Manchester Cotton Supply Association, on which the following opinion was given by them:—

"'The sample arrived this morning, and has been examined by two other parties of experience in the cotton trade, as well as by ourselves, and the conclusion come to is, that this sample is all that could be desired by those interested in promoting the cultivation of GOOD cotton in this country, and it is believed that any quantity of this quality would find a ready sale in Liverpool at the full rates for fair Orleans, at present 7¾*d.* to 8*d.* per lb. We have never had an opportunity of comparing this sample with cotton grown in black soil, but we are inclined to believe that the mode of culture adopted by you is peculiarly suited to this description of seed, no sample of New Orleans growth in this country having been seen here to equal yours. We may add, that one of the parties above referred to is the Secretary to the Chamber of Commerce, who has been paying great attention to the results of the cultivation of exotic cotton. It was remarked, in reference to the cleaning of your sample, that the churka had been very successful, whereas Dr. Forbes reports the churka to be entirely useless for cleaning American seed cotton. We mention this that you may observe if there is any greater difficulty in extracting the seed by this machine from this class of cotton than from the indigenous varieties.'"

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"In forwarding the above opinion, Captain Taylor adds: As far as this goes, this is the most satisfactory experiment he has yet made in exotic cotton, and that he will do his best to extend the cultivation next year in red or *mussul* soil, which he is strongly inclined to think is much more favourable to the culture of the New Orleans variety than black soil." [1]

The following is the report which the Manchester Cotton Supply Association gave upon the samples received :—

When received, and description.	Mark.	Our No.	Remarks of Valuers.	Valuation.
				d.
Dharaseo; from Egyptian seed sent to the district in 1858.	No. 1	26	Colour rather brown; rather soft in staple, but silky, and pretty strong.	7½ per lb.
From seed obtained from the above crop.	No. 2	27	Colour very brown, with seed and dirt; staple fine and strong, but not long.	6¾ & 7
From New Orleans seed sent by this Association.	No. 3	28	Colour rather brown; staple irregular, and tender.	4½
West Berar.—Cotton produced at Akote from New Orleans seed received from Dharwar.	No. 1B	29	White, with brown leaf; staple even, and pretty strong.	5 to 5¼
Ditto.—Cotton produced at Devulghat from ditto.	No. 2B	30	Whitish, pretty clean; staple short, and tender.	4½ to 4¾
Ditto.—Bhunnee, grown at Devulghat.	No. 3B	31	Colour yellow; brown leaf; coarse, open staple.	4 to 4¼
Ditto.—Jherree cotton, grown at Akote.	No. 4B	32	Colour yellow; brown leaf; staple very short and very tender.	3½
Dharaseo.—Egyptian cotton...	No. 1C	25	Saw-ginned, cleaned; light-brown colour; hard staple, rather short; much nep, and some waste.	5
Indigenous cotton, Raichore Doab.	No. 1D	38	Bright-yellow colour; staple short, very weak, but even.	5¼ to 5½
New Orleans cotton, from Raichore Doab.	No. 2D	39	Colour brown, over-ginned; clean, short, weak, and coarse in staple.	3½ to 3¾
Shorapore.—New Orleans cotton, grown in red granite soil.	No. 1E	40	Colour bright and beautiful, clean, and well got up; staple fine and strong, but mixed with a deal of short.	8 to 8½

[1] Colonel Davidson's Report, May 1860.

In forwarding this report, the Cotton Supply Association wrote to Colonel Davidson, regarding the samples, as follows :—

"Some of these samples have elicited great surprise and admiration from their excellent quality, and their suitability to the special wants of our market, more especially those marked with our numbers 40, 26, 27, and 38. Numbers 40 and 38 are just the class of cottons which, if imported in any quantity into Liverpool, will soon raise the character of India as a cotton-producing country. It is of the utmost importance that every effort be made to encourage the export of these cottons, which are well cleaned, and, in fact, No. 40 is superior to any Indian cotton *we have ever seen*. No. 26 is also deserving of every praise and encouragement." [1]

In October 1861, Major Spence, Judicial Commissioner, reported the result of experiments with American seed and guano received from the Agent of the Cotton Supply Association at Nagpore. The seed was planted in many places with considerable care. A great portion never came up, and, where it did germinate, the plants soon withered. "The Deputy Commissioner of Nagpore reported that the seed tried by him generally failed altogether, and, although a small quantity germinated, it never attained any growth, while the portion of this to which guano was applied was burnt up by it." [2]

Colonel Davidson, in March 1861, stated the number of acres cultivated with cotton in the various districts as follows :—

West Berar	354,805 acres.
East Berar	221,909 do.
Raichore Doab	243,795 do.

The report of the estimated produce then published was manifestly incorrect, and Colonel Davidson not only called attention to the remarkable discrepancy in the results stated, but instituted inquiries, with a view to ascertaining the actual statistics of the cultivation.

In October 1861, Captain W. Cadell, the Assistant Commissioner, then in charge, furnished the following more accurate information :—

	West Berar.	East Berar.
Yield per acre of uncleaned cotton	207 lbs.	192 lbs.
Yield per acre of cleaned cotton	60 lbs.	52 lbs.
Price of cotton per 100 lbs.....	Rs. 11 7 0	Rs. 9 12 8
Cost of separating 1 lb. of cotton from the seed..... ...	,, 0 0 4	,, 0 0 2½

[1] Revenue Department, General, No. 1285, 1860, Department No. 337.
[2] Revenue Department, No. 967 of 1861.

Colonel Davidson states, "The yield of 5,574 acres of New Orleans cotton sown in the Raichore Doab as a dry crop in 1859 was 436,190 lbs. in the seed, the third of which, or 145,396 lbs., would represent the amount of cleaned cotton. The yield per acre is estimated at an average of 78 lbs. with the seed, or 26 lbs. cleaned, valued at Rs. 2-10-6 (or 5*s.* 3¾*d.*), either with or without the seeds, as the amount of seed may be considered but equivalent to the value of the labour required to remove it. The year in which the above experiment was made (1860-61) was a very unfavourable one, as it has been known that in a fair monsoon the produce of an acre of indigenous cotton sold for Rs. 10 (£1). It is worthy of note here, that in a patch of dry ground sown in the Doab by Captain Meadows Taylor, the Deputy Commissioner, with acclimated Dharwar New Orleans seed, the produce per acre was 465 lbs. of uncleaned, or 155 lbs. of cleaned cotton, the value of which on the spot is estimated at Rs. 16-6 (£1-12-9)."

Regarding transit, Colonel Davidson reports, "In the province of West Berar, and in the Raichore Doab, the cotton is conveyed on carts and bullocks to the port of shipment, the cost of transit to Bombay being estimated in West Berar at 4 to 6 pies per lb., and in East Berar at 8 pies, or about a penny. In the Doab the cost of conveying cotton to Compta is computed at from 4 to 6 pies per lb. if carried on bullocks, and a pie or two less per lb. if conveyed in carts. The railway through Berar and to Moodgul in the Raichore Doab will necessarily facilitate the transmission of cotton to the coast to a very great extent."

Mr. Robert Watson states that cotton costing 1⅞*d.* 2¼*d.* per lb. in Berar, incurs an expense of about 1*d.* per lb. in transit to Cocanada, the shipping port of the Godavery.

Colonel Davidson gives the following information regarding cotton cleaning:—

"The churka is the only machine in use in Berar for cleaning cotton. Saw-gins have been supplied, but the machinery not being understood, they are not used. In the Raichore Doab, three Dharwar gins received from Dr. Forbes have been in full use for two years. Two Macarthy gins were also forwarded to that district, but they will not work, and are not considered simple enough. There are no presses in use in any of the districts. The cotton is packed in bales, and trodden down by the feet.

"The cost of cleaning cotton by the churka, or other machine used, is thus reported—

	Per lb.	
West Berar.....	½ pie	with the churka.
East Berar	near 4 pies	
Raichore Doab	2 pies	
Raichore Doab	1 pie with the Dharwar gin.	

"Upon the general question of extending and improving the trade and commerce of the assigned districts, I would first notice that the cotton-gins referred to by you appear to have gained favour in West Berar, and it is believed that they would obtain a sale, and that the people would willingly give cotton in exchange for them, several applications having been made by natives to be supplied with them. In East Berar the Dunlop gins sent are lying unused, as the people are of opinion that they would tear the staple, and that cotton cleaned by them would not obtain the full price. It is considered advisable that a few of the small cottage gins should be forwarded for experiment. The Macarthy gins have not been found to answer, and the Dharwar gins are only suitable for central marts."

Although there are considerable tracts of waste land still to be brought under cultivation, Colonel Davidson gives an unfavourable report of the prospects for European colonisation. He states—

"The extent of waste land in West Berar is estimated at 1,648,194 acres, and in the Raichore Doab at 550,000 acres of dry land, of which 100,000 may be reckoned as fitted for cotton cultivation. There are also in the last-named district about 6,028 acres of waste wet lands. In East Berar there is a large extent of waste land, but a report upon it has not yet reached me, and an estimate cannot be readily formed, as the boundaries of this district are undergoing modification.

"As has been already remarked, our great want in Berar, especially in its eastern division, is population. The impetus that will be given to trade when the navigation of the Godavery is opened out, and our eastern frontier is joined with the western ports by the railway, the completion of which, in 1862, is confidently expected, will invite capital; and that population invariably follows capital is known to be an unerring law. We may, therefore, reasonably look forward to a large extent of waste land, at no very distant period, being brought under profitable cultivation.

"European colonisation is another important question; but I have already expressed my opinion to the Government of India that we are here met by serious obstacles. Among the first of them is the consideration that our relations towards the assigned districts do not permit us to sanction the permanent alienation of the proprietary right in a single acre of the soil. And that nothing but the right to do this, and our disposition to avail ourselves of that right, would suffice to attract European capital and enterprise, is abundantly obvious. The revenues of these districts are assigned to us for a specific purpose by the Nizam; the districts themselves are not ceded to us

temporarily or in perpetuity, and it would be as unfair in us to tender, as it is improbable that European capitalists would accept, leases, for the fulfilment of which we could at the best propose a very imperfect and conditional guarantee. The prospect of rapid and large returns might tempt the adventurous and precipitate, but would have little attraction for the cool and sagacious speculator, who could thoroughly appreciate the want of permanency and insecurity of his position.

"Another objection, also elsewhere advanced by me, is the climate, which, especially in the valley of Berar, is decidedly unfavourable to the European constitution."

The Deputy Commissioner of the Raichore Doab thus estimates the extent and nature of the waste lands in that district:—

Statement exhibiting the estimated amount of Waste Lands in the KHALSA (*Government*) VILLAGES *of the* RAICHORE DOAB, *which can be cultivated, and are at the disposal of Government.*

NAMES OF TALOOKAS.	DRY ACRES.									WET ACRES.							TOTAL OF ACRES.		
	Black Soil.			Red Soil.			Mixed Soil.			Total.			Rice Land.			Garden Land.			Total.		
	Acres	C.	A.	Acres	C.	A.	Acres	C.	A.	Acres	C.	A.	Acres	C.	A.	Acres	C.	A.	Acres	C.	A.	Acres	C.	A.
1. Kooshtagee.	40,903	33	0	32,383	37	12	5,695	22	0	78,983	12	12	160	20	0	69	4	12	229	24	12	79,212	37	8
2. Copal.....	39,844	0	0	22,135	24	4	975	3	4	62,954	27	8	185	35	12	49	25	12	235	21	8	63,190	9	0
3. Raichore ..	48,022	14	0	52,559	31	0	744	10	4	101,326	15	4	2,600	29	4	277	18	8	2,878	7	12	104,204	23	0
4. Gungawutty	29,107	37	12	25,654	32	8	2,802	19	8	57,565	9	12	1 345	33	12	127	27	4	1,473	21	0	59,038	30	12
5. Lingsoogoor.	4,626	0	12	19,504	15	8	322	0	0	24,452	16	4	128	0	0	18	0	0	146	0	0	24,598	16	4
6. Sindnoor ..	22,060	39	0	1,367	15	12	7,461	34	0	30,890	8	12	....			14	23	4	14	23	4	30,904	32	0
7. Manvee....	63,826	9	0	19,083	27	12	18	15	0	82,928	11	12	7	0	0	38	0	0	45	0	0	82,973	11	12
8. Deodroog ..	42,776	20	8	22,395	26	8	74	0	0	65,246	7	0	47	35	0	110	21	0	158	16	0	65,404	23	0
9. Alpoor	127	9	0	1,249	29	0	....			1,376	38	0	7	0	0	28	0	0	35	0	0	1,411	38	0
Total..	291,295	3	0	196,335	0	0	18,093	24	0	505,723	27	0	4,482	33	12	733	0	8	5,215	34	4	510,930	21	4

R. N. TAYLOR, Deputy Commissioner, Raichore Doab.

Deputy Commissioner's Office, 15th June 1859.

The following important memorandum on the subject of roads in the province was prepared in June 1861, by Major Elliott, for the Government of India:—

"Before proceeding to consider the detail of a scheme of roads for the province, it appears desirable to say a few words on the territory itself. The province is of a triangular form, its extreme length from north to south being about 382 miles, and its breadth in the widest part of it 310 miles, exclusive of the detached principality of Kharona, or Kalahundee, on the east,

which is 92 miles broad by 90 in length. Nagpore is bounded on the north by the districts of Hoshungabad, Nursingpore, Seonee, and Mundlah, belonging to the Jubbulpore division, and the Sirgoojah Rajah's talookas. On the east by a portion of the Sirgoojah talookas and Ramgurh, and by the numerous petty states belonging to Chota Nagpore and Sumbhulpore; by a tract of about 30 miles belonging to independent hill tribes (Khonds) in the district of Ganjam, in the Madras Presidency, and by the territory of Jeypoor, also under the Madras Government. On the south, by the River Godavery, the talooka of Elmawar belonging to the Nizam of Hydrabad, and by portion of the Wurngunga, Pranheta, and Wurdah rivers. On the south-west and west by the River Wurdah, which divides it from the Nizam's dominions, and by the district of East Berar, and portions of Baitool and Hoshungabad, in the Jubbulpore division.

"The first step in arranging a scheme of roads is to classify them in the order of their importance, and this may be done under the three headings—IMPERIAL, PROVINCIAL, and DISTRICT.

"The imperial lines are those in the construction and maintenance of which the interests of the State preponderate, as lines of military communication, or for advancing the commercial interests of India generally, the provincial lines standing to the province, and the district lines to the several districts, in the same relation as the imperial lines do to the empire at large, each being intended in its degree for the improvement of the country, and the better development of its resources.

"The cost of the construction of the imperial lines would be borne by the imperial revenues of India, the cost of the provincial lines being defrayed by the imperial and local revenues jointly, in proportion to their general or local importance, leaving the outlay required for district lines to be borne by local funds alone, save in instances where imperial projects may be materially furthered and expedited, when the imperial funds might be charged with a quota of the expenditure.

"A glance at the map of India will show that, from the position of Nagpore, with reference to the four Presidences of Bengal and Bombay, Madras and the North-Western Provinces, the main imperial line must be the one known as the Great Deccan Road, which, leaving the Grand Trunk Road from Calcutta to Lahore at Benares, crosses the Ganges near Mirzapore, and passes, *viâ* Jubbulpore and Seonee, through Nagpore, to Jaulnah, Ahmednuggur, and Poona, connecting Calcutta with Bombay. This line enters the Nagpore territory about 49 miles south of Seonee, and passing through the

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military cantonment of Kamptee and the civil station of Seetabaldee (the head-quarters of the province), leaves it at the River Wurdah, a few miles to the westward of Nachengaum, having a course through the province of about 104 miles in length.

"The next in importance is the southern line, commencing, it may be said, at Agra, and passing *viâ* Gwalior and Jhansi to Saugor, whence it should be continued through Nursingpoor, entering this territory in the Chindwarra district above the Ghauts, and from Chindwarra proceeding by Nagpore and Hingunghat towards Hydrabad and Madras, thus connecting the Punjaub and Delhi, through Central India, with the Southern Presidency. This road might be called the Great Southern Road of Central India.

"The third imperial line would be that traversing the province from east to west, starting from Calcutta and passing *viâ* Midrapoor, Cuttack, and Sumbhalpoor, through Raepoor, Bhundara, and Nagpore, towards Oomra-wuttee and Ellichpoor in eastern Berar. This line joins the Great Deccan Road at Nagpore, and, in conjunction with it, was, prior to 1853, the postal line between Calcutta and Bombay. Since 1853 this line has been superseded by the one *viâ* Mirzapore and Jubbulpoor, though a foot dâk is maintained between Calcutta and Nagpore, along the old post road, for the convenience of the residents of Sumbhulpoor and Raepoor, &c.

"We now come to the provincial lines of road. The first should be a continuation of the road between Jubbulpoor and Mundlah, over either the Rajadhar or Chilpee ghauts into Chuttesgurh, with a road from its sudder station of Raepoor to the out-station of Belaspoor, Ruttonpoor, and the northern boundary. Again, southward there should be a road from Raepoor, through the Busten territory (a tributary of Nagpore) to Sirancha, situated on the Prandeta, near the navigable head of the Godavery; and the site selected for the head-quarters of the Deputy Commissioner in charge of the six talookas on the left bank of that river—recently ceded by His Highness the Nizam Sirancha—should also be connected with the southern imperial line by a branch *viâ* Ahere and Chanda to Wurrarah, about thirty miles south of Hingunghat.

"Another road, branching from the east and west (imperial) line, should start from some point (to be determined on hereafter) east of Raepoor, and, passing through the territory of the Rajah of Kharondh (Kalchund in the map), be carried through the Jeypoor estate, belonging to the Madras Presidency, to the sea-coast, thus connecting this province with the ports on the eastern coast to the south of Ganjan. This appears, from a report by Captain Saxton, to be the most direct and feasible line for the residents of the eastern portion

of this province to reach the coast, and its importance, in a commercial point of view, should not be lost sight of.

"The next line is one from Seonee (Jubbulpoor division) on the Great Deccan Road, through our northern district to Baitool (also in the Jubbulpoor division), for the purpose of connecting Chindwarra with Jubbulpoor on the north-east and Bhopal and Indore through Hoshungabad on the north-west. This line would have about 85 miles of its length in the Nagpore province. There is another road which, though entirely within the limits of the Nagpore district, is provincial, if not imperial, in importance, and should be constructed. It runs between the town of Hingunghat on the southern (imperial) line, and Nachengaum on the Great Deccan line, near to which latter place there is to be a railway station. Hingunghat is a very large cotton mart, as already reported. The distance between Hingunghat and the Wurdah along this line is about 45 miles.

"Two short lines from the cantonment of Kamptee remain to be noticed—the one to Patunsaongeh, a distance of 14 miles, connecting the cantonment with the southern imperial line towards Chindwarra and the north, and the other to Goomtarah, about 14 miles, to connect Kamptee with the east and west imperial line towards Bhundara. These two roads are required mainly on military grounds, to facilitate the march of troops from the head-quarters station of Kamptee towards the districts east—Bhundara and Raepoor, and north—Chindwarra, Baitool, Hoshungabad, &c.

"With these, the list of provincial requirements may be closed. Of the imperial lines the Great Deccan and southern roads are already under construction, the first-named being a first-class road, and the other a second-class road on a first-class basis. The eastern line is also sanctioned, and two sections, comprising the distance between Seetabuldee and Bhundara are under construction. This is a second-class road. The remaining provincial lines should all be of the second class, with the exception probably of the proposed line between the Raepoor district and the eastern coast, for which a less expensive class of road might in the first instance be found sufficient.

"The extent to which these lines of road will be affected by the line of railway now in progress from Bombay to Nagpore by Oomrawuttee, and through the valley of the Nerbudda with a branch to Jubbulpoor, and eventually to the Ganges, must be considered.

"The only line of road that will be in any way affected by the rail is the Great Deccan Road, and this only very partially. Beyond the limits of this

province, that is, from Jubbulpoor to Mirzapoor, the rail and the road from their proximity may be viewed as antagonistic by those who consider a good road along a line of railway to be unnecessary. But between Jubbulpoor and Nagpore, a distance of 160 miles, there is no rail or branch rail in contemplation, whilst the natural difficulties of the country between these two points make it improbable that any attempt to connect them by rail will ever be made. From Nagpore, however, westward as far as the boundary of the province near Nachengaum, the road and the rail will run side by side, but here any railway between them will terminate, the rail turning to the north-west towards Oomrawuttee into Khandeish, while the road continues on its course to the southward of west in the direction of Jaulnah, Aurungabad, Ahmednuggur, and Poona, at which latter place it meets a branch line of railway connecting that station with Bombay. In a military point of view, therefore, the importance of the Great Deccan Road in this province ought not to be materially lessened by the introduction of the rail, for it will still be required to maintain our communication with Seonee and Jubbulpoor to the north, and with Jaulnah, Aurungabad, Ahmednuggur, and Poona to the west.

"The entire length of the three imperial lines of road within this province may be set down 649 miles; the number of miles of the projected provincial lines is about 762, making a total of 1,412 miles, divided amongst 10 lines, one of which is of the 1st class, eight of the 2nd class, and one of the 3rd class. Estimating for these at our present rates, an outlay of 47½ lacs would be needed for their completion, a portion of which would be borne by the local funds.

"Of the district lines, those connecting the several tehseeldarees with the sudder stations of their respective districts and with each other, are the first in importance, the next being the opening of cross lines, to connect the tehseeldarees and the principal marts and bazars with the provincial and imperial main lines and with each other. These district lines are too many in number to enumerate here, but their aggregate length may be estimated at 1,000 miles. They may all be of the 4th class, or what are commonly denominated fair-weather roads, and, taking the expenditure needed for their construction at Rs. 250 a mile, would involve an outlay of Rs. 250,000.

"From the foregoing it will be seen that a scheme of roads, such as the one herein sketched, would require funds to the extent of fifty lacs of rupees, supposing present rates to continue;—a large sum certainly, though scarcely more than would be warranted by the results. The annual revenue of the territory

amounts to little more than 40 lacs; but with roads of ingress and egress in al directions, the increase that might be looked for would, I firmly believe, yield a very handsome return for an expenditure even of half a million." [1]

Captain Cadell states, regarding the means of transit, "No roads have been made as feeders to the railway; but in the valley of Berar carts can traverse the whole country with ease during the dry weather, and even now, when the carts are the means of traffic, most of the Berar cotton gets to Bombay before the monsoon commences."

The G. I. P. Railway will run through the very heart of Berar, and will, doubtless, carry off the greater part of its cotton. A portion of the Nagpore line as far as Sheegaum, which will be the station for Ramgaum, will be opened about the end of 1862, and, in the spring of 1863, it is expected that the line will be complete as far as the neighbourhood of Oomrawuttee.

The great rival of the Railway will, of course, be the River Godavery. The attention of the Madras Government has for some time been directed to this channel of traffic, and efforts are being made to render it navigable. The following is a summary of the principal facts relative to this river, prepared by Captain Haig, the engineer employed to examine and report upon it:—

"The Godavery, with its tributary the Wurda, has an average slope of 1' 4" per mile up to Chandah, a distance of 360 miles from the sea.

"The next 160 miles of the Wurda have a slope of 1' 7" per mile.

"The inclination of 150 miles of the Wyne Gunga is the same as that of the Wurda.

"350 miles of the Godavery, above the confluence of the Pranhita, have a slope of 2 feet per mile.

"There is sufficient depth of water in all these rivers for steamers of large size, with a draft of from 3 to 6 feet, during seven months of the year, and for boats of a lighter draught during eight or nine months.

"There is an inexhaustible supply of fuel on the bank.

"The hindrance to navigation now caused by rocks in the bed of the Godavery, Pranhita, and Wurda may be removed at a cost not exceeding £300,000.

"The length of the river that may be thus opened is 823 miles, of which 473 miles will be navigable during three-quarters of the year, and 350 miles during two to three months.

"The 473 miles of river thus opened consists of part of the Godavery, the Pranhita, and Wurda, which together constitute a very direct and uninterrupted line of communication from a point only 30 miles distant from the centre of the cotton district of Berar to the port of Coringa.

[1] Public Works Department, No. 46 of 1861.

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"The cost of the work required for the purpose, viz. £300,000, if charged solely to the Godavery, Pranhita, and Wurda, will be at the rate of £618 per mile; but if a share of the expense is borne by the other rivers, which will benefit by it for a shorter period, it will be £480 per mile.

"It is almost certain that 150 miles of the Wyne Gunga, and an equal length of the Godavery above the confluence of the Pranhita, may be rendered navigable for the same period as the other rivers at a proportionate expense.

"The whole length of the river that may thus be opened in the valley of the Godavery for navigation during three-quarters of a year is—

Godavery	376	miles,
Pranhita and Wurda	247	do.
Wyne Gunga	150	do.
Sebbery, Indrawatty, and Pyne Gunga	100	do.
Total	873	miles,

and the estimated cost per mile £520.

"The works proposed are of the simplest kind, viz. anicuts of from 15 to 20 feet in height, built on solid rock, locks of ordinary dimensions, and, in one or two instances, a few miles of canal.

"It is proposed to extend the present period of navigation to the whole year, by supplying artificially, by means of reservoirs situate on the head of the different rivers, a sufficient stream of water to afford the supply requisite for navigation during those months when the natural supply is insufficient.

"The climate of the Godavery is not of that very unhealthy character which has been supposed. There is very little or no fever in the hot months. It is more prevalent during the rains and cold seasons, but may generally be avoided by careful attention to the usual precautions with respect to food, clothing, and shelter.

"An abundant supply of labour is procurable."

One serious drawback to the river route is the fact that at its mouth there is no great market, and no very commodious port. Coringa is scarcely likely, for a considerable time, to come into competition with Bombay.

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CHAPTER XIV.

CULTURE IN NEIGHBOURING STATES.

Cotton cultivation in the Kolapoor Territory—The Southern Maratha Jagheer States—The Guicowar's Dominions—Kattiawar—Rewa Kanta—Kutch—The Valley of the Nerbudda.

Cotton cultivation for the purpose of export is not carried on to any great extent in the Kolapoor territory. About seven-eighths of the cotton produced in the district are taken for local consumption, and one-eighth of the whole is exported to Bombay.

A small quantity of exotic cotton was at one time cultivated, but it rapidly decreased, and only the indigenous is now planted.

The assessment on cotton land is calculated at Rs. 4 to Rs. 19, and the cost of cultivation at Rs. 11 to Rs. 12 an acre.

Cotton is separated from its seed by the foot-roller, with which instrument a woman can clean about 10 lbs. per diem. The wool goes through another cleaning, being whipped by the bow-string of an instrument called the "Kuman." By this mode about 40 lbs. may be cleaned by one person in a day. The cost of cleaning is Rs. 3-4-1 for 196 lbs., or $3\frac{5}{6}$ pies per lb.

The Political Agent states (28th November 1861) that, "for the most part the good soils in Kolapoor are under more remunerative crops than cotton, and it is not likely that these would be thrown up for growing cotton, unless

the price of the staple rose considerably, and the enhanced price stood firm for many years."

The following is a statement of the area cultivated with cotton in the Kolapoor district from 1850-51 to 1860-61 :—

Years.	Total extent of Land under Cultivation.	Land cultivated with Cotton.						Land capable of producing Cotton.
		Native.		Exotic.		Total.		
		Acres.	G.	Acres.	G.	Acres.	G.	
1850-51	About 150,000 Acres.	4,057	10	25	0	4,082	10	About 100,000 Acres.
1851-52		4,063	0	53	0	4,116	0	
1852-53		3,927	35	15	4	3,942	39	
1853-54		3,819	37	0	25	3,820	22	
1854-55		2,992	36½	.....		2,992	36½	
1855-56		2,305	11½	8	16	2,313	27½	
1856-57		6,198	25½	.....		6,198	25½	
1857-58		5,495	29	.....		5,495	29	
1858-59		6,789	25½	.....		6,789	25½	
1859-60		7,103	39½	.....		7,103	39½	
1860-61		7,704	0	.....		7,704	0	

In the absence of any recent returns, no accurate data can be given of the present position of cotton cultivation in the Southern Maratha Jagheer States. The following tables, however, although somewhat out of date, may be given for the purpose of showing the rate of assessment and cost of cultivation, as well as the area over which the culture of the staple may be extended* :—

Districts.	Land cultivated.						Rate of Assessment per Beegah.	Cost of Cultivation per Beegah.	Extent of Land capable of producing Cotton in Beegahs.
	Native.		Exotic.		Total.				
Season 1853-54.	Beegahs.		Beegahs.		Beegahs.				
Sanglee	15,028	5 0	1,591	5 0	16,619	10 0	From 8 Annas to 2 Rupees.	From 8 Annas to 2 Rupees.	16,619 10 0
Jumkhundee ..	28,912	0 0	1,735	0 0	30,647	0 0			146,283 15 0
Koorundwar....	2,367	15 3¾	....		2,367	15 3¾			2,600 0 0
Shedbol	3,646	0 0	....		3,646	0 0			15,500 0 0
Meeruj	7,352	19 5	1,152	0 0	8,504	19 5			10,000 0 0
Meeruj	4,708	2 0	2,864	0 0	7,572	2 0			13,975 0 0
Moodhole.....	30,433	0 0	....		30,433	0 0			31,000 0 0
Ramdroog	7,311	15 0	....		7,311	15 0			20,000 0 0
Total..	99,759	16 8¼	7,342	5 0	107,102	1 8¾	....	....	255,978 5 0

* It has not been considered desirable to delay this volume for later information.

TABLE (*continued*)—

DISTRICTS.	LAND CULTIVATED. Nativive.	Exotic.	Total.	Rates of Assessment per Beegah	Cost of Cultivation per Beegah.	Extent of Land capable of producing Cotton in Beegahs.
Season 1854-55.	Beegahs.	Beegahs.	Beegahs.			
Sanglee	12,045 10 0	2,087 5 0	14,132 15 0	From 8 Annas to 2 Rupees.	From 8 Annas to 2 Rupees.	14,132 15 0
Jumkhundee ..	19,102 0 0	8,598 15 0	27,700 15 0			146,283 15 0
Koorundwar....	918 5 3½	....	918 5 3½			3,017 0 0
Shedbol	4,811 0 0	....	4,811 0 0			8,625 0 0
Meeruj	5,559 15 4½	1,212 10 0	6,772 5 4½			10,000 0 0
Meeruj	2,598 15 3½	2,483 0 0	5,081 15 3¾			14,675 0 0
Moodhole	28,140 0 0	....	28,140 0 0			110,962 10 0
Ramdroog	6,999 15 0	....	6,999 15 0			62,949 0 0
Total..	80,175 0 11	14,381 10 0	94,556 10 11	....	....	370,645 0 0
Estimated average of the last 5 years.	95,131 19 0	7,571 12 0½	102,703 11 0½	....	....	255,978 5 0
Season 1855-56.						
Sanglee	6,606 0 0	1,930 0 0	8,536 0 0	From 8 Annas to 2 Rupees.	From 8 Annas to 2 Rupees.	14,132 15 0
Jumkhundee ..	14,974 15 0	5,655 10 0	20,630 5 0			146,283 15 0
Koorundwar ..	248 0 0	....	248 0 0			3,017 0 0
Shedbol	1,505 10 0	....	1,505 10 0			8,625 0 0
Meeruj	2,923 15 0	1,018 15 0	3,942 10 0			10,000 0 0
Meeruj	1,613 19 5	4,148 0 0	5,761 19 5			14,675 0 0
Moodhole	12,412 10 0	....	12,412 10 0			110,962 10 0
Ramdroog	4,718 10 0	....	4,718 10 0			62,949 0 0
Total..	45,002 19 5	12,752 5 0	57,755 4 5	....	....	370,645 0 0
Estimated average of the last 5 years.	89,967 8 0	10,861 17 0	100,829 5 0	....	....	313,311 10 0

In the *Guicowar's territory*, the climate and soil of which are very similar to those of Broach, about 260,000 beegahs are capable of cotton cultivation. The wool is cleaned by the native churka, and the expense of the operation is said to be Rs. 11 to Rs. 12 per candy. The average assessment ranges from Rs. 4 to Rs. 5½ per beegah, and the cost of cultivating that extent of land is estimated at Rs. 2½ to Rs. 3. No reliable information regarding the actual extent of cultivation can be given.

In *Kattiawar* it is estimated that about 2,000,000 acres are actually cultivated with indigenous cotton; but it would only mislead to attempt to give

details of a province so little under direct management as this. In 1858-59, it was estimated that the cotton crop amounted to about 132,725 candies of cleaned wool, of which 19,545 candies were consumed in the province, and 113,180 candies were exported. Cotton is cleaned entirely by the churka at an expense of Rs. 8 to Rs. 11 per candy.

In the *Rewa Kanta* districts about 23,000 acres are capable of cotton cultivation; but scarcely one-half of this is actually devoted to that crop. The churka is the only machine used for separating the seed from the wool, and the principal part of the quantity exported is shipped from the port of Broach.

Cotton is grown more or less over the whole of *Kutch*, but the extent of cultivation cannot be stated with accuracy. There is no land assessment, but the tenant pays on an average about one-fourth of the produce to the owner of the land. About a third of the cotton produced is consumed in the province.

The following account of the prospects of cotton cultivation in the *Valley of the Nerbudda*, which, by the extension of the G. I. P. Railway, may become very interesting to Bombay, was addressed, in February 1861, by Mr. H. Victor, of Hurdah, to the Bombay Chamber of Commerce, and is extracted from their report for 1860-61 :—

"The north-eastern extension of the Great Indian Peninsula Railway, now in course of construction, will open up and tend to develop the resources of one of the most fertile and productive districts of Central India—the Nerbudda Valley.

"The produce of this part of the country, until within the last few years, has been entirely cut off from the Bombay market, in consequence of the wretched state of road communication with the south, and the great distance and excessive rates of carriage. It, therefore, found its way to the nearest markets—on the north, the Ganges districts; on the west, the Indore states—according to the demand, the return imports being sugar from the first quarter, and English piece goods and Bombay supplies through Indore. As the railway, however, will form a direct and cheap route to a better market, of course it will be taken advantage of by the local merchants, and no doubt many of the members of the Chamber will, in the course of two or three years, have business transactions in this direction. With this idea, I submit a few notes which may prove interesting.

"I will confine myself to that portion of the Nerbudda Valley extending from the Saktha River and Nimar states in the south to the Town River, which enters the Nerbudda a few miles above Hoshungabad,—a tract of country about 100 miles long by 20 or 30 broad.

"Following the course of this railway, on entering the Hurdah Pergunna, the first 10 miles is nearly all jungle land, lightly wooded, covered with low scrub and long grass. This description of country extends from the Nerbudda to the Kallee Bheet jungles and Baitool districts. The country improves rapidly approaching Hurdah, and from that place up to the Town River very little jungle is met with, and the land is pretty fairly cultivated, but exhibiting want of system, capital, roads, and markets. Probably not more than one-half of the culturable land is tilled from want of hands, and what is worked is so slovenly, that one can see the cultivators hold more land than their means will allow them to work properly. Very little of the cotton raised travels far, and it only holds an inferior position as regards the area of cultivation, one-sixteenth being about the average devoted to that crop. The want of roads in this particular is evident, although the natives have an idea that cotton does not thrive well. This is entirely a mistake; the soil is capable of raising almost any crop to perfection, if it is properly treated; for where cotton has received some little attention, the yield is fair. It is not to be expected, though, to turn out to be profitable, as it is usually cultivated with pulse, pumpkins, and weeds at the bottom, and toor dhall overtopping the plants. The picking is generally delayed till the cotton is dropping, when a lot of rubbish gets mixed with it, and no care is taken in keeping different sorts separate, the cultivators packing clean and dirty, long and short fibre, all together, off to the buniahs as quick as he can, just to realise what it will fetch.

"As the cotton supply appears to be the most important consideration, I will enter a little more into the details of the subject, taking the 'queries' of the Cotton Supply Association as a guide:—

1*st*. *Beraree.*—Short, strong, harsh.
2*nd*. *Deshee.*—Short, tender, silky.
3*rd*. *Nandunbund.*—Long, tender, silky.

"The first, Beraree, is not cultivated to any considerable extent, from want of seed. Both the ryots and buniahs prefer it to any other,—the first from the plants coming up strong and healthy, giving a greater yield of kuppas, a greater proportion of clean cotton, and because it keeps close in the pod without gathering rubbish. The dealers look to the length of the fibre, and its freedom from impurities. The men who weave the coarse cotton cloth of the country (*dungaree*) use up nearly all that is raised, the weavers in many instances being the growers.

"The cost of cultivation of 10 acres, and the average return thereon is—

10 Acres, land rent	Rs.	15	0	0
Planting labour	„	12	0	0
3 Maunds (240 lbs.) seed	„	2	8	0
Weeding	„	7	0	0
Picking, husks, &c.	„	2	0	0
	Rs.	38	8	0

First picking 1,440 lbs. kuppas.
Second picking 480 lbs. do.

Kuppas ..... 1,920 lbs., at 32 lbs. per rupee	Rs.	60	0	0
(= 64 lbs. clean cotton per acre.)				
Profit to cultivator	Rs.	21	8	0

Or say Rs. 2 per acre.

The dealers account stands thus:—

1,920 lbs. kuppas, at 32 lbs. per rupee	Rs.	60	0	0
Cleaning the same, at 240 lbs. per rupee	„	8	0	0
	Rs.	68	0	0
640 lbs. clean cotton, at 10 lbs. per rupee	Rs.	64	0	0
Seed as cattle food, 100 lbs. per rupee, say	„	12	0	0
	Rs.	76	0	0

Dealers profit on 10 acres of produce Rs. 8, or Rs. 0-12 per acre.

"2*nd*. *Deshee*.—The cultivation of this description is of three times greater extent than the *Beraree*. Neither the cultivator nor dealer fancies it much; the former looks on it as doubtful crop, and if thriving not very remunerative. His calculations on 10 acres are—

Cost of cultivation, as before	Rs.	38	0	0
Yield 1,440 lbs. of kuppas, at 36 lbs. per rupee	„	40	0	0
Leaving him only as profit on the 10 acres	Rs.	2	0	0

The dealers account is—

1,440 lbs. of kuppas, at 36 lbs. per rupee	Rs.	40	0	0
Cleaning as before	„	6	0	0
	Rs.	46	0	0
400 lbs. of clean cotton, at 10 lbs. per rupee	Rs.	40	0	0
Cotton seed	„	10	4	0
Profit, Rs. 4-4	Rs.	50	4	0

3*rd*. *Nandunbund*.—There are only a few plants here and there in the district, and these are in gardens. The wool is used by the Brahmins for their sacred thread. I have met with two different varieties, both tall shrubs, 7 or 8 feet high, spreading, and of about six years growth. The natives consider it exotic cotton, and are anxious to obtain seed. One shrub bears a bright-yellow flower, dark-green spotted leaves, with bolls as large as a walnut. I counted on it upwards of 400 bolls. This plant had been irrigated. One or two seeds in each boll had been attacked by insects. The other shrub has scandent branches, dark claret-coloured flowers, small, dark-brown leaves; bolls small, but numerous; seed green, many attacked by insects. This had not been irrigated.

"It stands to reason that, when cotton cultivation is not remunerative, it will be neglected. The intelligent farmers are alive to this fact, and are particularly anxious to obtain good seed and raise cotton for export. They are quite prepared to try any experiment, and are willing to act upon any suggestions which are plain and simple enough for them to see the benefit of. The few pounds of American and Egyptian seed I distributed among them last season failed in their hands; notwithstanding this circumstance, they have expressed an earnest desire to be supplied with more seed in time for sowing. They attributed last year's failure to the lateness of sowing, it being, according to their account, forty days behind time. With clean cotton in the bazar here at 2½*d*. per lb., the carriage to Bombay nearly ½*d*. per lb. more, and the article of an inferior description, it is clear that it would scarcely pay to export it. The introduction and cultivation of foreign seed is necessary before any great supply can reach the Bombay market. There are now three years before us to extend the cultivation, and by that time the Railway will be completed.

"There are five classes of soils, placed below according to their value, with the description of crop suited to each:—

"1*st*. *Moorum*.—Light loam, free from kunkur and stones, generally at the top of undulating ground not scoured by drainage. The crops giving the greatest return on this soil are wheat, linseed, red til, and gram. The rental is about Rs. 2 per acre.

"2*nd*. *Kabur*.—Is a mixture of moorum and black soil; it raises to perfection cotton, rice, black til, dhall, and gram. Rent Rs. 1½ per acre.

"3*rd*. *Rankur*.—Is partially impoverished first-class soil, and low-lying black-soil, producing jowar, cotton, dhall, and common cereals. Rent Rs. 1 per acre.

"4*th* and 5*th*. *Wankur and Rorud* are two inferior classes—stony or swamp and grass land; requires manuring for successive crops. It is then generally converted into garden ground.

"*Moorum* becomes impoverished in about five years, when it is allowed to lay fallow for two or three seasons, or is manured by ploughing in a standing crop of *sunn* (hemp). The greatest area of cleared land is *Kabur*. New clearing is usually of the first class, according to its position, and the first crops raised after the timber is felled, and before the stumps are taken out, are gram and oil seeds. The principal and best-paying crops are wheat, gram, linseed, and red til. On 10 acres of land, the following is the cost of cultivation of each crop, the return of produce and profit to the cultivator:—

Grains.	Land Rent.	Seed.	Sowing.	Reaping.	Total cost of Cultivation.	Produce, Weight.	Produce, Value.	Profit to Cultivator.
Wheat ..	First class soil, Rs. 20	1,440 lbs. at 80 lbs. per rupee, Rs. 18.	Preparing the ground and sowing, Rs. 12.	Protecting crop, hedging, and reaping, Rs. 5.	Rs. 55	9,600 lbs.	Rs. 120	Rs. 65
Linseed.	The same, Rs. 20.	Rs. 4	The same, Rs. 12	The same, Rs. 5	Rs. 41	5,760 lbs.	Rs. 96	Rs. 55
Red Til ..	Second class soil, Rs. 15	6 annas.	The same, Rs. 12	The same, Rs. 5	Rs. 32-6	3,840 lbs.	Rs. 64	Rs. 31-10
Gram ..	The same, Rs. 15	Rs. 12	The same, Rs. 12	The same, Rs. 5	Rs. 44	5,760 lbs.	Rs. 60	Rs. 16

"The above is an average throughout of cost, crop, and market rate. Ten per cent. added for dealers profits, and Rs. 2-8 per maund of 80 lbs. for carriage, gives the probable value of the produce in the Bombay market. The result shows that carriage to a distant market is not profitable.

"The average fall of rain is about 30 inches; the setting in of the monsoon is usually in the early part of June, when there is a heavy rain fall for about three days within a week; after this the sowing of cotton, jowar, dhall, rice, and til commences; the next three weeks the weather is fair, with occasional light showers, followed by another heavy fall. By this time the crops are fairly above ground. Variable weather until the middle of August. The greatest quantity of rain falls at this period—usually incessant for a week,—then light showers, with fair weather, till the middle of September, when the rains are considered at an end. In October the heat is great, and night dews heavy; if the soil is light enough, the sowing of wheat, gram, and linseed is commenced about the middle of the month. The first picking of cotton is in the middle of November; by that time the night dews are light, and

the days cool. Towards the end of November the north-west wind sets in; the nights are cold, the thermometer occasionally falling to freezing point. Between sunrise and noon the temperature varies in the shade 40° or 50°. The second cotton picking is about a month after the first; now and then a third picking in February. The cotton is usually injured by rain. Light showers in the last week of November and December, and middle of January. Towards the end of February the reaping of dry crops is in hand. March, light showers; wind changes to the north-west, blowing hot. April and May hot, thermometer rising to 110° in the shade. Towards the end of May wind strong and variable; weather cloudy, the thermometer going down. Climate considered very hot in open land; in the rains, light attacks of diarrhœa. October and November fever very prevalent; jungle land dangerous. March and April, cholera season; never very severe. May, fever and small-pox among the natives. The climate for European constitution is preferable to that of the Concan or Deccan. Should the rains not set in till the end of June, thus delaying the sowing of the cotton crop till the middle of July, the yield is considerably affected, as the young plants are not strong enough to stand the heavy rains of August, are in a weakly state when subjected to the extremes of temperature of October, and seldom exceed two feet in height, each plant bearing about seven well-developed bolls, whereas the same plant, if healthy, should bear twenty-two. The natives believe in early sowing, but not before the first rain-fall. Irrigation is unknown, but the cultivators think one or two waterings, as the plants may require them, would be beneficial. Their reason for not troubling themselves about irrigation is, that the deep-cracked soil would take more money to saturate it than the increase in the value of the crop raised would cover. The only wet crop of any importance is rice; that is sown in natural swamps. All other water crops are considered garden produce, as opium, ginger, and turmeric.

"The system of land tenure is the *Malgoozaree*, or farming, and *Zemindaree*; if the first, the farmer rents a village under Government for short periods, until a permanent settlement is carried out, and sub-lets the land to cultivators upon yearly agreements. At the temporary settlement in 1844, when this district was received from the Holkar, from want of a proper survey, the villages were let at a very low figure, a guess area being taken, and assessed accordingly. * * * *

"There are some hundreds of square miles of unoccupied land, within a short distance of the Railway, that might be obtained from Government on clearing leases. To bring any large extent at once into cultivation, it will

be necessary to import labour, upon a moderate scale at first, so as to start the work; and it is my opinion that sufficient labour would soon find its way to estates held by Europeans. The soil is as good as any other in the district, and I believe there is nothing to prevent an extensive cultivation of cotton with a profitable return, with labour and capital to raise it, and a railway within a few miles to convey the produce to a good market at a reasonable rate.

"The terms of clearing leases in the North-West Provinces may be considered favourable. Each estate is not to exceed 4,000 acres of culturable land, the holding being for fifty years—the first three years rent-free—the assessment being three-fourths of the area of the culturable land, commencing the fourth year with a rental of fifteen annas for every hundred acres liable to assessment, and reaching the maximum rate (Rs. 76-14) in the twenty-ninth year. The lease-holder has to commence clearing the first year, and to bring into cultivation three-fourths of the culturable area in the first twenty years of the lease, or one-twentieth of the whole area every year. There is a reasonable prospect of remuneration to any European taking such leases. Field labour is cheap on account of the low price of food. If the estate is worked independently, it will require an outlay of about six annas for every acre cleared. This could be brought into cultivation at once, and pay its expenses the first year, with a favourable balance, if sub-leases are issued. A piece of land could be marked off for any applicant, allowing him ten acres for every pair of bullocks he could command. While the party is clearing the land, and before a rental is fixed, the landlord would have to find food for men and cattle, this advance being paid from the first crop raised. * * * *

"Sowcars (money-lenders) carry on a pretty thriving business in this part of the country, their rates of interest upon cash loans being very high,—often 50 per cent. per annum. When grain is advanced, as for instance wheat for sowing, for 1 maund of seed, they receive in five months 1½ maund of produce. In the case of advance of food to the hill people, for 1 maund of jowar, in six months is paid 1 maund of rice, equal to about 200 per cent. profit. For cashing cheques on Bombay houses 4 and 5 per cent. is charged. Hoondies at sight on Bombay cost from 4 to 7 per cent. Exchange is at 14 annas per rupee silver. Many of the sowcars are farmers of villages, besides carrying on extensive export and import transactions."

CHAPTER XV.

THE SOILS, CLIMATE, AND AGRICULTURE OF INDIA.

The various Cotton soils of India—Analysis of Sea Island Cotton wool by Dr. Ure—Deductions from it—Analysis of New Orleans Cotton Seed and Wool—Analysis of Indian and American Cotton soils—Climate—Tables of Temperature—Pluviometrical Tables—Climate of Southern Maratha Country and of New Orleans—Native agriculture—Mr. Mercer's report—Drill husbandry—Ridging—Rotation of Crops—Agricultural implements—Statement regarding Native cultivation by the Cotton Committee—Mr. Mansfield's statement—Mr. Shaw's report—Comparative results of Dr. Burn's system—Opinions of Planters and others regarding the Native system.

No correct estimate can be formed of the position and prospects of Indian cotton without considering the nature of the soil and climate in which the staple is produced, and the character of the system upon which its culture is conducted.

With regard to the soils in which cotton is cultivated, Mr. Mercer made the following remarks in a report to Government :—"Throughout India the black soil holds the first rank. Its cotton is longer, stronger, finer, and more plentiful than that of the other kinds. In nearly all the cotton districts I have above named (Guzerat, Khandeish, Southern Maratha Country, and Berar) there seem to be three descriptions of soil chiefly devoted to this culture—

1*st.*—Pure black or *regur*.

2*nd.*—A brown soil, which seems to be the above, containing a portion of integrated laterite, as small reddish stones generally abound on its surface; and

3*rd.*—Black land not deep, and having a lime substratum, containing also a large quantity of lime nodules, *kunkur*, which gives it a greyish appearance.

"The first, as I have said, produces the best cotton. The brown is scarcely inferior, and I find it suits rather best for New Orleans cotton in this region (Dharwar). The grey is decidedly inferior, giving a harsher, shorter, weaker, and less plentiful crop than either of the others.

"Red soils, which are found in most of the cotton districts, are scarcely ever sown with cotton. I have seen a few patches of it, and the plants looked pretty well, but the general avoidance of this sort of soil by the natives seems to argue their conviction of its unsuitableness. This is certain, that red land

of sufficient fertility to produce cotton can, in the whole of this region, be devoted to the more valuable crops of rice, sugar-cane, beetle-nuts, &c.

"The superiority of the black and brown soils seems to be in their depth and adhesiveness, rendering them retentive of moisture. During the actual falling of the rains, the cotton on the grey soils looks nearly as well as that on the pure black and brown, but as soon as there occurs any cessation of these, its want of depth and consistency tells immediately, and both the size of the plant and the quality of its produce suffer. That this retentiveness of moisture is the cause of superiority, is proved by the fact that the best black soils produce inferior cotton in certain localities, and under certain circumstances, where they necessarily become deprived of adequate moisture." [1]

It will be remembered that Dr. Lush reported that at least one variety of cotton, the Pernambuco, which thrived in red, entirely failed in black soil. He observed, "The common black soil, when unmixed, is poisonous to Pernambuco seed, particularly if irrigated; but when the black soil is mixed with red sand, it succeeds very well." [2]

Mr. A. N. Shaw records his opinion in favour of red soil as follows:—

"I would submit, also, that it has almost become an established rule that cotton should be grown only on black soil; this, I believe, to be an error, and that the very best soil for the culture of cotton is a partially damp red soil."

Mr. D'Oyly, when Assistant Collector of Belgaum, in reporting the total failure of an experiment with exotic cotton grown in red soil, stated that the plants thrived so long as the rain lasted, but withered when it ceased, and he mentioned that "the roots were found to have penetrated but a short distance below the surface of the soil." He observed, "The red soil is too hard and impenetrable for cotton: it dries up quickly, and cakes after the rains. Cotton is nowhere in this collectorate, nor, I believe, in any part of the Presidency, grown in red soil,—a sufficient proof that it must be naturally unsuited to cotton." [3]

Dr. Wight states that he prefers "a deep, dark-coloured, light, almost sandy loam; and if it has been long out of cultivation, so much the better." Of the red soil he remarks, "I am informed that in some parts of the country, for example in the Vizagapatam district, the finest cotton crops, both as to quantity and quality, are raised on red soils, and the redder the better for the purpose." [4]

Dr. Ure states, "It may be remarked that the short-stapled wool is of a better quality when raised near the sea than at a great distance from it, and it thrives most luxuriantly in alluvial soils, a little impregnated with salt, as

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[1] Rev. Cons., vol liii. 1846, pages 150 and 151.
[2] Ibid, vol. xiv. 1834, page 188.
[3] Ibid, vol. xl. 1860, pages 165 and 166.
[4] Royle, Culture of Cotton, page 166.

in some of the districts of Louisiana. There the soils, which are deeply tinged with red, and well seasoned with salt, between the waters of the Arkansa and the Red River, give forth the most abundant crops of the best quality of that description of cotton." [1]

Dr. Ure carefully analysed clean Sea Island cotton wool, and found the following results :—

"1. *Matter soluble in water, sixty-four parts, consisting of—*	
Carbonate of potash	44·8
Muriate of potash	9·9
Sulphate of potash	9·3
"2. *Matter indissoluble in water—*	
Phosphate of lime	9·0
Carbonate of lime	10·6
Phosphate of magnesia	8·4
Peroxide of iron	3·0
Alumina, a trace, and loss	5·0
	100·0

He remarks, "The results of the preceding analysis seem to throw considerable light on the predilection of the cotton plant for the neighbourhood of the sea, which supplies plentifully the saline substances requisite to the perfect development and constitution of its wooly fruit. It may hence be inferred, that the compost or manure best fitted for cotton plantations should contain neutrosaline matter with alkoline calcareous and magnesian bases. The presence of magnesia deserves notice, as it indicates marine food. Here, as in many other examples, the vegetative powers of the roots seem to eliminate potash from the stone detritus of the soil, which replaces the soda in the sea salts, for otherwise we should have found salts with a basis of soda instead of potash salts, in the ashes of the cotton." [2]

Dr. Royle gives the following analysis of New Orleans cotton seed and wool, which he obtained from Mr. Landon, of Broach [3] :—

New Orleans Cotton Seed.

Phosphate of lime (with traces of magnesia)	61·34
Phosphate of potassa (traces of soda)	31·73
Sulphate of potassa	2·65
Silica	1·68
Carbonate of lime	0·47
Carbonate of magnesia	0·27
Chloride of potassium	0·25
Carbonate of potassa, Sulphate of lime, Sulphate of magnesia, Alumina and oxides of iron and manganese, and loss	1·63
	100·00

[1] Dr. Ure, Cotton Manufactures, vol. i. page 115. [2] Ibid, vol. i. pages 86 and 87.
[3] Royle, Culture of Cotton, pages 154 and 155.

New Orleans Cotton Wool.

Carbonate of potassa (with a trace of soda)	44·29
Phosphate of lime (with a trace of magnesia)	25·34
Carbonate of lime	8·97
Carbonate of magnesia	6·75
Silica	4·12
Sulphate of potassa	2·90
Alumina	1·40
Chloride of potassium, Chloride of magnesium, Sulphate of lime, Phosphate of potassa, Oxide of iron (a trace) — and loss	6·23
	100·00

The following is an analysis of various cotton soils:—

Cotton Soils.	Water.	Organic matter.	Chloride of Sodium.	Sulphate of Lime.	Phosphate of Lime.	Carbonate of Lime.	Carbonate of Magnesia.	Peroxide of Iron.	Alumina.	Potash.	Silica.	
1. *Regur.*—Black cotton soil....	4·30		..	..	..	16·000	10·200	1·000	20·300	..	48·200	100·00
2. Black soil of the Deccan	11·400	2·500	0·068	0·074	0·016	9·250	Trace.	5·680	14·320	0·014	56·830	100·160
3. Surface soil of trappian rock.	18·000	0·450	0·083	0·007	0·027	0·450	0·013	15·200	16·500	0 085	48·000	98·815
4. Soil from Jacobabad, Sind, fair type of soil from the plain of the Indus	4·130	0·040	0·003	0·005	0·084	10·228	0·034	7·200	16·400	0·110	61·670	99·904
5. Soil from Hydrabad, Sind ..	2·500	Merest trace.	0·006	0·064	0·008	21·810	0·113	2·240	15·080	0·103	57·415	99·439
6. Red soil of India	Saline. 0·200	0·150	..	..	..	19·500	0·150	2·880	2·000	..	74·000	98·880
7. Black soil, Bundlecund	Saline. 0·330	2·000	..	..	..	11·900	Trace.	Protoxid of Iron. 7·750	3·100	..	74·000	99.000
8. Sea Island, like dark-grey sand mixed with charcoal-looking dust	Saline. 0·200	3·200	..	..	..	2·750	..	Protnxid of Iron. 1·000	0·200	..	92·000	99·350
9. Ditto uniform brown colour.	Saline. 0·600	5·000	..	..	..	4·000	..	Protoxi l of Iron. 1·300	0·630	..	88·200	99·550
10. Georgia Upland soil, light-fawn colour	..	4·700	..	..	..	2·900	..	Protoxid of Iron. 1·250	1·000	..	89·350	99·200

No. 1, Ansted; Nos. 2, 3, 4, 5, Dr. Forbes Watson, Growth of Cotton in India, pages 2 and 3; Nos. 6, 7, 8, 9, 10, Royle, pages 159—163.

The difference of opinion with regard to the best soils for cotton has probably, in part, arisen from the difference in climate. The soil, retentive of moisture, may suit a dry climate, while the lighter and more sandy may be more beneficial in a wet one. Mr. Mercer observed, "The Madras Presidency in its eastern and southern districts, and the North-Western Provinces of India, furnish instances of black plains under cotton cultivation producing inferior crops. The shortness and lightness of the north-east in contrast with the south-west monsoon is known to all. The greater part of the Madras Presidency is subject to the north-east monsoon, beginning in the

latter end of September and ending 1st December; consequently, nearly three-fourths of the year are a season of all but uninterrupted drought, the light showers which fall in March, and also after the setting in of the south-west monsoon, serving barely to moisten the surface of the ground, which immediately dries under an intense mid-summer sun. Here, then, is a district in which, from the shortness of the monsoon, and the unfavourableness of the season in which it falls, moisture is not abundant in any kind of soil, and the consequence is, as above stated, black soils produce short and coarse native cotton. Again, localities which receive the south-west monsoon suffer in the same respect from the evil influences of neighbourhood, such are the western provinces of India in their proximity to the rocky and sandy deserts on the west, from whence blow almost continually dry, and part of the time, scorching winds, which not only parch the earth, but almost clear the foliage. In comparison with the above, what is the climate of the provinces already spoken of as yielding the best cotton—to wit, Broach, Surat, Berar, Nagpore, and the Southern Maratha Country? All are subject to the south-west monsoon, followed by a season of heavy night dews, which only terminate at a time of the year when the sun is in its southern solstice and its drying effects must, therefore, be much less than that to which the soil of Madras is subjected by the sun of April, May, June, and July. The parts which grow the best cotton thus experience nine months of comparatively cool and moist climate, while the Madras country suffers from nine months of drought and heat, and, though enjoying three months of cool weather, has excessively dry winds, which blow during this time, and which more than make up the difference.

"Climate thus seems to be the prime cause of the great difference in the cotton products of Indian soils." [1]

The following tables, prepared by Dr. Birdwood, who has kindly placed them at my disposal for this work, exhibit the mean maxima and minima degrees of temperature (Fahrenheit), and the rain-fall in each month, at the principal places in Western India. To these are added a statement of the temperature of some of the American cotton districts:—

[*Statement*

[1] Revenue Consultations, vol. lii. 1846, pages 151 and 152.

MINISTRY OF CULTURE · GOVERNMENT OF INDIA

GSL

Statement showing the mean Maxima and Minima of the Thermometer at the principal

extending from January A.D. 1852

CALCULATED FROM OBSERVATIONS

	January.		February.		March.		April.		May.		June.	
	Mean.		Mean.		Mean.		Mean.		Mean.		Mean.	
	Maxima	Minima	Maxima	Minima	Maxima	Minima	Maxima	Minima	Maxima	Minima	Maxima	Minima
Ahmedabad	82·00	56·00	88·30	60·80	97·30	68·30	102·10	77·40	105·10	83·20	105·10	82·60
Ahmednuggur ..	79·90	54·60	87·00	59·50	94·20	65·60	99·20	72·60	101·80	76·40	97·10	75·00
Baroda	A 75·00	A 55·37	A 79·00	A 60·62	A 86·87	A 67·50	A 94·37	A 75·12	A 95·50	A 82·25	A 92·87	A 82·00
Belgaum	81·60	67·50	86·40	70·10	88·50	72·20	91·20	75·00	89·90	75·50	84·00	75·00
Bhooj, Cutch ..	C 81·28	C 51·28	D 89·12	D 55·37	D 98·12	D 63·25	D102·25	D 73·87	D106·00	D 73·37	E104·66	E 80·66
Broach	88·00	50·90	93·30	67·50	101·20	76·00	104·90	83·60	105·10	86·60	100·30	82·30
Dharwar	85·60	61·70	90·50	65·30	94·40	66·50	97·60	70·10	94·90	70·40	87·40	69·90
Kaira	85·20	54·60	87·00	57·30	97·60	69·00	102·80	73·70	104·10	81·80	101·70	80·20
Kattiawar	F 85·00	F 42·66	F 90·33	F 47·44	F 98·22	F 53·44	F102·88	F 63·33	F105·33	F 70·55	104·20	74·20
Kolapoor	80·70	61·10	86·70	65·60	91·30	69·10	93·80	73·20	93·50	74·60	87·50	73·30
Mahee Kanta ..	81·40	58·40	90·50	69·00	96·20	74·10	100·50	78·20	104·20	83·20	101·90	82·40
Pahlunpoor	H 72·00	H 60·50	H 71·40	H 61·50	H 87·25	H 72·10	H 89·25	H 76·50	H 99·50	H 83·25	H102·50	H 85·60
Poona	81·80	57·60	86·60	66·20	92·50	70·50	95·90	74·00	96·20	77·80	89·40	73·30
Rutnagherry	82·60	69·90	83·60	72·20	86·70	72·80	K 89·33	K 79·22	K 89·44	K 80·22	J 89·00	J 77·87
Sattara	84·20	58·30	87·60	61·20	92·90	68·50	96·30	70·40	95·10	71·40	89·40	70·90
Sawunt Warre..	84·80	67·90	86·80	68·90	88·00	73·60	92·20	76·08	89·60	78·90	88·10	76·80
Sholapore	80·70	61·10	86·70	65·60	91·30	69·10	93·80	73·20	93·50	74·60	87·50	73·30
Surat	87·70	60·70	91·00	64·30	97·20	70·70	99·20	76·80	99·70	80·00	93·80	79·60
Tanna	86·60	60·60	92·30	62·40	99·00	66·40	M 98·88	M 77·55	98·50	80·20	94·30	77·60
Dhoolia (Khandeish)	88·40	52·60	91·30	56·50	90·10	67·40	103·10	75·00	105·60	80·70	101·90	75·90

Cities and Stations of the Government of Bombay, calculated from Observations to September A.D. 1861 *inclusive.*

DURING TEN YEARS.						CALCULATED FROM OBSERVATIONS DURING NINE YEARS.						REMARKS.
July.		August.		September.		October.		November.		December.		
Mean.		Mean.		Mean.		Mean.		Mean.		Mean.		
Maxima	Minima	Maxima	Manima	Maxima	Minima	Maxima	Minima	Maxima	Minima	Maxima	Minima	
96·50	79·50	91·50	78·90	92·70	78·40	93·44	70·88	89·77	64·33	82·88	58·11	
90·90	74·20	88·30	73·40	86·80	71·60	87·22	65·44	84·66	61·00	80·33	57·00	
A 86·75	A 79·75	A 82·87	A 76·37	A 84·62	A 75·87	B 85·42	B 72·42	B 79·71	B 61·00	B 74·00	B 57·00	A For eight years only.
77·40	71·40	78·60	71·90	79·90	71·80	80·88	71·33	81·33	67·22	79·44	65·77	B For seven years only.
B 96·88	B 80·33	D 91·37	D 77·25	D 94·12	D 75·62	D 85·75	D 69·50	D 91·50	D 60·12	D 81·50	D 55·50	C For seven years only.
92·80	73·70	91·00	79·20	92·90	78·70	93·33	79·44	89·88	70·88	85·66	65·44	D For eight years only.
79·20	69·30	80·60	68·50	82·70	68·30	84·22	67·77	84·44	62·88	82·77	61·88	E For nine years only.
94·70	77·30	88·90	77·70	93·50	75·90	81·66	71·66	88·22	65·55	84·88	57·44	
95·10	73·50	90·50	72·30	92·90	72·00	94·66	63·44	G 92·37	G 51·25	G 88·50	G 44·87	F For nine years only.
80·90	72·00	79·20	72·10	82·50	71·80	82·88	71·11	82·66	66·00	80·66	62·00	G For eight years only.
84·20	79·20	89·00	77·70	90·60	77·50	90·00	72·66	86·00	67·44	82·88	60·44	
H 98·00	H 81·75	H 87·75	H 70·00	H 80·00	H 70·75	I 89·00	I 79·33	I 84·00	I 72·00	I 76·00	I 68·33	H For four years only.
82·00	73·10	79·90	71·90	82·80	70·50	85·55	68·00	84·22	63·22	82·22	58·44	I For three years only.
K 83·33	K 76·77	K 83·33	K 75·00	K 83·44	K 77·00	85·55	75·00	J 85·00	J 73·75	J 84·87	J 71·87	J For eight years only.
81·00	69·90	79·60	69·10	83·20	67·10	85·22	64·44	84·44	60·77	83·11	57·77	K For nine years only.
80·90	75·80	80·70	75·40	L 82·33	L 75·33	84·22	74·55	83·77	70·55	83·55	69·11	L For nine years only.
80·90	72·00	79·20	72·10	82·50	71·80	82·88	71·11	82·66	66·00	80·66	62·00	
89·20	78·20	87·30	78·40	89·50	77·00	92·00	73·44	89·55	66·55	87·11	63·33	
82·70	76·10	84·20	75·80	85·30	75·10	90·44	71·22	89·11	66·22	85·77	61·55	M For nine years only.
91·80	74·70	90·00	74·10	89·80	73·40	90·40	66·55	87·33	59·44	83·77	54·44	

Statement showing the mean monthly rain-fall at the principal cities and stations of the Government of Bombay, calculated from returns extending from January A.D. 1852 *to September* A.D. 1861 *inclusive.*

Talookas.	Average of Ten Years.									Average of Nine Years.			Mean annual fall for nine years.
	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inchs.	Inches.
Ahmedabad	0·11A	.. A	.. A	.. A	0·13A	6·03A	16·20A	8·32A	4·04A	0·20B	0·04B	.. B	37·35B
Ahmednuggur	0·17	0·06	0·06	0·15	1·97	5·05	2·66	3·74	6·38	4·33	0·33	0·80	24·30
Baroda	.. C	0·09C	.. C	.. C	.. C	6·87C	15·28C	12·78C	5·60C	0·18D	0·01D	0·03D	41·67D
Belgaum	0·05	..	0·46	1·37	4·59	6·36	15·55	8·67	3·54	4·65	1·13	0·04	46·62
Bhooj, Cutch	0·02	..	..	0·06	0·04	0·96	4·47	4·96	2·80	0·29	0·06	..	14·23
Bombay Observatory, Colaba	..	..	..	0·02	0·53	20·44	21·56	10·72	9·62	1·93	0·21	0·13	63·08
Fort	..	..	..	..	0·55	23·87	24·31	11·96	9·74	1·33	..	..	48·76E
Byculla	..	..	..	..	0·78F	24·31F	27·89F	16·08F	9·47F	..	..	..	79·13F
Broach	0·01	..	0·26	0·04	0·01	8·24	14·97	8·33	7·03	1·12	0·02	0·16	41·60
Dharwar	0·06	0·03	0·14	1·19	5·28	4·19	6·71	4·45	3·07	6·02	0·78	0·10	31·39
Kaira	..	..	..	..	0·46	4·72	15·88	7·15	4·82	0·24	..	..	33·78
Kattiawar	..	..	..	..	..	3·89	8·34	6·82	5·86	..	..	..	24·00
Kolapoor	0·04	0·10	0·72	1·66	3·14	6·42	15·38	6·39	4·72	5·29	0·78	0·12	44·72
Mahee Kanta	..	..	..	..	0·09	4·08	12·18	6·59	2·07	0·31	0·17	..	27·82
Poona	..	..	..	0·13	0·26	5·09	8·42	3·92	4·64	3·90	0·27	..	24·85
Sattara	0·03	..	0·07	0·69	2·87	7·02	16·41	7·85	3·52	4·90	0·58	0·42	43 18
Sawunt Warree	..	..	..	0·26	6·82	38·06	49·29	25·04	11·16	7·32	0·21	..	138·00
Sholapore	0·09	0·05	0·27	1·18	2·20	4·92	4·67	4·66	6·42	4·23	1·29	0·53	30·46
Surat	..	..	..	..	0·05	9·43	14·82	7·20	5·70	0·76	0·02	0·14	34·15
Tanna	..	..	..	0·03	0·58	26·65	35·65	21·01	15·13	2·35	0·49	0·02	98·27
Dhoolia (Khandeish)	0·04	0·05	0·08	0·13	0·51	5·93	4·01	2·79	3·81	1·58	0·14	0·19	18·69

A For nine years only.
B For eight years only.
C For eight years only.
D For seven years only.
E S. W. Monsoon only' and for ten years.
F S. W. Monsoon only, and for six years only.

Mean Temperature.

	Lat. N.	Lon. W.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Mean of year.
Galveston, T.	29°18′	95°10′	60·30	62·50	75·00	73·20	83·50	86·50	88·20	88·50	87·10	64·20	60·10	59·40	74·03
New Orleans, L.	29 58	90 70	56·75	58·39	66·58	72·41	77·26	81·18	82·22	82·12	79·42	69·71	58·71	52·26	69·80
Mobile, A.	30 12	87 59	56·46	57·37	65·64	70·00	76·36	82·17	82·41	82·73	78·94	69·97	61·50	55·50	69·92
Baton Rouge, L.	30 26	91 18	52·37	51·86	61·55	68·99	76·58	82·90	80·10	82·40	76·58	66·84	62·47	55·89	68·15
Natchez	31 34	91 25	50 13	50·89	62·20	69·98	72·72	80·62	81·78	80·13	74·99	64·58	55·23	49·09	66·10
St. Augustine, F.	29 50	81 27	60·73	64·97	67·55	70·06	76·89	81·41	82·81	82·67	80·16	73·83	63·55	60·92	72·13
Savannah, G.	32 50	81 10	41·22	57·83	53·34	59·23	70·51	81·35	82·56	82·48	73·54	64·87	59·52	49·09	64·63
Charleston, C.	32 47	79 57	49·61	52·80	58·34	63·20	75·19	78·85	80·70	80·15	74·30	66·70	58·60	51·80	65·91
Augusta	33 28	81 54	45·69	47·63	53·66	62·34	69·38	77·72	79·47	75·95	72·96	60·35	54·23	43·45	61·90

The accompanying diagrams, prepared from these statements, and contrasting the climate of the Bombay Presidency with that of South America, may enable some opinion to be formed, at a glance, why the cultivation of American cotton has not been more successful in India.

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Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain-fall during each month at **BROACH**; also the Mean Temperature at **NEW ORLEANS, L.**

Prepared by W.R.C.

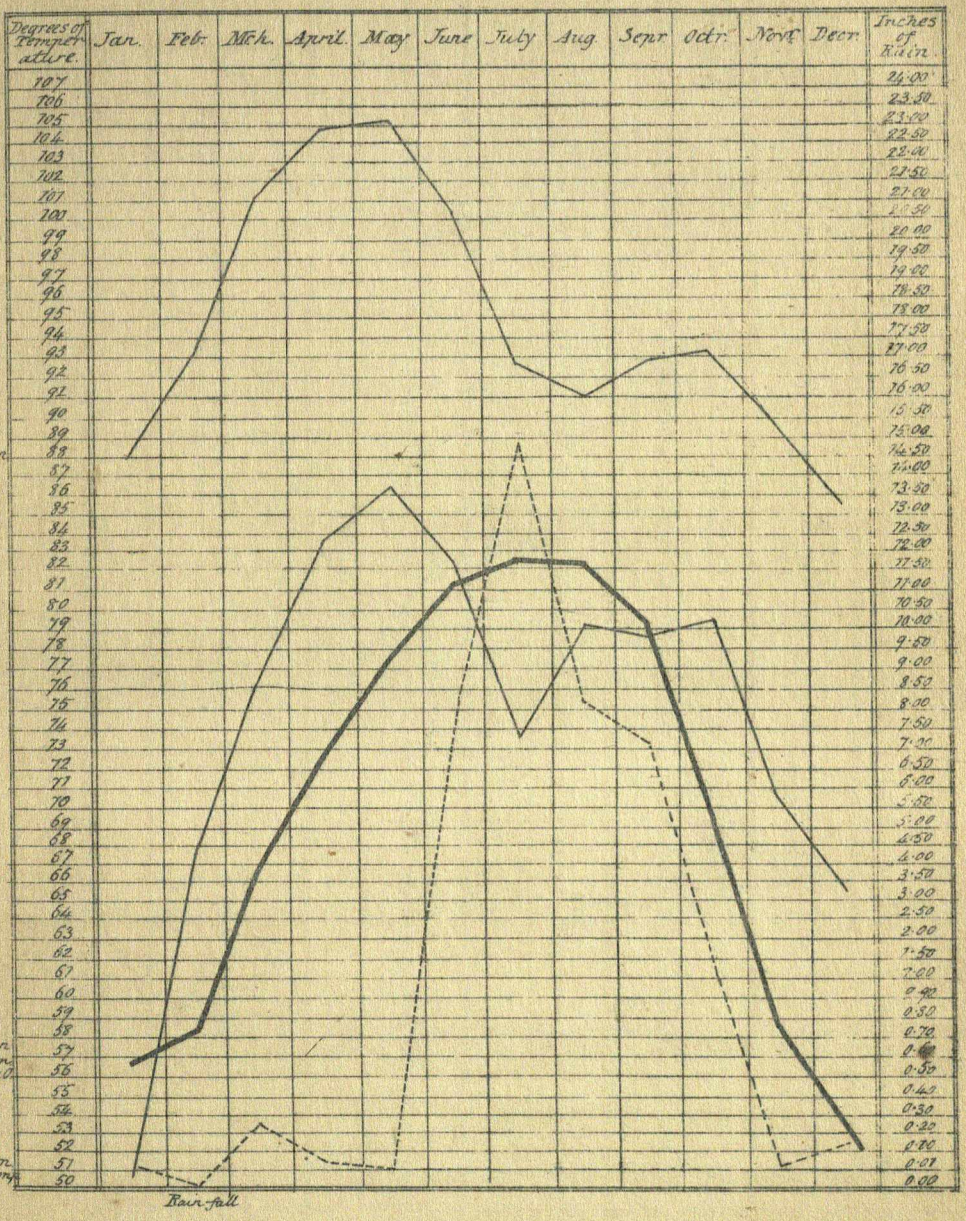

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Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain-fall during each month at SURAT, also the Mean Temperature at NEW ORLEANS, L.

Prepared by W.R.C.

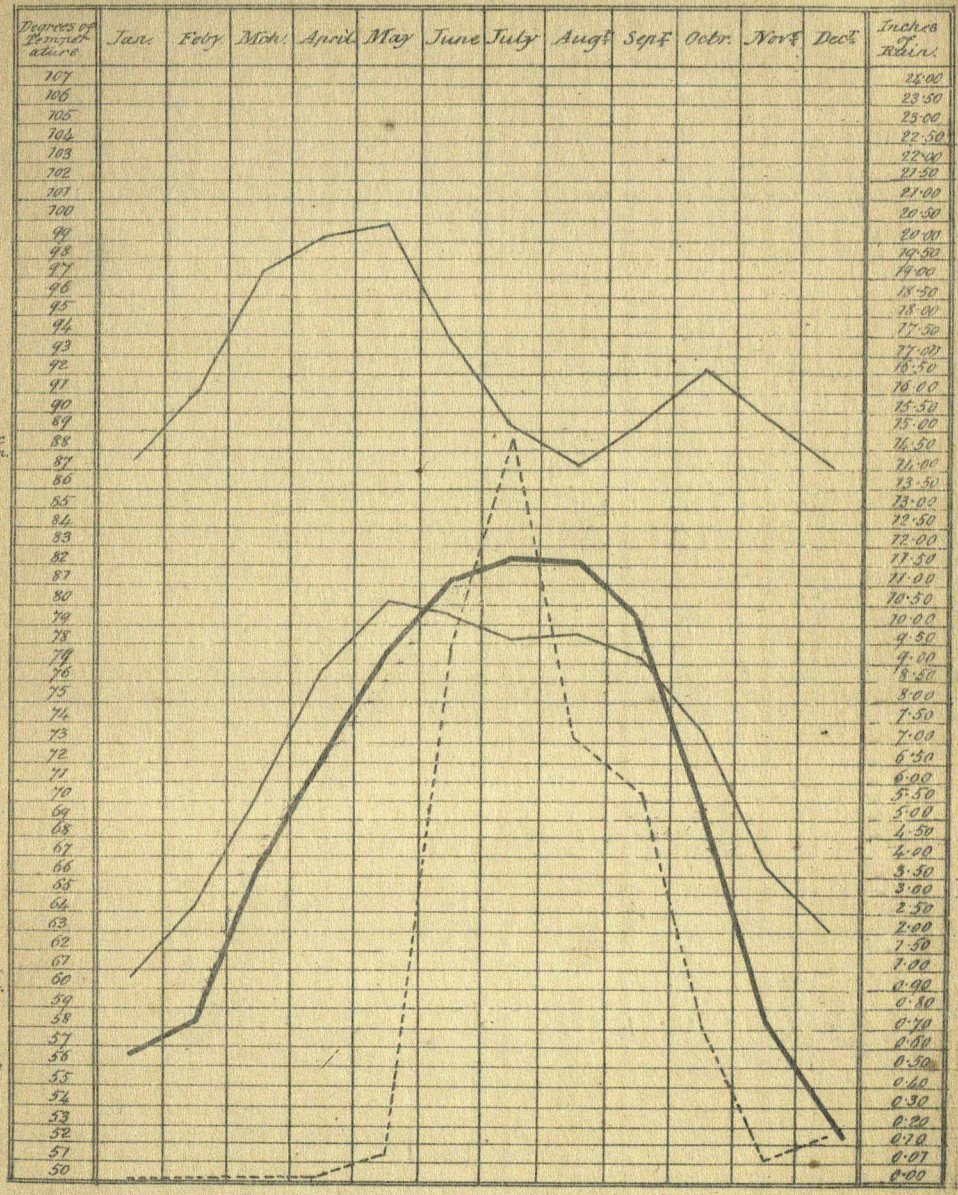

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Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain-fall during each month at AHMEDABAD; also the Mean Temperature at NEW ORLEANS, L.

Prepared by W.R.C.

Degrees of Temperature	Jan.	Feby.	Mch.	April	May	June	July	Augt.	Sept.	Octr.	Novr.	Decr.	Inches of Rain
107													24·00
106													23·50
105													23·00
104													22·50
103													22·00
102													21·50
101													21·00
100													20·50
99													20·00
98													19·50
97													19·00
96													18·50
95													18·00
94													17·50
93													17·00
92													16·50
91													16·00
90													15·50
89													15·00
88													14·50
87													14·00
86													13·50
85													13·00
84													12·50
83													12·00
Max. Temp. 82													11·50
81													11·00
80													10·50
79													10·00
78													9·50
77													9·00
76													8·50
75													8·00
74													7·50
73													7·00
72													6·50
71													6·00
70													5·50
69													5·00
68													4·50
67													4·00
66													3·50
65													3·00
64													2·50
63													2·00
62													1·50
61													1·00
60													0·90
59													0·80
58													0·70 Min. Temp.
Temp. New O. 57													0·60
56													0·50
55													0·40
54													0·30
53													0·20
Rain fall 52													0·10
51													0·01
50													0·00

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Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain fall during each month at KAIRA; also the Mean Temperature at NEW ORLEANS, L.

Prepared by W. R. C

Degrees of Temperature	Jan.	Febr.	Mch.	April	May	June	July	Augt.	Sept.	Octr.	Novr.	Decr.	Inches of Rain.
107													24·00
106													23·50
105													23·00
104													22·50
103													22·00
102													21·50
101													21·00
100													20·50
99													20·00
98													19·50
97													19·00
96													18·50
95													18·00
94													17·50
93													17·00
92													16·50
91													16·00
90													15·50
89													15·00
88													14·50
87													14·00
Max. Temp. 86													13·50
85													13·00
84													12·50
83													12·00
82													11·50
81													11·00
80													10·50
79													10·00
78													9·50
77													9·00
76													8·50
75													8·00
74													7·50
73													7·00
72													6·50
71													6·00
70													5·50
69													5·00
68													4·50
67													4·00
66													3·50
65													3·00
64													2·50
63													2·00
62													1·50
61													1·00
60													0·90
59													0·80
Mean Temp. New O. 58													0·70
57													0·60
56													0·50
Min. Temp. 55													0·40
54													0·30
53													0·20
52													0·10
Rain fall 51													0·01
50													0·00

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Diagram showing the Mean Maxima and Minima degrees of Temperature _____ and the Rain-fall _____ during each month, at KAT TIA WAR; also the Mean Temperature at NEW ORLEANS. L. _____

Prepared by W.R.C.

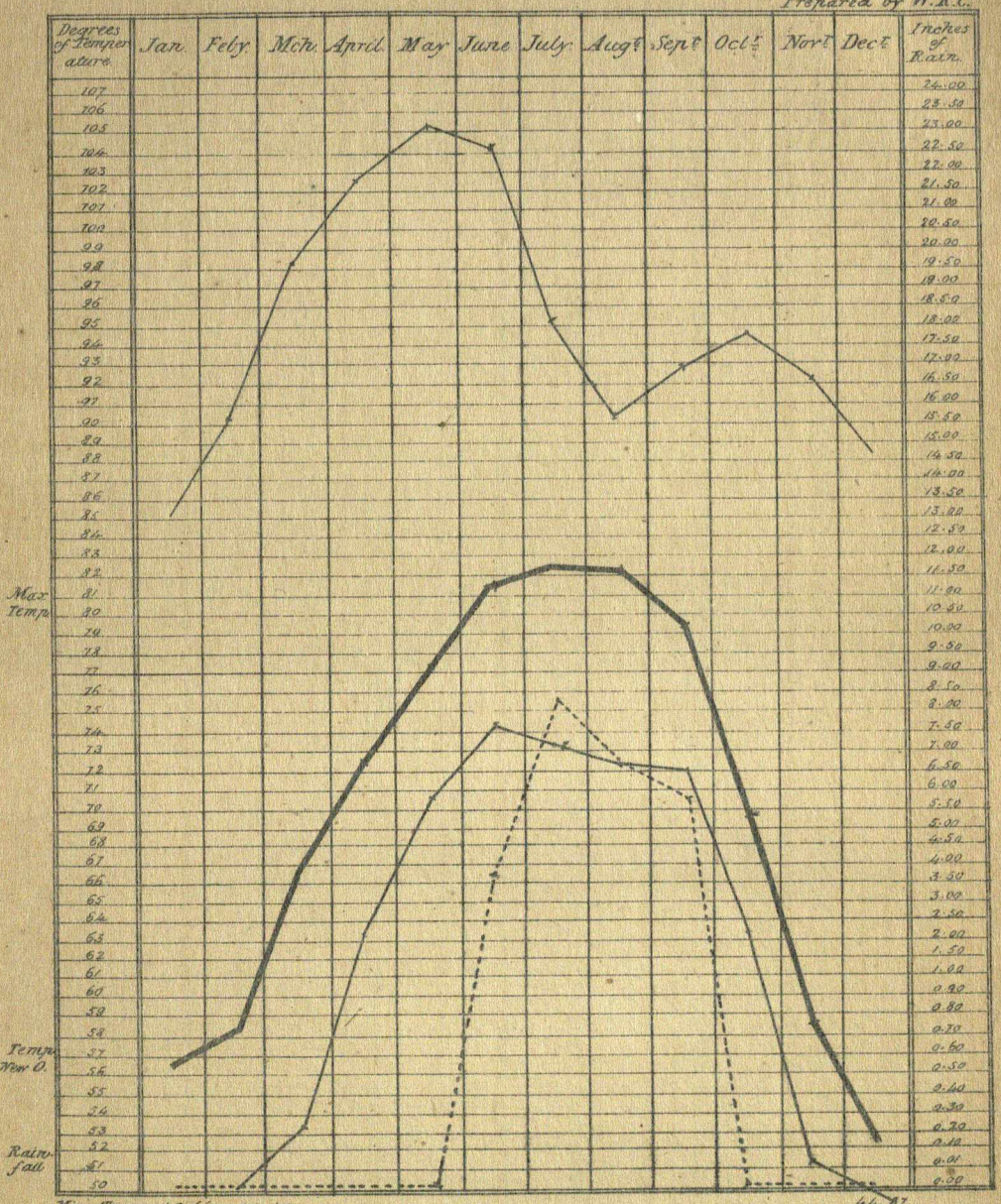

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Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain-fall during each month at BHOOJ, (KUTCH),

Also the Mean Temperature at NEW ORLEANS, L.

Prepared by W. H. C.

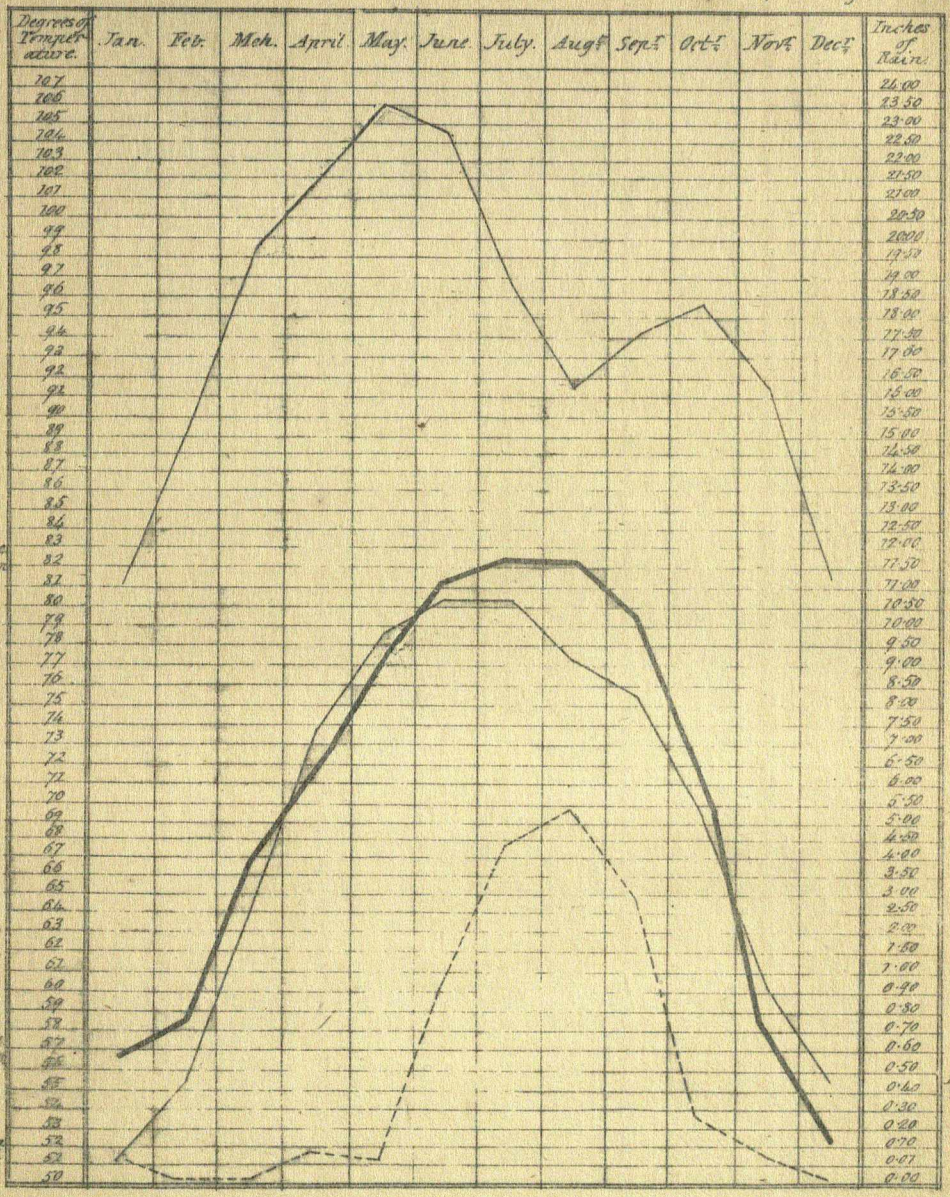

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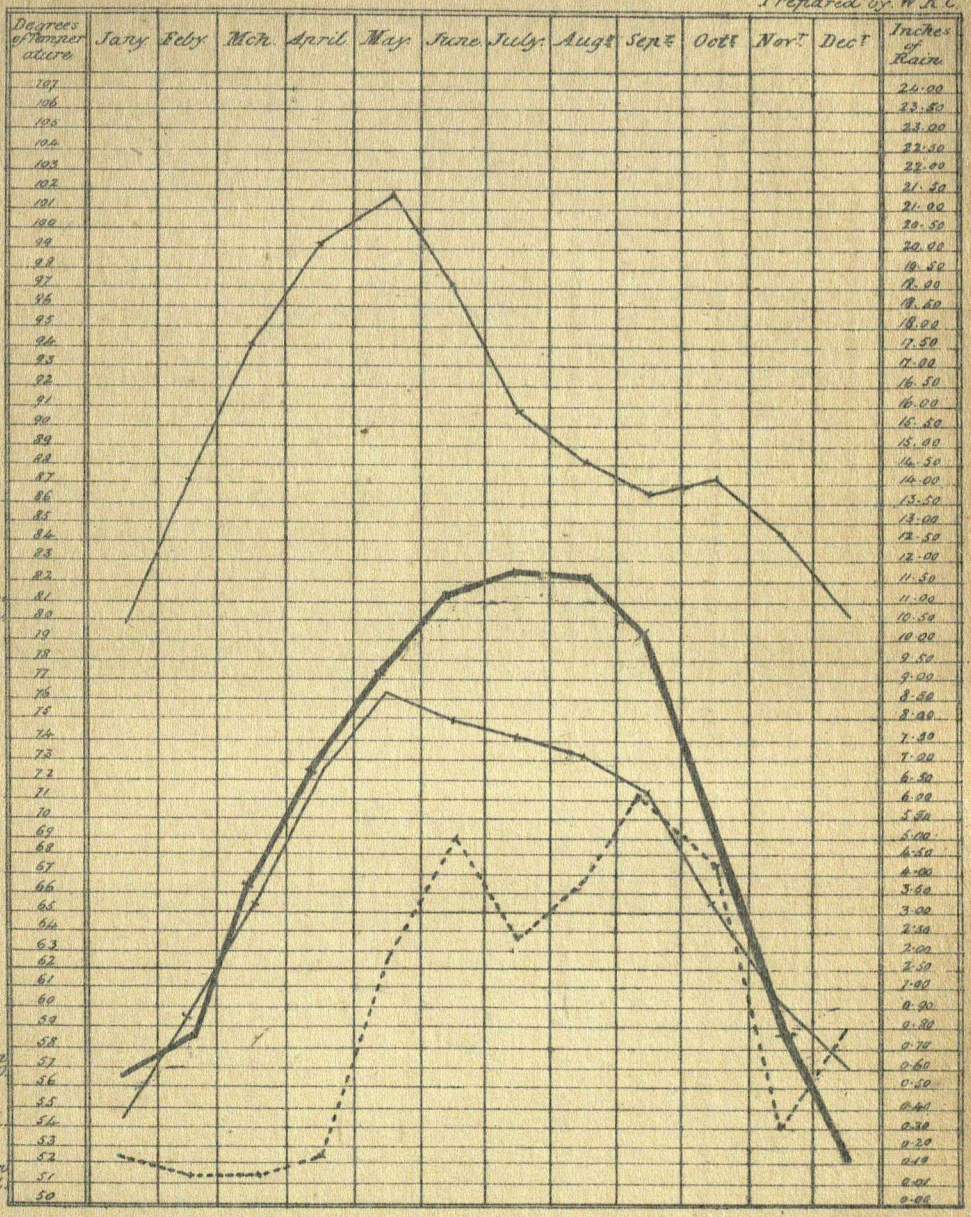
Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain fall during each month at AHMEDNUGGER, also the Mean Temperature at NEW ORLEANS.L.

Prepared by W.R.C.



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GSL

Diagram showing the Mean Maxima and Minima degrees of Temperature _____ and the Rain-fall _____ during each month at SATTARA; also the Mean Temperature at NEW ORLEANS, L. _____

Prepared by W.K.C.

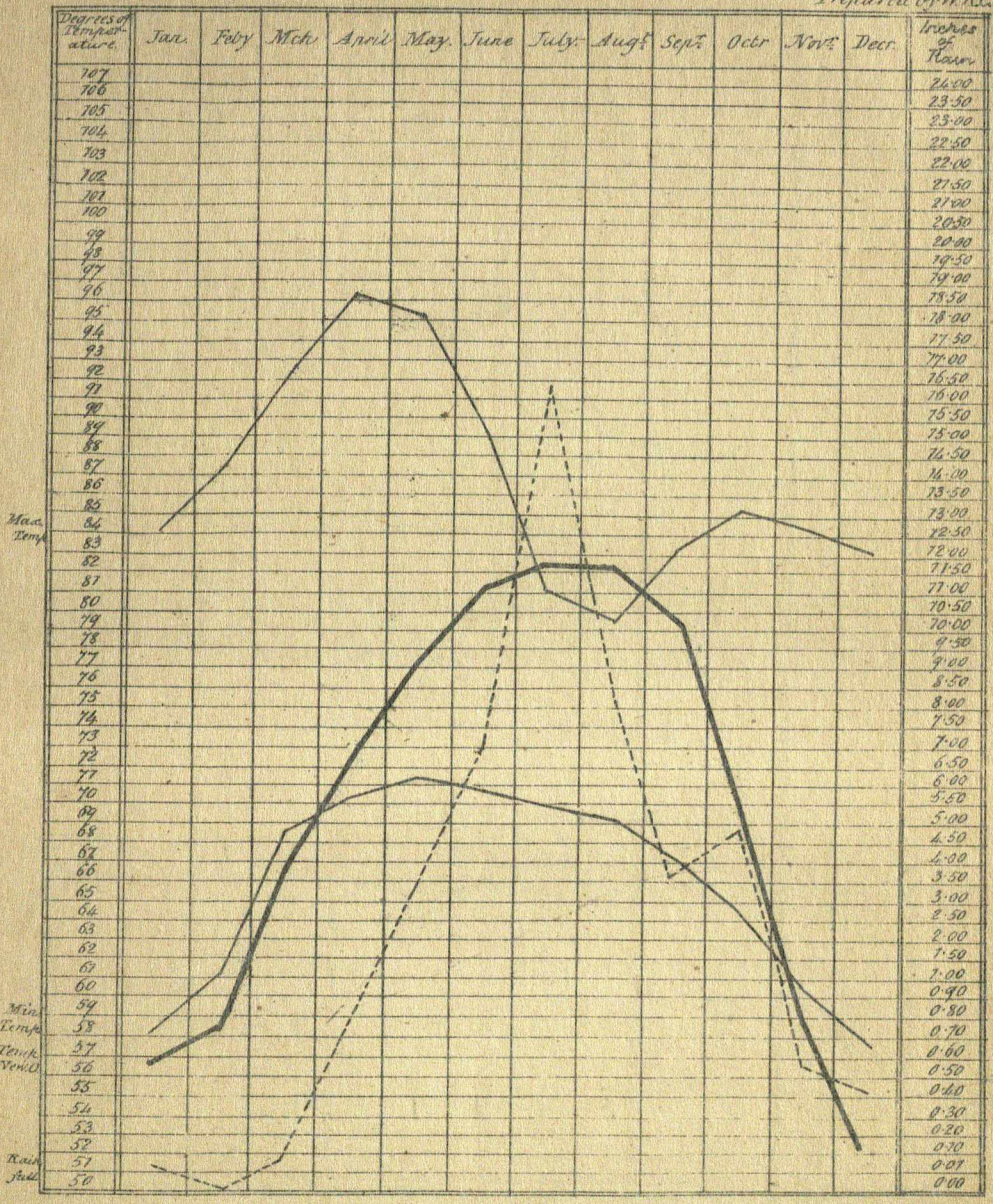

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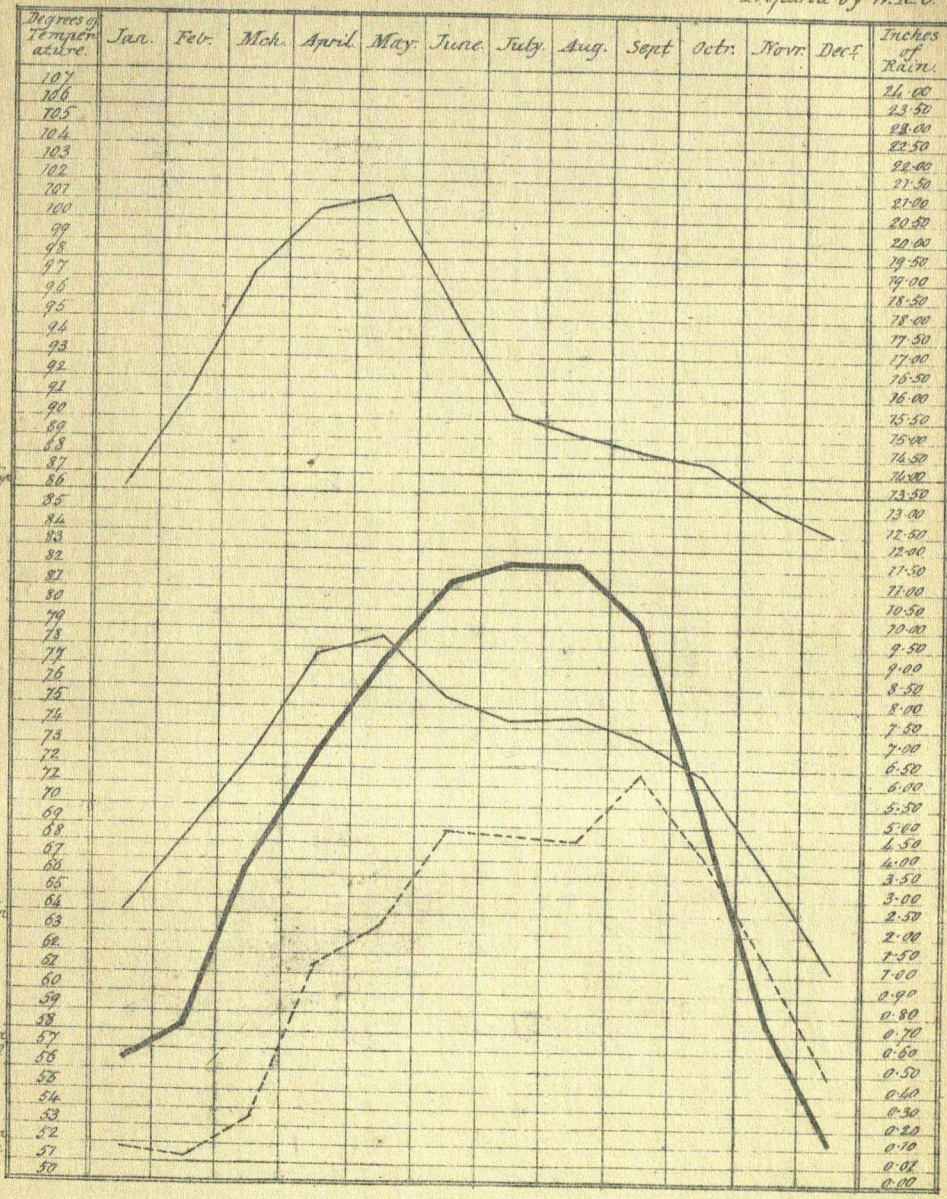
Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain fall during each month at SHOLAPORE; also the Mean Temperature at NEW ORLEANS, L.

Prepared by W.R.C.



MINISTRY OF CULTURE · GOVERNMENT OF INDIA

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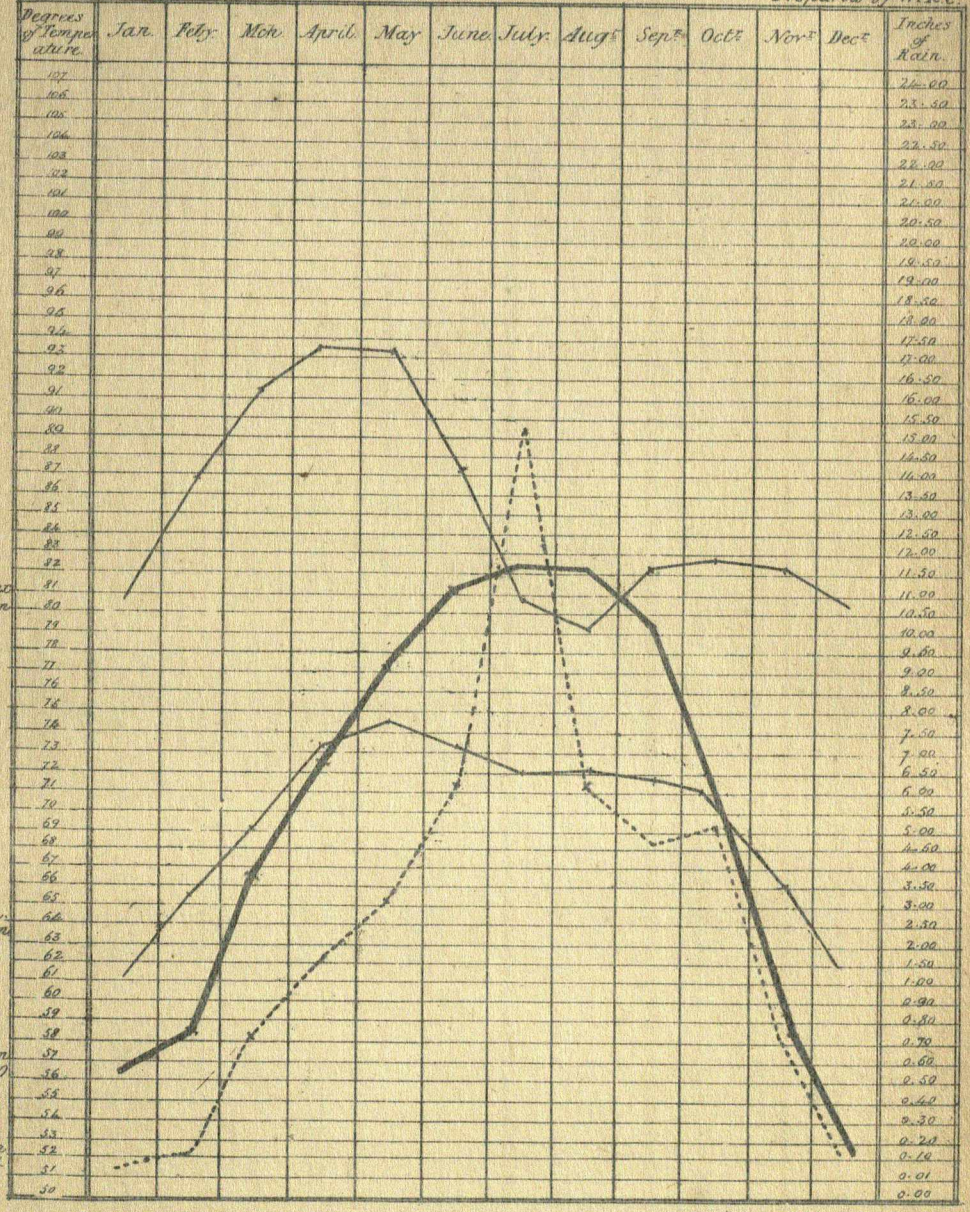
Diagram showing the Mean Maxima and Minima degrees of Temperature
and the Rain-fall during each month at **KOLAPORE;**
also the Mean Temperature at **NEW ORLEANS.L.**

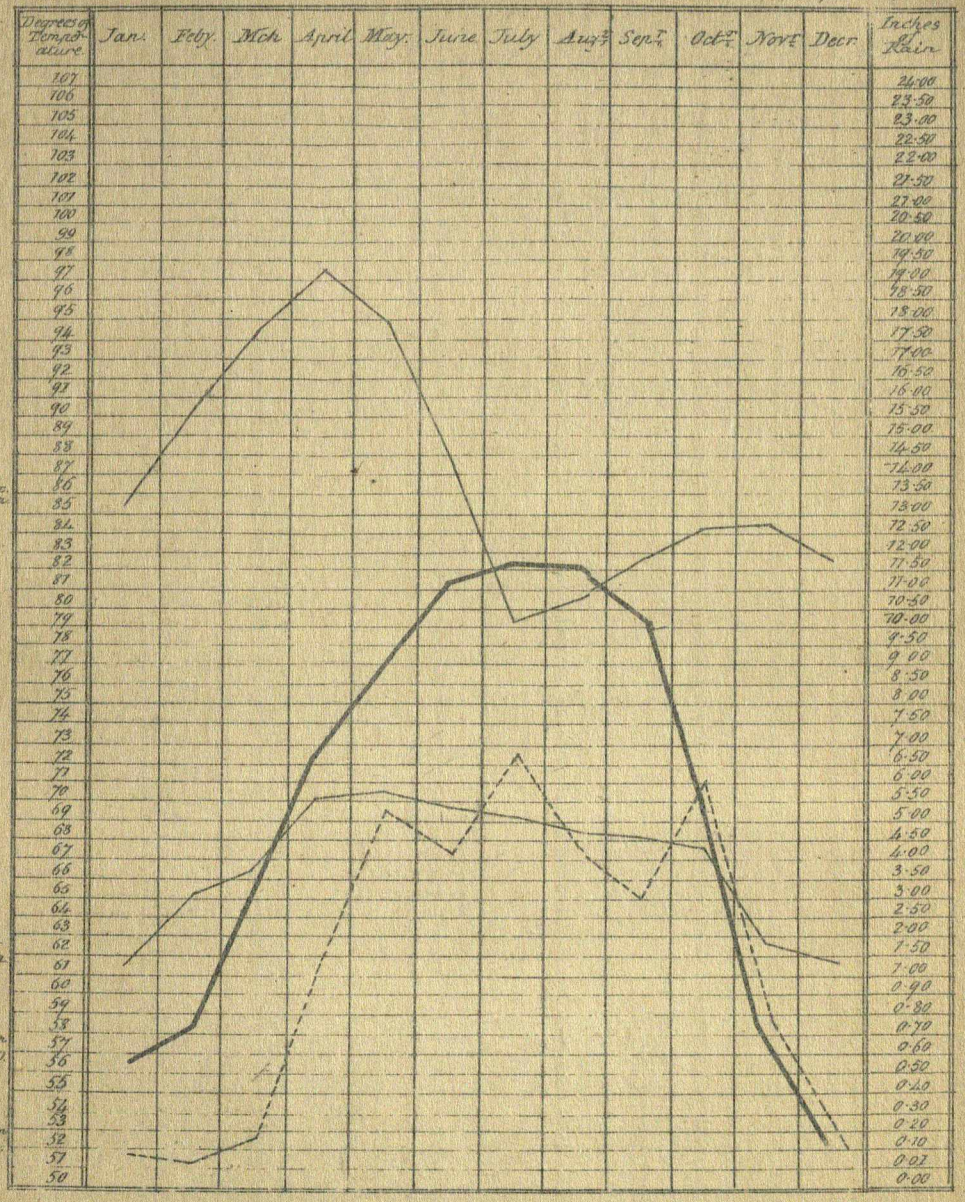
Prepared by W.R.C.



MINISTRY OF CULTURE · GOVERNMENT OF INDIA · CSL

Diagram showing the Mean Maxima and Minima degrees of Temperature and the Rain-fall during each month at DHARWAR; also the Mean Temperature at NEW ORLEANS, L.

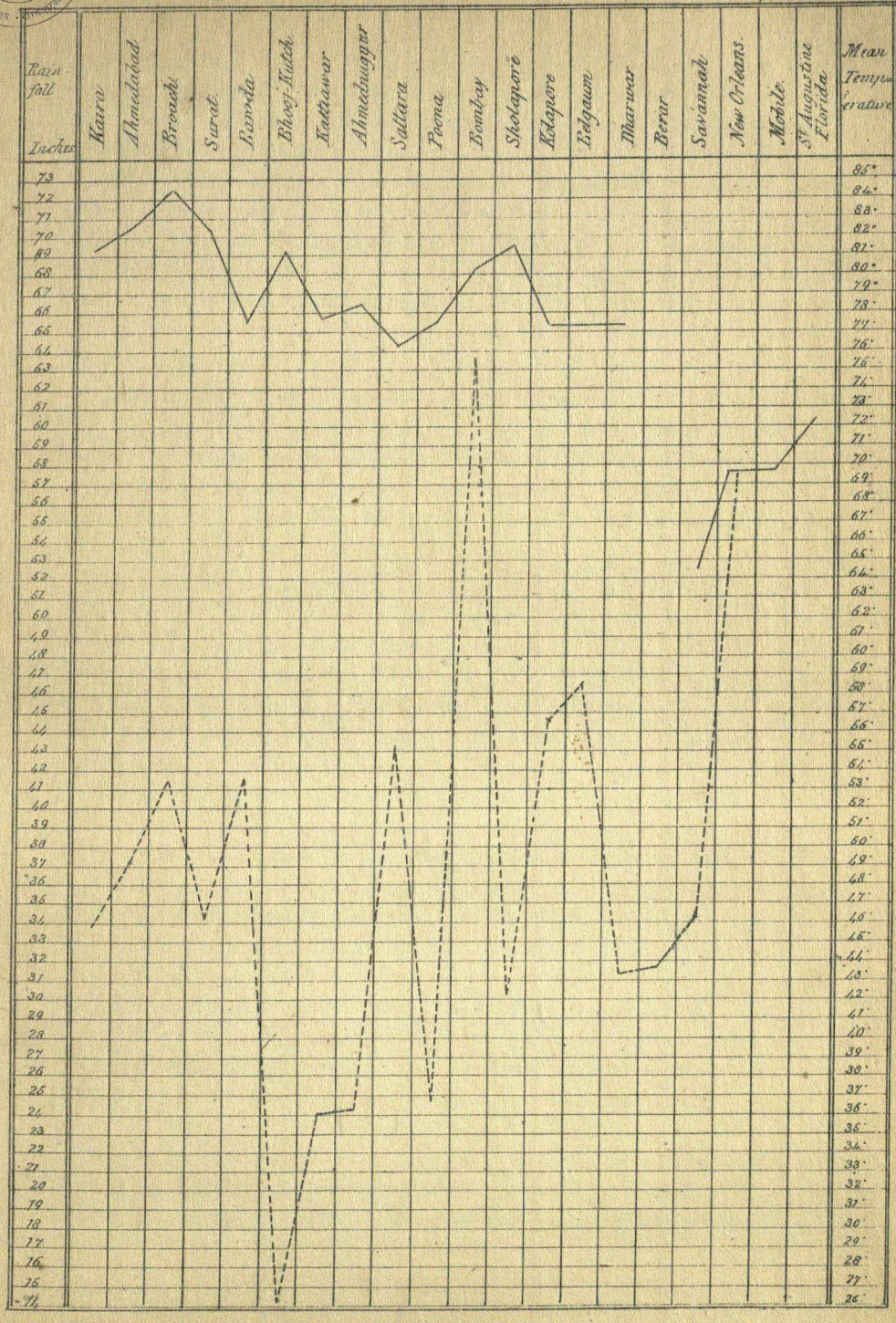
Prepared by W.R.C.



MINISTRY OF CULTURE · GOVERNMENT OF INDIA

---------- during the year, at various places in WESTERN INDIA and the UNITED STATES

Prepared by W. P. C.



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It will be observed from the foregoing tables that Mr. Shaw is fully supported in his assertion "that, perhaps, the climate of no part of Western India approaches so near the climate of the cotton districts of the United States as the Southern Maratha Country."

It has not been possible to obtain data for the monthly rain-fall at New Orleans, but the following is an account of its climate extracted from Dr. Stark's report on the vital statistics of New Orleans, in the *Edinburgh Medical and Surgical Journal*, January 1851:—"The daily range of temperature is small in the summer months, being from 5 to 8 degrees daily, and in the winter and spring months from 8 to 12 degrees daily. On very rare occasions the daily range has been observed so high as 15 degrees.

"The annual fall of rain averages from 55 to 60 inches. July is *par excellence* the rainy month, the fall averaging 15 or 16 inches during that month. October is the next most rainy month; then June. March is the driest month of the year, the monthly fall of rain not in general exceeding two inches, sometimes being considerably below that amount. The average number of rainy days is 59 or 60; of fair days 200."

In his report already quoted, Mr. Mercer made the following remarks regarding the state of native cotton culture:—"A better mode of culture prevails in the countries where climate is most favourable. This is probably owing to the better return from the crops inducing efforts at improvement; but, however that may be, in all the regions above named (Broach, Surat, Khandeish, Southern Maratha Country, and Berar), I find an approach to the American mode of culture, by sowing in drills, and at regular intervals, while in Madras, the North-Western Provinces, and almost every other part of India where cotton is grown, the broad-cast system alone is used. The first, by allowing the crops to be kept from grass and weeds, by means of the ploughs or cultivator, and, the ground about the plants being thoroughly and constantly stirred, gives an advantage both in regard to cheapness and the improvement of the plants themselves that the other never can possess, and is, indeed, the chief excellency of the American mode of culture, and the only one of its features which has been found not to need much modification. Ridging is a part of the American mode, intended simply to prevent water from lying upon the roots of the plants; and the question of its adoption must be decided by the flatness and adhesiveness of the land intended for cultivations. In Bundelcund on some of the farms it was found to increase the crop of native cotton very much, in consequence of some of the lands there being perfectly level, and of a very tenacious nature; but in Broach, Berar, Nagpore, Khandeish, and the Southern Maratha Country, the process would be worse

than useless. In the distance between the rows, I have found it best to approximate very much to that adopted by the natives. This distance is to be determined by the known strength of the soil, in giving height and bulk to the plants, the object being, as Dr. Wight says, to allow room for full growth, but adjusted so that boughs of contiguous rows shall meet and shade the intervening space, and of this the natives, from their acquaintance with the powers of the soil, are naturally the best judges.

"Thus, then, it appears, that the natives of large tracts, as Guzerat, Berar, &c. &c., already employ a mode of cultivating the cotton plant, in principle nearly the same as the American, but better suited in some respects to locality, &c. I now proceed to consider their knowledge of the more general subject of agriculture. The benefits of manure are mostly pretty well appreciated by the natives, but its scarcity precludes its use in any but lands immediately adjoining the villages where garden stuffs are produced, and in the neighbourhood of large bazars on lands devoted to the production of fodder, which pays for almost any expense. Periodical relief of soils by leaving fallow is not practised, owing to the poverty of the ryots,* but no people better understand the advantage of a rotation of crops than do the natives of India generally. The same crop seldom appears oftener than once in three years on the same land, and frequently, in the case of cotton, only once in four years. Dr. Wight in his 'Extract Notes,' after speaking of the defectiveness in this respect in America, seems to think that the rotation practised by the natives in India is governed merely by chance or caprice; but in this I am prepared to say he is mistaken, as he is also in the remarks he makes on the American system of rotation. The natives have a thorough knowledge of the sort of crops which are best suited for succeeding each other, such as wheat following jowaree, gram succeeding wheat, and cotton following gram. Necessarily this course varies as one kind of cultivation predominates over another; but I must again say that the natives seem to be fully aware of the necessity of the system, and I consider them capital good judges of how it should be conducted.

"With regard to implements of cultivation, I agree with Dr. Wight in thinking that the American are mostly too heavy and expensive, and that for all practical purposes those now in use among the natives of the districts where the drill system of cotton culture is practised are quite sufficient, being fully adapted to the most thorough tilling of the ground.

"These brief statements of the actual condition of native cotton culture I think will leave the conviction that, though the field for improvement is great,

* In Broach, Surat, and Khandeish land is periodically allowed to lie fallow.

still, throughout very extensive cotton countries of India, the manner of growing the cotton is not nearly so defective as it has heretofore been the practice to represent." [1]

It will be remembered that this is the testimony of an experienced American planter, who certainly conducted with great skill and intelligence the cotton experiments which ultimately led to the general adoption of the New Orleans variety in the Southern Maratha Country.

His opinion, as well as that of other American planters, was cited by the Committee appointed to inquire into the cause of the decline in the Bombay cotton trade as follows :—

"Upon this branch of the subject, we must content ourselves with offering the impression of Mr. Mercer, Mr. Hawley, and other practical gentlemen, who have had the best opportunity of observing the various systems of Indian agriculture, that there remains not much to desire in the way of change or improvement in this respect; that, in fact, the system pursued in the chief agricultural districts of this part of India, for generations past, is as well adapted to the circumstances of the country and of the climate as can reasonably be expected; that the land is made to yield as large an annual increase as it is capable of doing, unassisted by the chemical, mechanical, and other scientific appliances which have contributed so much within these last few years to swell the annual increase of the highly-tilled districts of the United Kingdom. With respect to the purely agricultural part of the question, therefore, we are not in a position to put forward any specific recommendation for reducing the cost of raising cotton." [2]

In 1846, Mr. Mansfield, then Acting Collector of Dharwar, addressing Government, wrote—

"I have stated in my letter No. 658, dated 9th May 1846, that the impression in England was, when the American planters were sent out, that the system of cultivation in India was very defective, and that, by the diffusion of the experience and knowledge possessed by them among the ryots, the cultivation and the quality of the cotton might be greatly improved. This, however, by the admission of the American planters themselves, turns out not to be the case, but that the natives of India cultivate extremely well, and their system is better adapted to this country than that pursued in America;

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[1] Revenue Consultations, vol. liii. 1846, page 156.

[2] Returns, E. I. Cotton, 1857, page 11.

or, in other words, the peculiarities of the soil and climate in America, in order to attain the same excellence of cultivation, require a system much more expensive than is required in India."

At the end of this letter Mr. Mercer wrote, "In the above views I entirely concur," and Mr. Hawley added, "I also concur." [1]

Mr. Shaw wrote, in November 1847, "So far from it being my desire to lead the ryots to a doubtful system of planting and cultivating in the expensive mode adopted at Koosighul, I endeavoured to induce them to follow their own plans with some improvements, feeling assured that, indifferent and inferior as their own cultivation was, it was better adapted to the culture of cotton, than the system introduced at Koosighul (under American planters); and the result proved the correctness of this idea, for the ryots in the neighbourhood of Koosighul had better crops than those grown on the Government farm." [2]

The utmost that Dr. Burn, with unlimited expenditure and European skill, could effect was to force the soil to yield a third more of produce than the ordinary tillage of the ryots at double the cost of cultivation, and with the invariable result of a heavy loss on the sale of the cotton.

In reply to the inquiry of Government, "What method would you recommend for cultivating New Orleans cotton, the native or American?" Mr. Blount, the American planter, who succeeded Mr. Mercer as superintendent at Dharwar, stated, "I would recommend the native method as best adapted for it." [3]

Mr. Channing, superintendent of experiments at Belgaum, answered, "The method of cultivation I would recommend is the one followed by the natives, which, when carefully followed, answers well." [4]

Mr. E. G. Fawcett, the Collector of Surat, replied, "I have nothing novel to suggest. The experiments in American cotton here have not been fortunate; but the cases which turned out best appear to have been treated in the same way as the native kind." [5]

Mr Simpson, the American planter, superintendent of experiments in Khandeish, stated, "The drill system of husbandry, as at present practised by the ryots of Khandeish, when fully carried out, has all the elements of good husbandry, and is well suited to all varieties of cotton. This system has all

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[1] Returns, E. I. Cotton, 1857, page 282.
[2] Revenue Consultations, vol. lix. 1848, page 285.
[3] Returns, E. I. Cotton, 1857, page 106.
[4] Returns, E. I. Cotton, 1857, page 116.
[5] Returns, E. I. Cotton, 1857, page 128.

the primary features of the American system of cotton cultivation, allowing for the difference of the two climates and soils in which they are carried on, the American climate being regular, mild, and humid, with a fertile soil of great depth, the Indian being periodically deluged with an excess of rain, followed by perpetual drought, an arid atmosphere, a parched surface, and shallow depth of soil, based on 'kunkur,' or partly decomposed rock, very near the surface, and according to which the revenue standard of assessment is determined and fixed by Government officers." [1]

Mr. Price, the assistant superintendent, stated, "I would recommend the method now in use in rearing the indigenous cotton as the best to be pursued in the cultivation of the New Orleans, as I have experienced the benefit of it myself, and no other system, I am of opinion, will answer the purpose better under the present circumstances of the agricultural population."

The Collector of Broach stated, in 1854, regarding native agriculture:—

"On this point we have the evidence of Messrs. Mercer, Simpson, and Hawley, the scientific superintendents of the cotton experiments, who are of opinion 'that the skill exhibited by the ryots in their agricultural operations is very superior, and that their economical system enables them to obtain much larger returns for the capital invested than they, the planters, can.' Any one who has observed the native mode of agriculture, the careful manner in which every particle of manure is preserved, the rotation of crops attended to, and, above all, the heavy crops produced, must have arrived at the same conclusion; their implements of agriculture are rude, but efficient, and suited to the soil and climate. The experiments tried with the American ploughs resulted in utter failure, and deep ploughing was found to be unsuited to the soil of Guzerat." [2]

Mr. W. H. Havelock, Acting Collector of Belgaum, in 1854, likewise observed, "I have been informed by an American cotton planter (Mr. Simpson), who was sent out on purpose to introduce American cotton, and superintend its cultivation, that he could teach little or nothing to the cultivators of cotton in the plain of the Taptee in Khandeish; that, in fact, the husbandry was very good, and the yield of indigenous (not American) cotton in a good season very heavy. The ploughing in particular is generally held up to ridicule by English writers on Indian husbandry; but I will engage to say, that an English settler in the plains of the Deccan would soon give up English ploughs for the native implements, because the light cattle of the

[1] Returns, E. I. Cotton, 1857, page 147.

[2] Returns, E. I. Cotton, 1857, page 1097.

country could not draw the English plough. The native ploughman could not hold the English plough; and the English cattle and ploughmen, if imported for the purpose, and applied to the purpose, would die in the first season." [1]

Without further pursuing this question, it may be stated that all the American planters who were sent out to this country to conduct experiments in cotton cultivation began by despising the primitive, and apparently rude, system of Indian agriculture, and ended by adopting it. Doubtless there is room for improvement, but it is probably better suited to the requirements of the soil and climate than those who are unacquainted with either are disposed to admit. Unreasonable hopes of immediately increased supplies at a cheaper price should not be based upon the mere revolutionising of a system of culture which has descended from the time of Alexander.

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[1] Returns, E. I. Cotton, 1857, page 1051.

CHAPTER XVI.

THE CULTURE OF COTTON.

Early sowing—Mr. H. Brooke's experiments at Cochin—Dr. Gibson's report upon them—Experiments made by direction of Mr. Brooke in the Dharwar district—Reports of Dr. Forbes on early sowing—His summary of results—Resolution of Government on the subject in 1858—Experiments in early planting by Dr. Forbes—Report on early sowing by Mr. Seton Karr—Mr. Mansfield's statements regarding its unsuitability to this climate—Mr. G. Inverarity's representations on the Irrigation of Cotton—Reports on the subject from the Bengal and Madras Presidencies—Reports from all the Collectorates—Major Meadows Taylor's report from North Berar—Experiments in Irrigation at Broach and Surat—Report on the Cotton produced—Experiments at Belgaum—Dr. Gibson's report—Conclusions.

The advantage of "early sowing" has very frequently been urged upon Government by public bodies in England, and the system is still advocated in Europe by those who are interested in Indian cotton. The expression is a very vague one, and admits of considerable latitude of interpretation, but it may be stated that, generally throughout India, no seed can be sown until rain has fallen. The time of sowing in each district is, consequently, regulated rationally by the season.

The whole of the American planters sent to this Presidency, whilst they asserted the advantages which would ensue from early planting, if it were possible, without exception agreed that the period must be determined by the fall of rain.

In June 1858, Messrs. A. C. Brice & Co. communicated to Government the following particulars of an experiment in early sowing conducted by their partner, Mr. H. Brooke, at Cochin, and they attributed the failure of exotic cotton to its having been planted at the same time as native seed. Mr. Brooke

sowed Egyptian Sea Island seed every week from April to August, with the following results :—

"*Sown previous to 1st May.*—All came up at the same time, viz. about 6th May; was 8 inches high by 6th June; grew during the following six months of the monsoon to the height of *twelve feet*, and bore pods of long-stapled cotton till the following March.

"*Sown about 1st June.*—Came up in two or three days; grew quickly but weakly; attained a height of about 6 feet, but could not stand the hot, dry weather of December.

"*Sown about 1st July.*—Came up quickly, but did not attain a height of more than 4 or 5 feet.

"*Sown after 1st August.*—Did not attain a height of more than two feet six inches, was weak and miserable, and would not live without watering."

Dr. Gibson, whose experience gives very considerable weight to his opinion, on being referred to by Government, reported upon this communication as follows :—

"I may state that the case of the Malabar Coast and Cochin, where the experiment of early sowing is described as having been tried with success, is an exceptional one, dissimilar in circumstances of soil and climate to other districts of Western India.

"Sloping, low hills near the coast, having a gravelly or laterite soil, frequently showers in April, and most generally a saturating shower or two previous to the middle of May, and the land daily cooled by a sea breeze obtained at first hand, are all of them contingencies likely to lead to the success of the experiment as made at Cochin.

"In fact, I have no hesitation in offering the opinion, which, if I mistake not, I have already done in some of my former reports, that cotton sown in such ground, in any part of the Malabar Coast, each seed hole having a pot of water poured into it, would give a strong, healthy plant, well calculated to resist the strength of a monsoon, which must be fatal to one recently sprouted.

"I have myself seen on the hill seaward of Murmagaum, or Moreguam Fort, in the Goa country, on the 28th December 1845, Upland cotton growing in a state then wild and perfectly uncared for, but nevertheless strong in growth, and showing bolls of which any planter might have been proud.

"It cannot, however, be said that we have any one of these favourable circumstances in other parts of Western India.

"Therefore I argue that this experiment, while affording excellent grounds for an extension of the cultivation in such situations in Malabar, can lead to no inference in favour of success elsewhere.

"If my garden report for 1842 (contained in a printed compilation published by the Horticultural Society) be referred to, it will be seen that (paragraphs 9 and 10) I take some pains to point out how much injury has often been done, and unnecessary expense incurred, by hasty conclusions drawn from partial premises; and again, in paragraph 10, I say, in relation to this very product, 'A person, unacquainted with the general features of this country, and with the great modification of climate (irrespective of latitude), caused by our north-west wind blowing over such an extent of continent, as, compared to the sea it has to pass over, might, from the result of the above trial, to look on the success of American Upland cotton as certain, and recommend it accordingly.'

"Now the whole of the land in our cotton districts is, as is well known, by the middle of April cracked and burnt up by the fierce heat of the sun, and this continued heat is not dissipated, nor is the soil formed again into a homogeneous mass, until it has received the heavy rains of June and July.

"I therefore maintain that to attempt to sow cotton in April, even were the place destined for it flooded with water by artificial means, is hopeless. A stunted plant may be obtained, but it will be burnt up at its leaves and roots, and will never become healthy.

"It is for this reason that I do not advise even a general experiment in the measure. As respects the cotton districts of our Presidency, indeed, I am under the impression, in as far as an imperfect recollection of the events which occurred twenty-six years ago can assist me, that the plan was tried in the experimental cotton farm at Danda, in the Broach Collectorate, and that Mr. Martin, the superintendent, had a well dug and built for this purpose.

"In case that Government should determine on trying the experiment on a small scale, I have, in the ground at Hewra, some fields of brown soil which can be irrigated, and thus give the experiment rather a better chance of success than it could have in the regular black cotton soil. The experiment also would have this advantage, that no expense need be incurred in carrying it out."[1]

In February, March, and April 1859, Mr. H. Brooke addressed Government on the subject of early sowing, and laid before them the following results

[1] Revenue Consultations, vol. liii. 1858, pages 219—224.

from trifling experiments made by his direction in the Dharwar districts :—

"Egyptian Sea Island seed was sown on 4 acres :—

	Sown about 5th June.		*Sown about 15th June.*	
	1st Acre. Native way.	2nd Acre. 1 foot distance.	3rd Acre. Native way.	4th Acre. 2 feet distance.
Picked.	lbs.	lbs.	lbs.	lbs.
November 26th.....	12	30	14	12
December 15th.....	56	51	27	28
January 1st.....	74	102	40	61
	142	183	81	101"

Mr. Brooke, in the same letter, drew attention to another experiment proceeding at the same time near Hooblee under his instructions, of which the following are the details :—

"Two pieces of land, one of *red soil*, and the other of *black soil*, were prepared for sowing at the latter end of April, and the seed was sown, *one row daily*, from the 11th May to 22nd June, and every four days, from 26th June to 21st August. The three descriptions of seed—the native, the American, and the Egyptian—were sown in separate rows in both descriptions of soil. The following reports came to hand at the following dates :—

"21*st April*.—All people tell me that Egyptian and American cotton will not prosper on red soil, but as you desire it as a trial, I must comply with your instructions.

"23*rd July*.—The plants earlier sown were about one foot above the ground, and on *every day* there were some seeds that had vegetated ; the largest average were those sown on the 16th, 23rd, and 27th May.

"7*th August*.—Early-sown plants were from 18 to 30 inches high ; those sown after 6th June were from 3 to 6 inches high only. Egyptian cotton appears to grow best in *red soil*.

	Inches.
"5*th September*.—Early-sown plants were from....	17 to 54 high.
Sown after 6th June „ „	13 to 22 „
"27*th September*.—Early-sown plants „ „	20 to 72 „
Sown after 6th June „ „	16 to 23 „

The Egyptian and American plants in full blossom.

"*30th September.*—The Egyptian plants look most healthy; some above 70 inches high, and 1 inch diameter at the bottom of the stalk.

Native plants.—No native plants ever looked so high and healthy as ours.

American plants.—The pods are opening, which is not desirable, as the cotton will be spoiled by rain in October.

"*3rd January.*—Native cotton plants have buds, but no flowers, yet the trees have grown large.

"*2nd February.*—Cotton plants in the four acres in good order. Those sown in the native way are one to one and a half foot high. There is plenty of cotton on them.

"The cotton picked from the rows sown during a period of fourteen days for the early sowing, and in periods of one month for the later sowings, have been kept separate, and present the following results up to 21st March:—

		Black Soil.			Red Soil.		
		Egyptian.	American.	Native.	Egyptian.	American.	Native.
Sown daily.	Rows.	Tolas.	Tolas.	Not kept separate, the pickings were so small.	Tolas.	Tolas.	Not kept separate, the pickings were so small.
11 to 25 in May..	14	132	183		240	175	
23 to 26 in June..	14	60	65		165	71	
	14	60	65		165	71	
22 to 24 in July..	14	41	81		100	60	
	14	41	81		100	60	
22 to 23 in Aug..	14	60	50		80	39	
	14	60	50		80	39	
Tolas..		454	575		930	515	
At 40 tolas per lb.		11	14	4	23	13	3¾

"Each row being 20 feet long, and the rows being 2 feet apart, an acre being 210 feet square, would give 10 rows long by 105 rows broad, or say equal to 1,050 rows. Basing a calculation, therefore, upon the result of the earliest sown (14 days in each instance) would give the following results:—

		Egyptian Cotton.			Per Acre.	
	Rows.	Tolas.	Rows.	Tolas.	Kuppas.	Cotton.
Black soil if....	14 :	132 ::	1,050 :	9,900 ÷ 40	= 250 lbs.	or 83 lbs.
Red soil if....	14 :	240 ::	1,050 :	18,000 ÷ 40	= 450 lbs.	or 150 lbs.
		American Cotton.				
Black soil if....	14 :	183 ::	1,050 :	13,725 ÷ 40	= 343 lbs.	or 114 lbs.
Red soil if....	14 :	183 ::	1,050 :	13,125 ÷ 40	= 328 lbs.	or 109 lbs.

"The quantity obtained from the native seeds is so inconsiderable as not to deserve further notice."

Mr. Brooke remarks :—"It appears, therefore, that Egyptian should be sown in red soil by preference; but as regards American, it is matter of indifference which soil is made use of; it may be worth while to revert to the native opinion that neither Egyptian nor American would flourish in *red soil.*

"The average quantity of native or American cotton obtained per acre in Dharwar does not exceed 60 lbs. of clean or rather dirty cotton.

"It appears, therefore, sufficiently proved (as far as so small an experiment would permit) that the earlier the cotton is sown the better."

He proceeds to describe further experiments as follows :—

"The second experiment of early sowing at Hooblee was of three acres, sown in *June*, and one acre sown in September, as natives usually plant, and the result of the three acres sown in June is as follows :—

	lbs.	lbs.
Sown 5th to 15th June, native mode, in drills.....	216	
Ditto ditto at 1 foot distance	185	
	——	401
Sown 10th to 20th June, native mode, in drills	151	
Ditto ditto at 2 feet distance	184	
	——	335
Kuppas or seed cotton..		736 lbs.

"This produce of 736 lbs. I have had sorted as follows :—

1st quality kuppas, perfectly sound, 73 per cent. produced 33·70 per cent. cotton,

2nd quality kuppas, discoloured, 14½ per cent. produced 20 per cent. cotton,

3rd quality kuppas, damaged by boll-worm, 12½ per cent. produced 20 per cent. cotton,

or an average of say 31 per cent. of cotton, or nearly one-third, or say 228 lbs. of clean cotton for three acres, or 76 lbs. per acre; and, taking into consideration that there was still some unripe cotton in the field, the produce may fairly be taken at 80 lbs. per acre.

"From the one acre sown in September I have no return yet, as, on the 1st March, the cotton was only then beginning to get ripe."

A third experiment at Bunkapoor he describes as follows :—

"Three acres of cotton were sown on the 21st of July in black soil,

"The picking is not yet finished, but has produced thus far—

	Kuppas.	Cotton.
1 acre sown native way, in drills	158 lbs.	53 lbs.
1 acre sown 1 foot distance	244 lbs.	81 lbs.
1 acre sown 2 feet distance	181 lbs.	60 lbs.
		194 lbs.

or average 65 lbs.

"It is stated, however, that the cotton is of inferior quality. All these experiments appear to me to confirm my former view, but it is absolutely essential that the soil should be sown early,—indeed as early as possible, and if so, an advantageous return may be expected."

In September 1858, Dr. Forbes, of Dharwar, wrote, "I have at present under observation samples of early cotton, consisting of Egyptian, American, and native varieties, sown at Hooblee in the month of May last. I examined the plant a few days ago, and found pods forming upon both the Egyptian and native plants, and I have had sent me to-day a small supply of kuppas,—the first produce of the American variety. The staple is not longer than that of the usual crop, and the fibre is apparently weaker. It is scarcely possible, however, to form an opinion from so small a specimen, nor indeed until the whole of the crop has been picked, after which I shall have the pleasure of forwarding samples for comparison with others of the usual produce.

"I may mention, however, that the present small experiment will not be conclusive. At the time of sowing I was absent on other duty, and the spots of land selected were in a more sheltered situation than I could have wished. Moreover, it is by no means certain that the Carcoon in charge did not indulge the plants with a little water. Allowing such, however, to have been the case, as the season (with regard to rain) has been most unfavourable, I consider the appearance of the plants when I last examined them was sufficiently satisfactory to encourage a repetition of the experiment upon a larger scale, and I should be glad to obtain permission to undertake it next season." [1]

A month later, Dr. Forbes continued his report, and referred to the question then submitted by Messrs. Brice & Co., as follows:—

"Having recently paid a visit to the experimental cotton fields alluded to in my letter of the 30th ultimo, I found the produce had suffered to such an extent from the late fall of rain, that probably any repetition of the experi-

[1] Revenue Consultations, vol. liii. 1858, pages 224 and 225.

ment may be deemed unnecessary, and the question submitted by Messrs. Brice & Co., as to the benefit which might be expected to result from earlier sowing, may be considered as disposed of in as far as this part of the country is concerned.

"As a specimen of the article will best exemplify the damage which unpicked cotton sustains from rain, I have taken the liberty of forwarding to your address, by banghy parcel, a few pods which I picked for that purpose.

"I have also enclosed in the same packet a sample of early-sown American cotton (picked before the rain fell), and along with it a specimen of the same variety sown at the usual period. A comparison will decide the superiority of the latter, more especially as regards strength and soundness of fibre, and from this it may be inferred that the season at present resorted to is (with respect to quality also) best suited to the culture of the plant in this country.

"Contrary to the expectations formed on my previous visit, I found that the early-sown Egyptian cotton had also ripened, and that its produce had suffered from the rain in the same manner, as will be seen from the sample I have sent; and I may mention that not only was this the case in both instances, with respect to the pods which had burst, but also with those which had only partially filled. The moisture appeared to have soaked through the capsules, and stained the contents of even the smallest bolls.

"The native cotton, sown at the same time as the above (viz. on the 11th May), was more backward, only a few of the plants having flowered. It appears to require a longer period to come to maturity, and, for this reason, is not open to the same objection as regards early sowing. It will yield its crop about December—a season at which there is very little chance of rain falling,—and it remains to be seen what the quantity and quality of the produce will be as compared with that sown at the usual period. The advantage of early sowing, with this variety, would be that the crop could be cleaned and exported before the ensuing rains set in, which is not the case at present." [1]

On the 12th February 1859 he again made a report on the subject, expressing opinions on the subject of early sowing, which are entitled to much attention—

"The experiment tried of early sowing with the native variety of cotton has also proved a failure.

"The plan has been simultaneously tried in different localities; the early sowing took place in May and June, and in the neighbourhood of each a small quantity of the same seed was sown at the usual season, viz. August and September, with the view of being able to compare results.

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[1] Revenue Consultations, vol. liii. 1858, pages 239—241.

"The plants from the early-sown seed appear to have exhausted themselves in running to wood. They attained an average height of five feet, but their produce was not equal in quantity to one-third of that of the small plants which grew beside them from the seed sown at the usual period. Besides this, they seemed unable to nourish their pods, so that the young 'forms' or bolls withered and dropped away before they had attained half their size. The cotton also, where it had matured, was not equal in length and strength of fibre to the usual produce.

"In addition to what has been reported in the former communication above alluded to, I have now only to add on this subject that Egyptian cotton, whether sown early or late, does not seem adapted to these districts. It has so disappointed the ryots, that, of their own accord, they will have nothing further to say to it; for, whilst the plant itself continues to look healthy and strong, the contents of the pod, both at the period of its ripening and earlier, are attacked by what they call 'wind-blight,' but what in reality is an insect, which causes them to discolour and wither up, so that they cannot be picked. I have samples of the produce in this condition now by me, which can be forwarded for inspection if required, as well as specimens of the young bolls which have withered and fallen away from the early-sown native plant, as above mentioned.

"The conclusion to be drawn from the experiments of last season may be summed up as follows:—

"1. Early sowing will not succeed with any description of cotton, the produce of which ripens at a period when rain may be expected to fall, and this has proved to be the case with both New Orleans and Egyptian cotton in the Dharwar districts.

"2. If it were not for this objection, New Orleans cotton might be grown at the above season with advantage, in so far as that the crop might be cleaned and shipped before the monsoon. It has been observed, however, that the early produce has not been superior (either as regards quantity or quality) to that from seed sown at the usual period. Experience shows that the most advantageous season for sowing this crop is in August, and the earlier it takes place in that month the better. At the same time, the soil must be in a proper condition as regards moisture,—if too wet, the seed will rot.

"3. Egyptian cotton sown at all seasons has hitherto proved a failure for the reason above mentioned.

"4. Early-sown native cotton has not succeeded, owing to the plant having run to weed; but possibly pruning at the proper season might obviate this objection, and I would, therefore, recommend a further prosecution of the

experiment. If successful, much advantage would ensue. At present the slow process of the churka is the only means by which it can be cleaned; accordingly none of the crop leaves the country until after the monsoon, and it suffers very materially from moisture during that period."

The following resolution on the subject was passed by the late Lord Elphinstone and the Bombay Government in 1858:—"Government are satisfied that it is hopeless to expect, as a general rule, that cotton seed in this Presidency can be put in the ground in the month of April with any prospect of success.

"But, so far as His Lordship in Council has the means of forming an opinion, it would appear very desirable that the sowing of American cotton should take place as early as the ground is in a fit state to receive the seed, and it is possible that, where means of irrigation exist, the ground may be brought to such a state a little earlier than where the natural fall of rain is alone depended on." [1]

The following year, Dr. Forbes repeated his experiment, and gave the following report of the result:—

"In conformity with the instructions conveyed in the Government resolution of 30th October 1858, early cultivation of indigenous cotton has been again tried this season. On the 1st of May last half an acre was sown in Dharwar, and an equal amount at Hooblee, and the same was repeated on the 15th of that month. The experiment on this occasion has proved entirely unsuccessful. The cause is, doubtless, to be attributed to a continuation of dry weather, which prevailed at the time of sowing. At Hooblee no rain fell, and the consequence was, that hardly a single plant appeared. In Dharwar there were some showers, and about 60 per cent. came up; but upwards of half of these were subsequently withered by the dry east winds; the remainder continued in a stunted and sickly condition until the end of June last, when a fall of rain refreshed them. By the middle of August they had attained a height of nine inches, and since then they have continued to grow well, but they are still in size far short of last year's plants of the same age, and the pruning, which I thought would have been advantageous to the latter, does not appear to be necessary, nor even admissible with these.

"The drought was general at that time, and, had the whole cotton land of the country been sown, the same result would have ensued.

"Under such uncertainty as regards the amount of moisture, it is needless to hope that the cultivators could be induced to alter their present season;

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[1] Revenue Consultations, vol. liii. 1858, page 244.

and, if the system is to be pursued, or the experiment tried again, I would recommend its being done under irrigation only." [1]

Mr. Seton Karr, Collector of Belgaum, addressing the Revenue Commissioner, stated, "Early planting, from the middle of April to the end of May, I scarcely need tell you has never been tried. Those months in the cotton plains are, perhaps, the hottest of the year, and the seed might as well be put into an oven as into the ground at that time." [2]

The testimony of Mr. Mansfield, Revenue Commissioner, Northern Division, was given on this subject in May 1860. He observed to Government—

"I beg to draw attention to an advertisement by the Chamber of Commerce which shows an extraordinary want of knowledge of the subject treated. People are therein advised to plant cotton in May and November; if they did not so, they would inevitably lose both the seed and their labour. The soil in the month of May is very much like cinders heated to a temperature of 150 degrees. The soil continues in this heated stated till the middle or end of June, when the seed, if not become cinders also, and deprived of all germinating power, is reduced to a state of rottenness by the torrent of rains at the first burst of the monsoon. If the sowing, again, is delayed till November, the cotton has not time to ripen before the fierce heat of the sun forces the bolls to open prematurely, as was the case with the cotton described by Dr. Forbes.

"Any person acquainted with agriculture in India is aware that no seed of any description of grain, cotton, &c. can be planted before the soil is moistened and cooled by the rains, and the time for sowing depends entirely on the fall of rain. For instance, in Khandeish, if rain sufficient for sowing does not fall before the first week in August, no cotton is planted; for the experience of ages has taught the people that a profitable return cannot be expected from a crop planted so late." [3]

Mr. George Inverarity, Collector of Broach, addressing the Revenue Commissioner, Northern Division, in 1855, stated that the greater part of the land in his collectorate consists of deep black soil, and that irrigation, supplied artificially to cotton grown upon it, far from improving the growth and staple of the cotton crop, acts injuriously, weakening its fibre, and reducing its value.

The Court of Directors desired that inquiries might be instituted, with a view to determine the correctness or otherwise of this opinion, and the

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[1] Revenue Consultations, vol. liv. 1859, pages 230—232.
[2] Revenue Consultations, vol. liii. 1858, page 226.
[3] Revenue Compilations, No. 110 of 1861, pages 15 and 16.

following is a condensed abstract of the replies received from the persons most conversant with the cotton plant in the several districts who expressed any decided opinion:—

BENGAL.

"From the papers submitted by the Government of Bengal, it appears that, in the opinion of the Board of Revenue, artificial irrigation in the culture of cotton would be useful in the districts of Behar, though such a process, they remark, is not required in Bengal. The Cotton Committee of the Agricultural and Horticultural Society, whom the Board consulted on the subject, observe that in sandy and light soils frequent irrigation will probably be found necessary for the successful growth of the plant; in some places a moderate degree of moisture is essential; while again in other localities it may not be at all necessary, but, on the contrary, may prove hurtful to the plant. On the whole, the Committee arrived at the conclusion that irrigation, under a certain peculiarity of soil and climate, acts injuriously on the cotton plant; yet in most localities it will be found beneficial alike to the indigenous and exotic kinds. In Assam the local officers consider irrigation to be unnecessary. Colonel Hannay remarks that in dry and sandy soils this process may, if judiciously applied, be partially beneficial; and Mr. Master, Deputy Collector of Seebsaugor, adds that the cotton plants grown in deep black soil, immediately under the Nagah Hills, which are frequently drenched by the water from the hills, are rendered weak, and the fibre deteriorated, while those immediately in their vicinity, on higher and drier ground, appear healthy and strong, and the staple far superior." [1]

MADRAS.

"From the replies submitted by the Government of Fort St. George, it appears that artificial irrigation of cotton crops is not carried on in any of the districts of that Presidency. The Collectors of Coimbatore and Madura are entirely opposed to it. The Collectors of South Arcot, Bellary, and Nellore agree in stating that black soil is ill-adapted to such a process; the first states that irrigation of the plant to any great extent is injurious, and the last two say that in red and sandy soils only it would be beneficial. In the opinion of the Collector and Agent to the Governor, Vizagapatam, irrigation would prove beneficial rather than injurious in seasons when rains fail, or vary in their supply. The District Engineer of this division, while admitting the growth of cotton on high lands, observes that a sufficient supply of water by irrigation

[1] Returns, E. I. Cotton, 1857, page 1609.

is also necessary. It would be the same thing, he says, whether the water supplied is rain water, or brought from a channel or tank; the prevalent opinion amongst the people whom he had consulted is in favour of irrigation. The Governor's Agent at Kurnool, and the Superintendent of the Gardens at Ootacamund, are of opinion that cotton plant would be improved by irrigation if properly applied, and at the right stages of growth. The latter goes on to say that the flooding of the whole surface with water is injurious, but it is beneficial when applied by small water channels in the middle of the rows.

"Of the authorities applied to for information by the Board of Revenue, replies have been received from two only—Dr. Cleghorn, the Conservator of Forests, and Mr. McIvor, the Superintendent of the Government gardens at Ootacamund. From their remarks it appears that artificial irrigation may be applied with benefit to the cotton plant under careful supervision, but that it is fatal to it if indiscreetly used, and Mr. McIvor's letter leads to the conclusion that in heavy soils the plant would not flourish under irrigation even of the most careful kind, while in sand and light red soils it might be much benefited."[1]

Bombay.

"Mr. Goldfinch, Collector of Sholapore, states that artificial irrigation is considered altogether unnecessary, if not injurious to the cotton plant, and that he has seen some New Orleans cotton planted in irrigated land, as an experiment, that failed completely, though the plant throve well in the same neighbourhood, and on the same description of soil, without irrigation, so that, so far as his experience goes, artificial irrigation is injurious.

"The Collector of Belgaum, Mr. Seton Karr, states that he does not remember ever to have seen cotton grown under irrigation. He observes that a good fall of rain is, of course, necessary for the land in the first instance, that is, before the seed is put in, but that the time at which the sowing is made, viz. towards the commencement of the cold weather, or when the monsoon is nearly over, is a circumstance which seems sufficiently to indicate that after the plant has sprung up, and has attained a few inches of growth, moisture would be injurious.

"Dr. Gibson, Conservator of Forests, states that he cannot from experience speak of the effect of irrigation on country cotton grown in black soil, but that he has seen moderate irrigation applied to the Barbadoes and the Upland cotton grown in such land with good result."

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[1] Returns, E. I. Cotton, 1857, page 1610.

Dr. Gibson adds—

"In the meantime I may state my impression, which is this: that regular irrigation may not be found well suited to country cotton, but that, if water be applied, as is done in the case of wheat and some other grains grown in stream-watered land, the effect on the staple would be beneficial.

"This application consists in flooding the fields, containing the plant, once or twice during its growth, viz.:—

"In the event of the latter rains being scanty, such a submersion of the ground would be required once in November and again in January, while the boll is filling.

"In the event, however, of the rains being abundant in October and November, one watering only would be required, and that late in January.

"The Collector of Ahmednuggur, Mr. Tytler, reports that, although cotton is but little grown in that collectorate, all that he can hear fully bears out Mr. G. Inverarity's opinion as to the effect of irrigation on cotton crops.

"Mr. Ogilvy, Collector of Dharwar, states that he does not find, on inquiry, that irrigation is used for cotton in any part of that collectorate, and observes that this may be owing to the fact that the plant is invariably grown in black soil, which is rarely irrigated, and is not considered so suitable for the purpose as other kinds. Mr. Ogilvy intimates that Mr. Channing, late of the Dharwar cotton experiments, having tried irrigation on a small scale, the crop of cotton was increased both in quantity and quality, and that he has himself seen New Orleans and other kinds of cotton successfully cultivated in a private garden, and in soil which would probably not be selected for the purpose by the native grower, remarking that it would thus appear that it has been determined by experiment that cotton can, by judicious management, be irrigated with success both in black and other soils.

"Mr. Hadow, Collector of Ahmedabad, forwards copy of a communication from the Superintendent of Cotton Experiments in his collectorate, and states that he inclines to Mr. Daley's views, that irrigation, by occasional floodings at seasonable periods, would be likely to prove beneficial to the crop, both as regards quantity and quality. Mr. Daley states, "Mr. G. Inverarity's remarks relative to the deterioration of the growth and staple of the cotton crop, by means of irrigation, apply, to a certain extent, to a cold, heavy, black, alluvial soil, which retains water by its gelatinous property much longer than any description of soil; but even in this soil, when the pods are being formed on the cotton plants, the rain water having either evaporated or percolated to a depth of from two to four feet below the surface, I beg respectfully to state that, if the plants were watered at this period, the growth and staple

of the cotton crop would in general be improved, instead of deteriorated. These occasional floodings, however, would entail too heavy a water rate to justify its adoption for the culture of cotton alone on such a soil.

"Mr. Gray, Acting Collector of Kaira, states that the cotton produced in his collectorate is never artificially irrigated; and that, if it were so, the young plant (as is supposed by those most experienced and best informed on the subject) would get rotten, and fail to attain maturity.

"Mr. L. H. B. Tucker, Collector of Broach, observes that the belief appears to be universal among native cultivators, that to irrigate the ordinary indigenous annual when growing in the deep, black soil, which forms the great mass of the arable land of these districts, would be injurious rather than beneficial.

"Mr. Mansfield, Collector of Khandeish, intimates that it is not the practice to use irrigation in the cultivation of cotton in Khandeish, and that there is no tradition among the people of its ever having existed. He observes, that in the western districts of Khandeish there is a large number of irrigational works, and that a considerable area of land is under irrigation, in which sugar-cane, rice, wheat grain, and different kinds of vegetables are grown, but never cotton, notwithstanding that its value in the market is much greater than any of the above products, excepting sugar-cane and rice."

Major Meadows Taylor, Deputy Commissioner of Northern Berar, reported, "I am of opinion, with Mr. Inverarity, that irrigation of the plant on deep, black soil would prove injurious both to the fibre and produce. The black or *regur* soil, on which cotton is invariably sown, is very deep and retentive of moisture, and though the surface appears dry, and no doubt is so to the extent of a few inches, as far as the plough or hoe has disturbed it, yet the sub-soil, after the proper monsoon, always retains moisture, not only beyond the time at which the cotton ripens, but for the whole of the hot weather. The roots of the cotton strike very deep. In specimens lately prepared for America, I have found them as long as eight feet from the tap-root, and usually from two feet as a minimum to three and four feet, the lateral roots also having a tendency to lower as the moisture recedes from the surface. In all cases the roots were within sufficient moisture for the nourishment of the plant.

"Again, a certain amount of dryness in the soil is apparently needed to bring the fibre to perfection, and to cause the bolls to open. The provision of nature seems adequate for the plant, without artificial means, in this deep soil; for it is observable that the whole growth of the plant, and, for the most part, its buds, flowers, and green bolls are produced while the sub-soil is wet, and that, as it dries, the stem hardens, the bolls become hard and ripen, and the cotton

bursts forth. It would not be so, I think, if the ground continued wet; the plant would, perhaps, be stimulated to put forth more green shoots, and, possibly, more flowers, but the ripening effects of the gradual drying of the soil would be lost.

"In the Shorapore country, where cotton is abundantly cultivated, the year 1848-49 was a very wet one. The monsoon continued late, and at the period at which cotton begins to ripen there (February and March), there were heavy rains. The consequence was, that the ground never dried sufficiently for ripening the plant; the bolls remained green, and did not open generally, and of what did open, the cotton was soft, flaccid, and hardly worth gathering; the bolls also were filled with insects. If irrigation, therefore, were employed, and the ground kept wet, I consider it would have a similar effect,—at least on indigenous, short-stapled cotton.

"When I was at Shorapore I made many trials of exotic cotton seed of various kinds with and without irrigation. The seed was New Orleans, Sea Island, and hybrid varieties. The New Orleans plant, when watered, did not appear to answer: the leaves were curled, and the bolls soft, and the fibre weak; when sown in unirrigated land at a proper season, the plant grew remarkably well, and the cotton, cleaned with a saw-gin, was very favourably reported on in Glasgow, where it was sent, the value being given at 5½*d.* per lb.,—a price then largely in advance of Guzerat or Berar cotton. Sea Island cotton I found succeeded best upon reddish, sandy soil; it was irrigated partially, that is, if I now remember aright, it had three waterings. This cotton reached a great height, and, as the plants were thinned, the lateral branches spread out, covered with flowers and bolls, weighing them to the ground; the produce was also very large, and was ginned and sent to Glasgow with the New Orleans, and valued at 10½*d.* to 11½*d.* per lb. It was objected to only on one ground, that the fibre, though long and silky, was weaker than the real Sea Island cotton, and I attributed this to the irrigation. The plants were cut down after the cotton was ripe, and the soil being ploughed between the rows, they were allowed to rest. During the monsoon the plants put out new stems and branches, and the growth was surprisingly great and luxuriant, even surpassing the first year. Irrigation was freely continued, I must say against the advice of the natives, who saw, and were interested in my experiments, and the result was, that the bolls were very small, imperfect, and remained green and soft; they did not, for the most part, ripen and open, or only partially so, and were perforated by insects, which destroyed the fibre. From this I assumed that partial irrigation of the Sea Island cotton was advantageous, but that continued irrigation of the soil was injurious.

"A small portion of New Orleans seed was sown at Akote this year too late for the full effect of the monsoon. It was being irrigated, but it was evident that the plant was not much benefited by it. The leaves were curled, and, in December last, it did not appear to me thriving. I shall, however, have an opportunity of seeing it again, and will report on its condition.

"Though, as I have above stated, I should consider irrigation unnecessary, and indeed hurtful, in deep, black soils, like the majority of Guzerat and Berar, yet there is a good deal of shallow and stony soil in Berar, and generally in the Deccan, to which one or two waterings could be applied with advantage. It is evident, from the growth of the plant up to October, or as long as there is general moisture, that what is sown on deep soil and on shallow or stony soil is pretty equal in growth; but after that, while the roots of plants in deep soil strike down to the sub-soil moisture, and progress in height and lateral extent, those on the other soils stop short, lacking moisture, and assume that stunted, withered appearance which is often seen, the plant being not more than eighteen inches or two feet high, while in deep soil it is ordinarily from five to six feet, and upwards. I therefore consider, both on my own experience with exotic seed, and on the ordinary results in shallow, stony, or sandy soils, that irrigation to a certain extent, say two, or, at most, three waterings, according to season, between the end of October and 15th December, would be found advantageous to the growth of the plant. After that, it would be hurtful to any kind of seed or any kind of soil.

"In any case, however, irrigation would, I think, reduce the crispness of the fibre, though it might increase its length, and, on shallow basalt soils, where the fibre is naturally very short and very harsh, it might thus improve it. On other soils it would decidedly injure it, and also the plant itself, keeping the bolls green, stimulating it too much to green shoots and flowers, retarding the ripening of the cotton, and possibly exposing it to the attacks of insects.

"I have been daily in communication with great numbers of practical cotton farmers since the receipt of your letter, and have asked their opinion on the subject of irrigation. They all agree that it would be injurious to water fields which have sufficient sub-soil moisture, but that on dry, shallow soils one watering or two might be of use. They have never employed irrigation themselves; and all agree in stating that, when the ground is too wet from a late monsoon, both the rate of produce and the staple of the cotton are much injured in Berar." [1]

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[1] Returns, E. I. Cotton, 1857, pages 1595—1597.

Government ordered experiments to be tried, in order to form a judgment upon actual data, and, in doing so, they stated, "It is certain, from the reports now received, that the agricultural practice under this Presidency is opposed to the irrigation of cotton crops; and the general belief is, that with the indigenous variety, at all events, irrigation would be injurious."

On the 28th June 1859, the Collector of Broach, Mr. L. H. B. Tucker, thus reported the result of an experiment made by him :—

"An acre of black soil was selected at Broach, and one of red soil at Jumbooseer, and great care was taken to carry out the experiment completely. One-half of each acre was left unirrigated; the other halves received each two copious waterings—the first in December, the rain having fallen late and plentifully, and the second while the bolls were filling.

"The return was as follows :—

"BROACH.—*Black Soil.*

Irrigated.		*Unirrigated.*	
Clean cotton	41½ seers.	Clean cotton	34½ seers.
Seed	86¾ „	Seed	72¼ „
Total ..	128¼ seers.	Total ..	106¾ seers.

"giving an increase for irrigation of—

Clean cotton	7 seers.
Seed	14½ „
Total ..	21½ seers.

"JUMBOOSEER.—*Light Soil.*

Irrigated.		*Unirrigated.*	
Clean cotton	63 seers.	Clean cotton	57 seers.
Seed	134 „	Seed	134 „
Total ..	197 seers.	Total ..	191 seers.

"giving an increase for irrigation of clean cotton 6 seers. Unless, therefore, there should be a marked improvement in the staple of the irrigated cotton, to ascertain which I have sent you by banghy samples of each sort, the experiment must, I fear, be considered a failure." [1]

Mr. A. D. Robertson, Acting Collector of Surat, gave the following details of experiments in his zillah :—

"BHEESTAN VILLAGE.—*Black Soil.*

"In this village the yield of cotton from irrigated land in half a beegah was 1 maund and 37¾ seers, and that of unirrigated cotton in the same extent of land 2 maunds and 9¼ seers.

[1] Revenue Consultations, vol. lii. 1859, pages 199 and 200.

"Though the quantity produced from irrigated is less than that produced from unirrigated land, the former is better in quality, it being stronger and firmer in fibre than the latter, which is comparatively weak.

"The reason assigned for less being produced in irrigated land is, that irrigation is not congenial to cotton plants in black soil.

"ULTHAN VILLAGE.—*Gorat Soil.*

"The yield of cotton from irrigated land in half a beegah was 2¼ maunds, and that of irrigated cotton in the same extent of land 1¼ maund.

"Here the cotton produced from unirrigated land, though less in quantity, is better in quality than that produced by irrigation. It is supposed that in *gorat* soil a heavier yield is secured by irrigation, but the cotton produced is not so good in quality." [1]

Samples of this cotton were laid before the Chamber of Commerce, by whom the following opinion was expressed:—

"The quality of the cotton does not appear to be materially affected, but if anything, that from the irrigated black soil appears rather weaker than the unirrigated, and the reverse is the case with that given in light soil; as, therefore, the expense must be considered, and the increased out-turn is unimportant, the Committee are of opinion that the question of irrigation in the districts alluded to (Surat and Broach) may be regarded as satisfactorily disposed of.

"It may be stated, as a general principle, that when once the plant has attained its full growth, and has come into bloom, the less water it receives the better, as the effect of watering at such a period is usually to cause the bolls to drop off, and the plant has again to put forth new fruit-bearing branches; the effect, therefore, is to delay, without materially affecting, the ultimate out-turn of the crop." [2]

The opinion formed from an experiment in the Belgaum Collectorate was reported to be, that "cotton cannot be grown profitably in the district on red soil, and that, in black soil, irrigation is positively injurious to the crop."

Mr. Seton Karr, the Collector, stated, "The actual result of the experiment in figures is as follows:—

"*Half Beegah—Red Soil.*

	Yield.	Value.	Expense of Cultivating.
		Rs. a. p.	*Rs. a. p.*
Irrigated	1 Maund 44 seers	1 4 5	10 5 6
Unirrigated	.....	.....	10 0 0

[1] Revenue Consultations, vol. lii. 1859, pages 205—207.
[2] Revenue Consultations, vol. lii. 1859, pages 213 and 214.

"*Half Beegah—Black Soil.*

	Yield.	Value.	Expense of Cultivating.
		Rs. a. p.	*Rs. a. p.*
Irrigated	6 Maunds 5 seers ...	10 12 6	5 15 0
Unirrigated	10 Maunds 4 seers ...		

The Revenue Commissioner, in forwarding this report, observed, "As regards the Belgaum Collectorate, the result is stated to be a failure with respect both to red and black soils." [1]

In his Garden and Forest Reports for 1858-59, Dr. Gibson stated—

"Cotton, watered and unwatered, was tried as an experiment, in obedience to the orders of Government, last season.

"The produce, as is usual with cotton grown in this part of the country, is short in staple, and all the pods more or less diseased. The difference in produce between watered and unwatered was not more than 4 lbs. The total quantity sown was three-quarters of an acre, and this in soil which, if situated in Guzerat, would have been called cotton 'khanum' soil, of quality No. 2." [2]

The diversity of opinion which prevails regarding the effects of irrigation may possibly bear some relation to the famous argument about the colours of the chamelion. The whole seems to resolve itself into this: a certain degree of moisture is requisite for the cotton plant, but an excess of it is injurious, either rotting the seed, or forcing it out into mere stalk and leaf. When the natural moisture is not supplied in rain, there is no doubt that artificial irrigation, if judiciously supplied, would be beneficial, but the difficulty of estimating the quantity required, the danger of having that calculation upset by subsequent circumstances, and the impossibility of repairing an error of judgment, render the system of artificial irrigation, for cotton cultivation in this country, extremely hazardous. The tendency would always be to give water in excess.

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[1] Revenue Consultations, vol. lii. 1859, pages 243 and 244.
[2] Revenue Consultations, vol. lii. 1859, page 244.

CHAPTER XVII.

COTTON,

FROM FIELD TO MARKET.

The deterioration of Indian Cotton—The Kullee system—Hybridising and adulteration—Remedies—Report of Mr. Seton Karr—Report of Mr. Stewart Gordon—Report of Dr. Forbes—Revenue Commissioner's opinion—Communication on the subject from the Bombay Chamber of Commerce—Reply of Dr. Forbes—Cotton-cleaning machinery—The Churka—The Sind *Aitree*—The Foot-roller—The Saw-gin—Defective gins in use in the Southern Maratha Country in 1855—Improvements effected by Dr. Forbes—Unsuitability of the Saw-gin for cleaning Native Cotton—The Cottage Churka invented by Dr. Forbes—Opinions regarding its merits—Middle-men and their relation to the Ryots—Prevention of fraud—Condition of the Ryot—The yield per acre of Indian Cotton.

The American planters, as well as all those who preceded them in the management of cotton experiments, have agreed in asserting that the defects of Indian cotton, so far as they are not peculiar to the species, arise from improper treatment after the crop is ripe. Mr. Mercer stated, in the report already quoted, "The great inferiority of most of the Indian article is the result of what befalls it subsequent to its production in the fields; that is, from the way in which it is gathered and stored, and chiefly the way in which it is separated from the seed and prepared for market, as well, also, as the manner of its transmission to market." [1]

The impure state in which cotton is brought to market originates in carelessness, and is perpetuated by calculation. Alive as the native is to self-interest, so far as he is capable of seeing it, the probability is that cotton is not prepared in a cleaner way, precisely from the consideration stated by Sir J. Carnac, that "dirty cotton pays better than clean." The remedy for this evil has clearly not been administered by buyers and consumers, in whose

[1] Revenue Consultations, vol. liii. 1846, page 156.

hands it rests, or the cure would, ere this, have been effected; but all who know the character of the Indian must be sure that, unless he is tempted by an increased ratio of profit upon clean cotton, he will not take the trouble to produce it. Such a characteristic, indeed, is not limited to the Asiatic, and we may, perhaps, look in vain for the spirit which improves an article for the sake of the consumer, without the stimulating prospect of increased gain to the producer. The American planters, as has already been shown in this work, found the natives perfectly well acquainted with the proper mode of picking cotton, and they stated that only the stimulus of a rather higher price was requisite in order to induce them to adopt it. The picking of native cotton is generally paid for in kind, and the great object of the labourer being to gather as rapidly as possible, he is indifferent to the quantity of leaf which he may collect at the same time. The picking of New Orleans cotton is paid for by the day, like any other labour, and its pods being much larger and more open than those of the indigenous kind, the careful gathering of the crop can be more easily secured than in the case of the indigenous.

The kullee system formerly assisted in deteriorating cotton. It has already been explained, that, under the old revenue system, cotton, when gathered, was immediately transported to the village kullee, or pound in fact—a large enclosure, surrounded by a thorn or prickly-pear hedge, in which the cotton was detained till the assessment was paid. There, it was either piled in heaps, or laid in pits dug for the purpose, with their sides plastered with cow-dung; a few clods were placed over it, which, although sufficient to prevent its being blown away, were not sufficient to prevent its being wet by the dews or mixed with the dust. It was with great difficulty that Government, on the abolition of the kullee system, could induce the native owners to adopt a better mode of storing.

It will be remembered that Mr. Elphinston attempted to produce, by artificial impregnation, new and superior varieties of cotton. He stated his belief that the staple might, by judicious crosses, be as much improved as the qualities of the horse were by a careful admixture of races. In 1845 he wrote—

"Perhaps it may not be unacceptable if a few remarks are here offered regarding the attempts made, in a small way, at Rutnagherry, with the object of creating an improved variety of cotton for general culture. Proceeding upon the basis that the Bourbon cotton, from its hardiness and prolificness, and the goodness of its cotton (which seemed superior to the New Orleans), was one of the best kinds to experiment on, wishing the continuance of these qualities in this perennial, and at the same time to improve its wool, a hybrid seed was generated from these plants by artificially crossing them with the

American Sea Island annual, and to seed of the first class I have given the name of Hybrid Bourbon No. 1, and to three succeeding crosses the names respectively of Hybrid Bourbon, Nos. 2, 3, or 4, as the case may be ; these have been raised in some quantity at the Sewra Garden, as will be seen in the list of the cotton sent to Bombay. The seed of this kind (the Hybrid Bourbon), sown in good soil, will not yield a degenerated cotton, but will, I expect, permanently maintain its superiority, and is accordingly worthy of distribution to other collectorates if Government see fit."[1]

There has been much controversy, in connection with the deterioration of Dharwar New Orleans cotton, as to how far natural hybridisation takes place. In this country the question is so closely connected with that of the wilful mixture of seed and the adulteration of its produce, that it is scarcely possible to separate them. The attention of Government was called, in 1858, to the increase of mixed cultivation in the Dharwar districts, which threatened seriously to injure the reputation, and finally to destroy the value, of the exotic cotton grown there, and they were urged to legislate, in order to stop the practice, making mixed sowing a penal offence. The matter was referred to Mr. J. D. Inverarity, the Revenue Commissioner, who forwarded to Government the following opinions from officers in his district :—

"Mr. Seton Karr, Collector of Belgaum, premises that the cotton referred to which it is desirable to preserve free from adulteration is, of course, the New Orleans, and, he adds, "The object in view is not easy of attainment. During my tour last season, I ascertained, by personal observation, that a large breadth of land had been sown with New Orleans and country cotton intermixed, and, of course, nothing could prevent the wool of the two sorts from being mixed in picking. All I could do was to impress on the people how requisite it was, for their own interests, to keep the two species quite distinct. It is necessary, however, to use great caution in interfering on such a point. The ryots are very easily alarmed, and if subjected to annoyance, or to any injudicious interference on the part of the native officials, they are not at all unlikely to relinquish the cultivation of cotton in favour of some other produce. Some years ago a large decrease in the cotton cultivation of the Southern Maratha Country was attributed partly to the scoldings which the ryots got on this very point, and to the dislike which was created to having any concern with it, if not allowed to please themselves. I think the most judicious course would be for the cotton merchants, in Bombay,

[1] Returns, E. I. Cotton, 1857, page 715.

to act as much as possible on the traders and middle-men by whom the cotton is purchased directly from the ryots. More could be effected, I believe, by their means than in any other way. The European and native officers of Government should also continue their endeavours to prevent admixture in the sowing, or, afterwards, in the packing of the bales, but they should be cautious in their interference.

"Regulation III. of 1829 deals with the subject as far, perhaps, as it is safe for legislation to go. Self-interest in such a matter is likely to effect more than any other motive, and that can be most effectually operated on by those who take the cotton off the growers' hands, and without whose connivance the practice of admixture could not obtain." [1]

Mr. Stewart Gordon, First Assistant Collector in charge, Dharwar, forwarded a letter from Dr. Forbes, whose experience gives great weight to his opinions, and he observed, "The chief difficulty is the indolence of the cultivators, who reap such a large profit from the careless cultivation of mixed cotton, that they will not, unless compelled, take the trouble to procure unmixed seed.

"I see no remedy but to strike at the root of the matter by forbidding the cultivation of mixed cotton, and empowering the revenue officers to pull up the young plants, leaving it to the cultivators to elect which of the varieties shall be uprooted, and which preserved.

"I am confident that, if authorised to interfere to this extent, in the second season there would be no mixed cotton sown throughout the Dharwar Collectorate. The mixed cotton cannot be, and never is, picked separately, and when once mixed in the picking, nothing can separate the two varieties.

"Thus, if the mixed sowing be got rid of, and the Draft Act of 16th January 1858 be passed into law, with the verbal correction in Section II., as pointed out by Dr. Forbes in the 6th paragraph, the object of Government will, in my opinion, be obtained, and the more stringent the law is, the less necessity will there be for the continuance of Government interference with the cultivation of and trade in cotton." [2]

Dr. Forbes, in the letter referred to, states, that "in deciding as to what should best be done with a view to securing the cultivation of New Orleans cotton free from admixture with the native variety, there is but a choice of two measures, viz. the employment of persuasion or compulsion. The former would, of course, be most desirable, but my belief is that it cannot be used with advantage or success, notwithstanding any inducements that may be offered in the shape of prizes, rewards, &c.

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[1] Revenue Consultations, vol. liv. 1859, pages 176—178.
[2] Revenue Consultations, vol. liv. 1859, pages 178—180.

"Hitherto the cultivation of American cotton has always been a profitable and safe investment, yielding returns which have enriched a large proportion of the cultivators, and with which all of them are satisfied, so much so, that it is needless to attempt impressing upon them the fact that a little more honesty, as well as trouble, bestowed in procuring a better article would inevitably increase their profits.

"My connection with the factory causes me to see a great deal of the cotton cultivators, and I seldom miss an opportunity of representing the advantage to themselves that a very trifling amount of extra trouble would ensure. Where adulteration is wilfully practised, it is, of course, hopeless to expect that any attention would be paid to such advice; but where this was not the case, the replies of some betrayed the general feelings of all: 'It pays us very well as it is: why should we take any more trouble with it?'

"I have formerly had occasion to mention that I did not believe that prizes, or reward to any amount, would stimulate competition; one or two individuals might exert themselves for the occasion, with a view to securing the prizes merely for the sake of their value, if they were sufficiently tempting, but any desire of distinguishing themselves in the promotion of a public benefit would be looked for in vain.

"I have dwelt upon these points because I wish to show that, in recommending a compulsory measure, I do so from a clear conviction that no other resource is left; and my long residence in this part of the country, and my acquaintance with the cotton-growing ryots, ought to enable me to form an opinion on the subject.

"In a former communication to the Revenue Commissioner, dated 13th October last, paragraph 13, it was suggested, with reference to the new Draft Act of 16th January 1858, that exposing to sale different varieties of cotton mixed in the same bale should also be considered penal, with a view to obviating the evil now under consideration; but on further reflection, as this might probably not be taken by the grower as applicable to himself, it would, I think, be also necessary to introduce a clause forbidding mixed cultivation, as regards American cotton, under a penalty of fine or the confiscation of the crop. At the proper period for thinning and weeding, the plants are so easily distinguished from each other, that there would be no difficulty whatsoever in separating them, and this was done last season to a very considerable extent.

"To provide against evasion, the mamlutdars and mahalkurrees should be required, at a stated period, to visit the American cotton fields in their respective districts, and to report upon their having any admixture of the native

variety. The assistant collectors in charge should also be required to exercise a personal supervision,—to such an extent only, however, as would suffice for securing the proper attention of his subordinates to this duty; and, as a final check, it should be made part of the duty of the superintendent of the cotton-gin factory to visit the districts at the cleaning season, and, whilst inspecting the condition of the machinery, he should also be required to report upon the freedom of the seed from admixture. Evasion of the provisions of the Act should only be held to have taken place after the crop has arrived at maturity." [1]

The Revenue Commissioner observed, "On the same subject, I, in my letter dated 9th June 1858, wrote as follows:—Adverting to the observations of the Chamber of Commerce, in their Secretary's letter, dated 13th April 1857, relative to the admixture of inferior native kuppas with the American staple, and of the seeds of the two kinds at the time of sowing, I beg to state that the prevention of the mischievous practice has never been lost sight of. Personal influence is exerted, self-interest is appealed to, and every opportunity is taken of impressing both upon growers and dealers the importance of preserving the purity of the staple; but the evil complained of will not be completely remedied so long as ready sale is obtained for mixed cotton, and will be effectually cured only when experience has convinced the dealers that every bale of such cotton will be positively refused by the merchants interested in the trade. Mr. Gordon, First Assistant Collector at Dharwar, notices that 'he was told by the Agent of Messrs. Brice & Co. at Bunkapoor, that, at commencement of last season, his contractors brought him nothing but the most execrable cotton, but that, *when he resolutely refused to receive it*, they managed to provide cotton of a superior quality.'

"Government have already resolved that the necessity for any alteration of the law for the prevention of adulteration of cotton has not yet been shown, and add, 'It is a sound principle in commercial polity that the Government should refrain from authoritative interference with the regulation of domestic trade, except with the view of preventing fraud, and protecting the fair dealer.' If, then, merchants will be but true to themselves, they will find the local authorities always ready to co-operate, and to enforce the law wherever adulteration and fraud may be shown to exist." [2]

The Chamber of Commerce, in 1859, addressed Government on this subject, representing the desirability of framing some enactment for the prevention of

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[1] Revenue Consultations, vol. liv. 1859, pages 180—185.
[2] Revenue Consultations, vol. liv. 1859, pages 185—187.

mixed cultivation. On the question of hybridisation, they advanced the following statement:—

"It appears to the Chamber, from the numerous communications of Dr. Forbes, that this deterioration of the produce is not to be traced to a wilful admixture of the native with the American seed, but rather to the result of hybridising. Thus, assuming that in 1850 the total amount of native plants in a field of cotton should be only one per cent., and that this one per cent. would hybridise the seed of five plants in its vicinity, we should have the following formula of progressive deterioration:—

	Native Seed.
1850.—1 per cent. of native plants would hybridise 5 per cent., and would yield	2½ per cent.
1851.—2½ per cent. of native plants would hybridise 12½ per cent., and would yield	6 do.
1852.—6 per cent. of native plants would hybridise 30 per cent., and would yield.....	15 do.
1853.—15 per cent. of native plants would hybridise 75 per cent., and would yield	37½ do.
1854.—37½ per cent. of native plants would hybridise the whole, and would yield	50 do.

"Assuming this view to be correct, the present crop of American cotton is nothing but a hybrid between the native and the American; but, as a hybrid tends constantly to return to its original character, the relative characters of the two plants are not really permanently changed, but merely mixed together, as it were, mechanically, and the whole cultivation presents the appearance of native and American plants intermixed. If, however, the natives could, by any means, be induced to weed out all the native plants, the American would soon revert to its original purity, and regain the commercial value it held five years ago.

"The distribution of pure American seed by the Cotton Supply Association will hardly check the evil, as the quantity thus obtained can only be small, and it is always liable to the chance of its germinating power being lost, by heating or other causes, during the sea voyage, when the labour of the cultivator will be totally lost, and experiments with this description become justly unpopular with the natives." [1]

In reply to a reference on this subject, Dr. Forbes stated, "I do not at present recollect the communications in which I supported the theory of

[1] Revenue Consultations, vol. liv, 1859, pages 291—293.

'hybridising,' but if I did at one time hold such an opinion, I have certainly since then met with sufficient grounds for modifying it.

"I believe that the indigenous and American varieties do not readily affect each other in this respect, or, if they do, that the change in the offspring is so very slight, that it cannot readily be distinguished from the exotic parent. On the other hand, the two varieties, seen growing together in mixed cultivation, are just as distinct from each other as those of separate fields. I have over and over again examined the supposed hybrid in all its stages, and found it invariably true to the native plant in every characteristic. Recently also, when examining the cotton cultivation in the Assigned Districts, in company with the Commissioner, Major Meadows Taylor, we made this the subject of careful observation, and he was of the same opinion that I have now stated."

And in another communication he observed—

"On the subject of hybridising, my impression is, that the deterioration supposed to arise therefrom, and regarding which so much has been written, is to a great extent imaginary. I belive that this theory has been saddled with the whole burden of the evils arising from mixed cultivation and the wilful adulteration of cotton."

As regards the remedy, there existed equal difference of opinion. The Bombay Chamber of Commerce stated, in the letter just quoted—

"Upon numerous occasions the Government has called upon the mercantile community to check adulteration and fraudulent admixtures, apparently under the impression that it was specially a merchants' rather than a planters' question, and that the former were deeply interested in purchasing a pure article. This, however, is by no means the case: the whole business of a merchant is to buy in the cheapest, and sell in the dearest market; and if he believes that, taking price into consideration, he will reap a higher profit from the purchase of adulterated saw-ginned cotton than he will from the finest Broach cotton, he will purchase the adulterated in preference to the pure article, and no combination that could be devised would prevent this principle being carried into effect."

In his reply to Government, Dr. Forbes made the following comments upon this passage:—

"There can be no doubt that the rule which governs ordinary mercantile transactions is to buy at the cheapest, and to sell at the dearest market; but where this is adhered to, the purchaser has no cause to complain of the quality of the produce, if, for his own individual advantage, he prefers purchasing the inferior article whilst the superior is at his disposal.

"This particular case, however, I think, presents an exception to the usual

rule. The outcry from home is to the effect that the proper quality of produce is not procurable; that the resources of the country are not being developed; that India is capable of supplying a superior article to that with which the consumers are now served, and which might render them more independent of other sources, which are considered precarious. At the same time, it is here admitted that this better quality of articles *is* procurable, but that it must give place to the inferior, which, for the time being, realises a better profit to the merchant. This not only offers a premium upon adulteration, but it also excludes the home manufacturer from ever seeing the proper article, because he can only do so through the merchant, who is virtually his agent.

"Even where the trade of a country was fully established, its decline might be anticipated if such a system was invariably pursued; but where, as in the present case, the object in view is the introduction of a foreign or exotic article, which, as yet, may be said to have its reputation to establish in the home market, it is scarcely possible to hope that its cultivation can be successfully extended, unless it can obtain the support of a little more liberal consideration.

"No steps that can be taken, either by Government or otherwise, towards enforcing or obtaining purer cultivation can be of any use so long as the better quality is not appreciated; and the grower can hardly be expected to discover his interest in producing it, when he finds that he obtains a more ready market for the impure and adulterated article, which probably, for the occasion, pays him just as well as it does the merchant.

"But even if the cultivator exerted himself to the extent expected of him, the case would be in no way improved. Adulteration is the trade of the native broker: and so long as he remains the medium of communication between the grower and the Bombay merchant, it is hopeless to expect that the produce of the country will arrive at the home market in a pure condition, let it be cultivated, picked, and cleaned ever so carefully.

"I know also that this is the opinion of the ryots and dealers by whom the American cotton is ginned in this quarter. In the Bunkapoor and Seegaum districts, where a very considerable addition has been made this season to the cultivation of the New Orleans plant, the fields have been cleared of admixture with the native variety in a manner which was most satisfactory to notice. I examined them during my recent tour accompanied by their owners, who pointed to what they had done in fulfilment of a former promise, and at the same time they stated that they were most desirous that their cotton should go to England in its present pure state, in order that it might obtain the name which they knew it deserved, and of which they would ultimately reap the benefit; but that, nevertheless, they knew that it had not the most remote

chance of doing so through the Compta brokers, who would only use it for admixture so as to pass off their up-country inferior cottons.

"I have only to repeat that, from what I have seen of the willingness on the part of the cultivator to meet the wishes of those who are calling out for purer produce, I believe that, if he receives the encouragement which in his turn he has a right to expect, no legislative interference will be required in this quarter."

The portrait drawn in the Chamber's letter is not flattering, but it is true, although the likeness has been repudiated. The same reply to the appeals of Government for co-operation appears a dozen times in the Government records. The description of mercantile operations is true, and always will be true, but probably the matter is neither a merchant's nor a planter's, but a consumer's question. So long as the spinner finds it worth his while to pay a higher price in proportion for adulterated saw-ginned Dharwar than for Surats, the merchant will find it worth his while to supply, and the Banian to produce it.

There are two native machines for separating cotton from its seed, viz. the churka and the Southern Maratha foot-roller. The following is a description of the churka:—"It consists of two cylinders—one of iron, the other of wood—which revolve in opposite directions, and are placed in a horizontal position, parallel to, and touching each other; they are each about 2 feet long, with their ends resting and moving upon wooden legs or supports 12 or 14 inches high. The iron cylinder is about half an inch in diameter, rather thicker about the centre, and slightly, or rather gradually, tapering towards each end; it has a handle attached to one extremity by which it is turned. The wooden one is about an inch and half or two inches in diameter, having the end opposite to the handle of the iron cylinder fixed to the centre of a wheel 18 or 20 inches in diameter with a broad run, in which there is a hole sufficiently large to admit the finger, or a piece of wood as thick, by which it is turned. A man and a woman, or a man and a boy, take their stations at each end of this gin and turn the cylinders in opposite directions, feeding them alternately."[1] Cotton cannot be cleaned by the churka in damp weather, and for about four months in the year, consequently, they cannot be used. Dr. Burn stated, "A slight shower of rain happening is sufficient to put a stop to all the churkas in the country for one or two days."

In Sind the machine in common use is called an "Aitree," and is merely a rude form of the churka.

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[1] Revenue Consultations, vol. xxxiii. 1839, pages 98 and 99.

"The instrument has for its base a plank, or rather block of wood, about 20 inches long and four in breadth. On this plank are raised two pedestals, having a space between them of eight or ten inches, and being themselves about 18 inches high. Between these pedestals, and resting on them, are two rollers—the one of steel or iron, three-quarters of an inch in diameter, the other of wood, an inch and a half, or nearly two inches in diameter. These rollers are turned by the hand, the handle of the wooden one being on the opposite side to that of the steel. Two men are employed in working the instrument—one man on one side turning the wooden roller from right to left, while the man opposite causes his steel roller to revolve in the opposite direction. The thin steel roller is placed over the wooden one and almost touching it.

"The cotton which is to be freed from the seed is placed in a heap close to the workmen, one of whom, while turning the handle with his right hand, feeds the instrument with his left. The rollers revolving in the opposite directions close to each other draw in the phootee; the seed, from their size, not being able to pass between the rollers, are pressed out, and fall on this side the rollers, while the cleared cotton, passing through the rollers, falls on the other." [1]

The Southern Maratha foot-roller is an iron rod, thick in the centre and tapering to the ends. "The cotton cleaner, generally a woman, sits on a low stool with a smooth, flat stone on the ground before her. Upon this stone the roller is laid, and on the projecting portions two wooden soles (as of shoes) are placed. The feet of the cleaner are placed upon these soles and rapidly pushed backwards and forwards simultaneously, which communicates a rotary motion to the iron roller. The cleaner, assuming a sloping posture, feeds the roller from the front with the cotton, which is by the action of the roller drawn under it towards the cleaner, while the seeds are separated and ejected by the roller in front." [2]

Mr. Shaw stated that a woman can with this machine, in a working day of nine hours, clean 15 lbs. of native cotton, and only 3 lbs. of American cotton, her wages for doing so in either case being one anna and three pies. [3] The same necessity for dry weather exists in the operation of this machine.

The following description of the saw-gin is given by Dr. Ure:—"The principal parts of the saw-gin are two cylinders of different diameters, mounted on a strong wooden frame, which are turned by means either of a handle or of

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[1] Revenue Consultations, vol. lxxxiii. 1851, page 101.
[2] Revenue Consultations, Compilation No. 527 of 1861.
[3] Returns, E. I. Cotton, 1847, page 478.

a pulley and belt, acting upon the axis of a fly-wheel. Its endless band turns a large pulley on the end of the saw cylinder and a smaller pulley upon the end of the brush cylinder, so as to make the latter revolve with the greater rapidity. Upon the wooden cylinder, ten inches in diameter, are mounted, three-quarters of an inch apart, circular-saws of one foot diameter, which fit very exactly into grooves cut one inch deep into the cylinder ; each saw consists of two segments of a circle, and is preferably made of hammered (not rolled) sheet iron ; the teeth must be kept very sharp. Opposite to the interstices of the saws are flat bars of iron, which form a parellel grid of such a curvature that the shoulder of the slanting saw-tooth passes first and then the tooth. Care must be taken that the saws revolve in the middle of their respective grid intervals ; for if they rubbed against the bars, they would tear the cotton filaments to pieces. The other hollow cylinder is mounted with brushes, the tips of whose bristles ought to touch the saw-teeth, and thus to sweep off the adhering cotton wool. This cylinder revolves in an opposite direction to the saw cylinder. The seed cotton is thrown into a hopper, and disc-saws, in turning round, encounter the cotton filaments resting against the grid, catch them with their sharp teeth, and drag them inwards and upwards, while the stripped seeds, too large to pass between the bars, fall through the bottom of the hopper. The size of the aperture is regulated at pleasure by an adjusting screw to suit the size of the particular species of seeds. The saw-teeth, filled with cotton wool, after returning through the grid, meet the brushes of the other cylinder, and deliver it up to them ; the cotton is thereafter whisked down upon a sloping table, and thence falls into a receptacle prepared for it." [1] This, with slight modifications, is the machine about whose introduction into this country so much has been said in this work.

The advantages it possesses in economy of time and expense are vast, but, unfortunately, these for a long period blinded experimentalists and others to the fact that, though admirably suited for cleaning long and strong stapled cottons, the more tender fibres of Indian cotton cannot withstand its somewhat severe action. This injurious operation is singularly exemplified in the fact that the adulteration of New Orleans cotton with indigenous Compta is at once betrayed, after passing through the saw-gin, by the destroyed fibre of the latter.

The American saw-gins first introduced into this country were of excellent construction, but, subsequently, alterations, miscalled improvements, and unskilful deviations from the original model, rendered the great mass of the small gins distributed throughout the country injurious to the staple of any cotton they

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1 The Cotton Manufactures, vol. i. pages 141 and 14

might operate upon, and more especially to the indigenous. Dr. Forbes, in 1855, attributed the very great decline which had taken place in the cultivation of native cotton in Dharwar to the effects of these machines. He stated—

"The above failure is entirely to be attributed to the introduction of machinery ill-suited to the purpose required. The only object which would appear to have been kept in view was the amount of cotton a gin could be made to clean in excess of the churka, and quantity was accordingly attained, but the most casual examination of the staple would have shown that for all manufacturing purposes it was utterly ruined in the process, and the fibre cut off the seed rather than pulled from it."

And again—

"The cause of this state of matters has been the introduction, on an extensive scale, of a description of gin, so objectionable in mechanical construction, that, after a very short period of use, injury to the fibres of the cotton cleaned by it must ensue, and this injury must continue increasing in degree, until the machine at length wears itself out." [1]

Mr. Reeves, then Revenue Commissioner, Southern Division, confirmed the assertions of Dr. Forbes as to the character of the saw-gins in use, and he observed—

"In the Southern Maratha Country, Government have had three American, and one English, superintendents, every one of whom was fully convinced that he understood the calculations by which the construction of a saw-gin should be effected. Yet it is now as clear as day-light that for years Government has been making and selling gins to the cultivators and merchants connected with the production of New Orleans cotton in Dharwar, which will probably create a serious objection against that kind of cotton in the home market. Having twice visited the factory at Dharwar, now under the care of Dr. Forbes, and carefully examined the saw-gins formerly made by Mr. Frost, particularly those brought in for repair, and compared them with those made up by Dr. Forbes, I am quite convinced of what I here state.

"The cultivators and local dealers of Dharwar and Belgaum look solely to the quantity of cleaned cotton that they can turn out in a day; they are perfectly reckless as to the manner in which the cotton is cleaned, and they work their saw-gins as long as they can be kept going. It is therefore of the greatest importance that the machine supplied to them should be made sufficiently strong, and on the best possible principle; too much care cannot be bestowed on these points, for the character of Bombay cotton depends on them."

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[1] Returns, E. I. Cotton, 1857, page 1203.

Dr. Forbes introduced several alterations into the saw-gin then in use, all tending to restore the machine to the effective state of the original model. He explained—

"Any person who has once seen a cotton gin in use must readily understand that the true working of the saws in the grating is absolutely indispensable to the safe cleaning of the cotton. Whenever these two parts come even into close proximity, the staple cannot be drawn through without damage. When they come into actual contact, every fibre must be cut, and the machine becomes an engine of destruction to the material ginned, as well as to itself, by the grinding away of the saws. It is in this latter condition that it is usually brought in for repair, and I have not been able to devise either an alteration or reconstruction calculated to prevent this result."

Mr. Ogilvy stated to Government the nature of the modifications devised by Dr. Forbes as follows:—

"The chief remedies that Dr. Forbes proposes to apply to the saw-gin machinery in use throughout this collectorate are the separation of the driving-wheel from the body of the gin, as in the American model, and the substitution of zinc for wood and iron at those parts of the machine that are liable to wear from friction.

"By separating the driving-wheel from the body of the gin, and removing it to a greater distance from it than can be done when the two are united by a frame, as those made at Dharwar have hitherto been, the machine works with a truer and steadier motion, and by preventing any displacement of its parts, it preserves the fibre from injury by the saws." [1]

Mr. Reeves reported very favourably of this improved machine.

"Dr. Forbes has now produced a ten-saw machine," he observed, "in which these defects are very completely rectified, as I believe. I have seen it work twice, and its superiority over the latest improvement of Mr. Frost is very evident. * * * The performance of Mr. Frost's eight-saw gin being 1 maund 13½ lbs. of cleaned cotton per hour, or 15 maunds 15 lbs. per diem, while that of Dr. Forbes' ten-saw gin is 1 maund 26 lbs. per hour, or 19 maunds 3 lbs. per diem."

Government consequently authorised the alteration of all the old gins at the mere cost of material and labour, to which the owners were very willing to agree.

A committee was appointed by Government to test the working of Dr. Forbes' gin in contrast with the former model. The committee consisted of Mr. Spooner, Captain J. H. Burke, Captain W. C. Anderson, Captain H. J.

[1] Returns, E. I. Cotton, 1857, pages 1203—1206.

Barr, and Mr. A. Binny as the nominee of the Chamber of Commerce. The following is an extract of their report :—

"The 20-saw gin received from Dharwar, the 10-saw gin from the same place, both of the new or Dr. Forbes' construction, and both the gins received from Guzerat, were tried in the presence of the committee; a maund of seed cotton was allotted to each gin. The following tabular statement gives the time in which each gin performed its task, together with particulars as to the quantity of seed and of wool turned out, and the extent to which the staple was injured :—

Description of Gin.	Number of Men working.	Weight of Seed Cotton	Time occupied in Cleaning.	Out-turn.		Remarks.
				Seed.	Wool.	
		lbs.	Minutes.	lbs.	lbs.	
20-saw Guzerat Gin, No. 1.	4	28	20	20	8	Fibre much cut and knotted.
Ditto ditto No. 2.	4	28	20	Result not taken.		
20-saw Dharwar Gin, Dr. Forbes' construction	4	28	10	19¼	8¾	Fibre as little injured as is possible in ginned cotton.
10-saw ditto ditto....	2	28	21	18¾	9	

"The Guzerat gins, it was evident, were in very bad working order: the saws were in continual contact with the grates, and injury of the staple was consequently unavoidable.

"The merchants and brokers connected with the cotton trade on different occasions inspected the gins, and saw them work, and expressed their approval of the manner in which the new gins worked, particularly as regards absence of injury to the staple.

"The committee are unanimously of opinion that the new, or Dr. Forbes' gins are decidedly superior to those of the old construction, both in durability and in the quantity and quality of the work capable of being performed by them, and they have no hesitation in strongly recommending that the new gins be introduced in substitution of the old to the greatest possible extent." [1]

As has already been stated, in November 1859 there were upwards of 600 saw-gins in the Dharwar district, of which number about one-half were constructed on the model introduced by Dr. Forbes.

The improvement thus made rendered the ginning of New Orleans cotton more effective, but did not materially increase the suitability of the machine

[1] Returns, E. I. Cotton, 1857, page 1219.

for the cleaning of indigenous cotton. In 1859, Dr. Forbes remarked on this subject—

"There can be no doubt of its being unsuited to the purpose, and that the staple is accordingly so seriously damaged, that a continuance of its use is an error calculated only to bring gins into discredit.

"As far back as 1855, I brought this subject to notice, and since that time no native cotton has been cleaned by the saw in these districts. I believe a gin may be made which would answer the purpose, but it must differ in many material points from the article which is now in general use throughout this Presidency, more especially as regards the description of saw applied. * * * The same gin will not clean equally well two articles that differ so much as the native and American do in this respect.

"Owing to the small size of the seed of the indigenous cotton (which does not exceed one-third of that of the New Orleans), and also from the shortness and tenderness of its fibre, there can be no doubt that, for the cleaning of it, the roller is the best and safest appliance, if its performance could only be expedited by the application of mechanical power to the churka."

The Committee of the Manchester Cotton Supply Association, in December 1859, made the following remarks regarding saw-ginned indigenous Indian cotton:—

"The Committee cannot recommend the use of the saw-gin, finding that the saw-ginned Indian cotton is almost unsaleable in Liverpool, on account of the injury done to the fibre by the action of the saw, and that it never realises by ½*d.* to 1*d.* per lb. so much as when ginned by the Macarthy gin. They are of opinion that, although the Macarthy gin does not turn out so much clean cotton per day as the saw-gin, it would pay better to work an extra number of them, than to use the saw-gin under any circumstances. It is only a question of first cost. For cottage purposes, the Macarthy gin surpasses the native churka. It does no injury to the staple, and will clean quite as much cotton as the ryot is likely to produce. They cannot, therefore, too strongly condemn the use of the saw-gin."

Dr. Forbes for a considerable time had turned his attention to the improvement of machinery for cleaning Indian cotton, and finally he succeeded in inventing an instrument, on the principle of the native churka, which was exhibited to the Chamber of Commerce in March 1860, when the following opinion regarding its capabilities was expressed by Mr. John Fleming, and confirmed by other members:—

"In principle it is almost identical with the Guzerat churka; but certain mechanical appliances, of a very simple character, enable it to be worked by

one instead of two persons, and to turn out a very much larger quantity of clean cotton in a given time than the rude native instrument.

"The present machine has been adjusted for cleaning kuppas peculiar to the Southern Maratha Country; but Dr. Forbes states that, by slightly altering the relative size of the rollers, it may be adapted for cleaning any description of native cotton.

"Even in its present state, however, this machine cleans Surat kuppas well.

"Worked by one lad, it yesterday cleaned 3 lbs. of Dharwar kuppas, yielding three-fourths of clean cotton, in five minutes=36 lbs. kuppas or 9 lbs. cotton per hour = 360 lbs. kuppas or 90 lbs. cotton per diem.

"The common instrument in use for cleaning cotton in the Southern Maratha Country is the foot-roller (worked by one woman), which, I believe, can turn out about 12 lbs. clean cotton daily.

"Comparing, therefore, Dr. Forbes' cottage churka with the foot-roller, we have a daily yield of 90 lbs. clean cotton against 12 lbs.,—the machine multiplying the power of a single person 7½ times.

"Another trial of this churka was made with Surat kuppas, for which, as previously stated, it is not properly adjusted. Two pounds of Surat kuppas, yielding two-thirds of clean cotton (the yield of fibre from native Guzerat kuppas is greater than from Dharwar kuppas) were cleaned in six minutes—20 lbs. kuppas, or 6⅔ lbs. fibre per hour = 200 lbs., or 60 lbs. per diem. The common Guzerat churka turns out only 28 lbs. to 30 lbs. of clean cotton daily, and requires two persons to work it.

"We thus find that, imperfectly adapted as this machine is in its present form for cleaning Surat kuppas, it quadruples the power of an individual, as compared with the common Guzerat churka.

"A comparative trial with one of Dunlop's Macarthy gins was also made. The Macarthy gin in question was imported by me about a year ago, and cost at home £12.

"Whilst Dr. Forbes' churka, worked by one lad, without any very violent effort, cleaned 3 lbs. kuppas in five minutes, the Macarthy gin, worked by two persons, with exertions which could not have been long sustained, cleaned only 2 lbs. kuppas in the same time; the result per individual is as six to two.

"As a cottage churka for cleaning Indian native cotton, I am of opinion that this machine of Dr. Forbes, stands at present quite unrivalled. It cleans cotton without injury to staple; it does a very large amount of work, with a comparatively small expenditure of force; it is a very simple construction, not easily put out of order, or, if disarranged, may be very easily repaired.

"The first question, I consider, is its cost. Dr. Forbes believes such machines can be supplied for Rs. 25 each.

"Supposing each machine to cost Rs. 30, and taking its results with Surat cotton, as compared with the common churka, what would be the result to the possessor of one of these new churkas?

Interest on cost price at ten per cent.....	Rs. 3
Annual repairs	7
Allowance for wear and tear.....	10
	Rs. 20

"Supposing it worked only three months in the year, we have a monthly charge of say Rs. 7 (the churkas are usually at work two to three months before the monsoon, and as long afterwards).

"As previously stated, Forbes' churka can turn out 66 lbs., or say 60 lbs. of clean cotton daily, worked by one person, whilst the native churka, worked by two persons, turns out only 30 lbs. We shall, therefore, require two churkas, costing about Rs. 2½ each, and four men, to do as much work as Forbes' churka and one man; and, comparing the monthly result, we have to pay for Forbes' churka—the wages of *one* man, Rs. 7, against, for native churka—the wages of *four* men; and assuming wages at Rs. 6 per month, we have the former worked for Rs. 13 per month, and the latter for Rs. 24 per month, showing a monthly gain in favour of Forbes' churka of Rs. 11.

"The power-churka cleans native cotton without injuring the staple, and works with as great rapidity as the saw-gin.

"I have carefully examined samples of Dharwar, Surat, and Egyptian cotton cleaned in my presence, and could not detect any injury done to the staple in the process of cleaning.

"A peculiar curl is given to the fibre by a wire used in this machine and the cottage churka for turning the cleaned cotton off the roller, and preventing clogging. I am of opinion that this does not injure the cotton in any respect, and were the cotton beaten after cleaning, as is usually done in Guzerat, the objectionable appearance, I think, would be removed.

"Dr. Forbes states that the larger machine can clean 1,000 lbs. kuppas—250 lbs. Dharwar cotton—daily, and requires two men to drive the fly-wheel, and a boy to feed.

"Referring to notes made by me two years ago at the Government experimental establishment at Dhundooka, I find that—

"*A gin* of 20 saws, costing Rs. 160, worked by 8 men, produced about 200 lbs. clean cotton daily.

"*A common churka*, worked by a man and woman, turned out 28 lbs. daily.

"*Dr. Forbes' churka*, worked by 2 men and a boy, turns out 250 lbs. daily.

"Comment is not necessary. The difficulty of getting labour for cleaning the cotton, especially in those districts where railway works are in progress, is becoming very serious, and even threatens the existence of the cotton trade.

"Dr. Forbes' invention appears most opportunely.

"His machine, cleaning cotton with as little injury to staple as the common churka, dispenses, in a great measure, with manual labour.

"Driven by bullock, steam, or (still better, where such is available) by water-power, it requires only a few boys and girls as feeders."

In consequence of doubts expressed as to whether the peculiar curl which has been mentioned does not prejudicially affect cotton cleaned by this "Cottage churka," Messrs. Birley & Co., of Manchester, were requested to work with a sample of it, and those gentlemen gave the following report :—

"We have passed the small bag of cotton, which you brought to us, through all the usual processes of spinning, and have spun it into 32's, weft cops. We watched it carefully through each process, with the view of ascertaining whether there is in it that peculiar 'curl' described by Mr. Crankshaw of Bombay, and quoted in the *Cotton Supply Reporter* of 15th June, but have failed entirely in discovering it. We think the cotton was exceedingly well cleaned, and quite suitable for spinning purposes." [1]

The rapid exhaustion of timber in the forests of Canara, from which the supplies of the Dharwar factory have hitherto been obtained, has rendered it necessary to adopt some substitute, and Dr. Forbes has long recommended the use of cast-iron. At the close of 1859, feeling that the provision of adequate cleaning machinery was absolutely necessary to the improvement of the indigenous cotton, Government resolved to depute Dr. Forbes to England, for the purpose of superintending the construction of his Cottage Churka, which promises to be the most effective gin yet invented for native cotton. In adopting this resolution, they stated, "We are convinced that this Government could render no better service to the cotton culture of the Bombay Presidency." [2] The result has been the production of an iron gin, simple, cheap, and durable, which is likely soon to supplant the native churka and foot-roller, and to have a most beneficial effect on the cotton trade of this country.

The subject of middle-men has been too frequently discussed to require much elaboration here. The system is one of the evils almost inseparable from a poor and undeveloped country. It exists, in some degree, in every land where

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[1] Report, Bombay Chamber of Commerce, 1859-60, pages 165—172.
[2] Revenue Consultations, vol. lii., 1859, page 100.

the soil is lotted out in minute plots amongst penniless cultivators. But India, without roads and without means of communication, is its paradise.

Mr. Vaupell, in 1839, gave the following account of this class:—"The agents employed between the grower and exporter are generally Banians, who, to the eastward of the Gulf of Cambay, are termed Wakariahs. These people are a kind of middle-men or forestallers, who make the necessary advances to the ryots to enable them to cultivate their fields, and become responsible to the Collector for the Government share of the produce, on condition of having the refusal of all the kuppas they may cultivate, either at the market rate, or at a rate previously agreed upon. It is these people who find their interest in adulterating the cotton previous to disposing of it to the exporter. If they, by any means, could be persuaded or compelled to relinquish such iniquitous practices, they would materially contribute to the preparation of the article in a clean marketable state, and consequently improve its quality in this respect; but until it can be made their interest to do so, it is not probable they will otherwise attend to any suggestion which may be offered for the attainment of so desirable a result. The cultivator, generally speaking, has no immediate inducement to render the produce of his fields unfit for the market; for, as in most cases he disposes of the cotton with seed in the state in which it is gathered, from that time his concern about it somewhat ceases, and it rests with the purchaser or middle-man to prepare it for the exporter."[1]

In 1850, Messrs. Ritchie, Steuart & Co., writing from Khandeish to Government, stated—

"Intrinsically the cotton is good, but the ryots generally, it appears, are so deeply indebted to the shroffs, that they have little interest in the crops, and the usurious profits which the latter are said to make, added to the apathy which characterises natives in such matters, render them indifferent to the quality of the produce. The cotton crop is, therefore, the least valuable which the people cultivate, and, being allowed to remain in the fields until other crops are secured, it is injured by the dews, and by the opening and crumbling of the parched pods. If parties who had advanced upon cotton crops were to interest themselves in inducing the ryots to give attention to the earlier picking of the cotton, they could afford to give so much higher prices as would place the cultivation of this produce on a par, in point of remuneration, with that of any other crops."[2]

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[1] Revenue Consultations, vol. xxxiii. 1839, pages 108 and 109.
[2] Returns, E. I. Cotton, 1857, page 913.

Mr. Price, the assistant superintendent of experiments in Khandeish, reported—

"Such are the restraints under which the growth of, and trade in, cotton are suffering in Khandeish, which, no doubt, are brought about by the growers of it being too poor to retain their crop in their possession for the market, in the hope of a more favourable opportunity for disposing of it occurring; they are obliged, consequently, to sell their cotton (which they very often do before it is picked and brought home) to the village Banian, who, from the influence he possesses over the ryots, can always obtain it at a price which can hardly remunerate the growers of it, and hence the reason why they do not interest themselves in picking their cotton clean for the market; these and other impositions, prejudicial as they are to the interest of the cultivating class, are, unfortunately, difficult of removal, more so as the generality of the ryots are too poor (and their produce, individually, too small) to undertake the consignment of their cotton on their own account to Bombay, or, at all events, to dispose of it with a fair advantage to themselves; and as the law, I fear, cannot take cognisance of these extortionate dealings, as they have the appearance of legal agreements, the mamlutdars, in my humble opinion, ought to be instructed to exercise a vigilant watch over the proceedings of the Banians, and to keep in check such practices as they, in their official capacity, can, by timely interference, prevent; this, with such assistance as Government can, through its experimental agency, furnish, by way of placing within access of the ryot economical machinery for cleaning his cotton, and superior seeds for the introduction of products capable of yielding richer returns than his ordinary crops. This, and the reduction of the land rates, where high and oppressive, will doubtless, in the course of time, operate as a gradual check against the extortions of the village Banian, and as a stimulus to the ryot to extend his cultivation of cotton."

In the Southern Maratha Country, Mr. A. N. Shaw stated amongst the great evils of the cotton trade in India—

"1. The want of local merchants, or persons deputed from the large mercantile establishments of the Presidency, to purchase cotton direct from the cultivators, instead of purchasing through a middle agent, who probably advances a sum of money to the cultivator for the crop, whilst on the ground, less than its worth. There is, therefore, no inducement to the cultivator to carefully gather the crop, and it is a matter of no great importance to the middle agent; hence follows the dirty condition in which cotton appears in the market."

In Belgaum, Mr. Channing, the superintendent of cotton experiments, stated, in 1848, as one of the causes of the deterioration of cotton, "The prac-

tice followed by the native dealers of advancing money to the ryots on the security of their crops, at the enormous interest of 37 to 38 per cent. per annum, and on receiving the kuppas, exacting from 3 to 4 pounds in excess to every maund delivered, and by so doing taking all profit from the grower, and thereby causing them to be perfectly careless as to how the crops are gathered, as the *more dirt the greater weight*, and, consequently, the deterioration of the value of the staple in the market, so much complained of." This opinion, "that the generality of the ryots suffer from the usurious practices of local monied-men," was concurred in by Mr. J. D. Inverarity, the Acting Collector, who added, "What is required to uphold this (improvement of cotton) is the existence of free communication by means of roads throughout all parts of the country. Until merchants from the Presidency or elsewhere are enabled, by means of roads, to visit the cotton districts, and create a competition by making their own purchases from the ryots, the latter must remain at the mercy of such dealers; and as these look to nothing beyond their own profits, which they attempt to swell by squeezing the ryots, the introduction of any improved exotic will never be accomplished so long as the country is shut out from free intercourse with the mercantile community at large." [1]

On the other hand, M. Davies, Collector of Broach, in addressing the Committee on the decline of the cotton trade, said something in their defence. He observed—

"The concluding part of your letter touches upon the enhancement which the cotton undergoes in price during its progress through the hands of the local purchasers and brokers. These, you are aware, are of two distinct classes—the wakharias (*i. e.* those who purchase the 'kuppas' from the ryot), and the brokers, who execute commissions from Bombay and other great marts. The wakharia has the cotton ginned and cleaned by Bheels, and by other labourers, preparatory to taking it into the market, and is generally reimbursed for this expense by the resale of the cotton seed. His prospects are afterwards very uncertain; for, as his profit or loss entirely depends upon the state of a distant market (Bombay), which may vary considerably after his time-bargains with the ryots and brokers have been completed, it often happens that those of his class become gainers or losers to a greater proportionate degree, upon the extent of their dealings, than the commission agents or brokers of the principal export towns, who derive their moderate per-centage without corresponding risk of loss. The wakharias are represented to have been considerable losers during the past three or four years, as well as others (natives of the districts),

[1] Revenue Consultations, vol. lxxiv. 1859, pages 216—219.

who, like the wakharias, were in the habit of purchasing cotton on speculation. I am given to understand, upon what I consider to be the best local authority, that a profit of two rupees per 'bhar,' or five rupees per candy of cotton, is regarded as sufficiently remunerative to the wakharia to reimburse him for all his risks.

"It appears to me scarcely fair to heap so much opprobrium upon the class of 'wakharias,' as has of late been the fashion. In hard times they are, undoubtedly, put to shifts which are as indefensible in a moral, as detrimental to their interests in a commercial, point of view, but it is not fair to regard them as a class of greedy middle-men. It should be borne in mind that they befriend the ryot, and, in a manner, become security for the public revenue by their individually humble, though jointly extensive, transactions; and that by their frugal management and moderate profit, they occupy the places of the more extensive merchants, whom the temptation of employing their capital to better purpose has drawn from the country." [1]

One thing, however, is undoubted—that much of the fraud and adulteration which are so common in Indian cotton take place after the staple has left the hands of the ryots. The exposure of cotton to night dews, mixture with leaf and seed, and with the refuse of the churkas, as well as the prevalence of other fraudulent practices induced Government, in 1829, to legislate on the subject. Regulation III. of that year makes it a penal offence—*Section* 1*st*, *Clause* 1*st*, Fraudulently to mix good and bad descriptions of cotton in one bale (or what is termed "false packing"); and *Clause* 2*nd*, Fraudulently to deteriorate cotton by exposing it by night to heavy dews, by putting dirt, stones, earth, or any other substance, or salt-water amongst it, with the view of making it heavier. These Regulations have been watchfully and stringently enforced for many years, and cases of such open fraud are now much less frequent than they used to be.

Although it is not the object of this work to examine the condition of the ryots, it may be incidentally mentioned that a great improvement in their state has taken place within the last ten years. The ryots are no longer the poverty-striken race they were, and their connection with the Banian is now less that of oppressed debtors, than of sellers dealing with their only customer. The ryot, it is true, inherits debt from his forefathers, the recognition of which is, by his religion, elevated to the rank of a virtue; but, whilst the debt is not repudiated, and interest is paid, the virtue is carefully transmitted to the next generation, and the inheritance is strictly entailed. Whilst the new Revenue Survey has lowered the assessment on the ryot's land, and demand has immensely extended cultivation, the value of produce has permanently advanced.

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[1] Returns, E. I. Cotton, 1857, page 32.

The following is a statement of the exports and imports, and of the relative value of some of the principal kinds of produce in 1850-51, 1855-56, and 1860-61 :—

	1850-51.	1855-56.	1860-61.
	Rs.	Rs.	Rs.
Imports of manufactures	15,272,124	19,314,097	36,172,563
Exports of cotton.....	19,313,656	23,204,541	53,523,208
Exports of oil seeds	268,321	2,112,772	5,959,296
Average prices of Cotton.			
Broach and Surat per candy	115·85	93·87	132·75
Dhollerah	117·64	94·50	126·46
Oomrawuttee	113.00	89·41	121.25
Compta.....	107·75	88·52	113·37
Average prices of linseed per cwt. ..	3·75	5·03	4·84 *
Rape seed per cwt.	..	4·07	5·87

These are facts which testify to the increased prosperity of a country, and all who are best acquainted with the condition of the ryots declare their present position to be greatly in advance of what it was ten years ago. They have never, since the country has been under the jurisdiction of Great Britain, been so well prepared to break through the meshes of the Banian, when European agency offers them, at their own door, a market for their produce.

The following are reports made by various Collectors as to the general condition of the ryot population in their districts :—

" *Dharwar Collectorate.*—Very flourishing.

" *Belgaum Collectorate.*—Good.

" *Poona Collectorate.*—Good, and great credit with sowcars or bankers. Many are, of course, in debt, and have inherited debt, instead of property, from their ancestors, which it is the height of merit, according to the shastras, to pay, and for which an insolvent relief act is wanted.

" *Ahmednuggur Collectorate.*—The condition of ryots has vastly improved, and is steadily improving from year to year. Many of them are still deeply involved, and the dealings of the Marwarees are most usurious. There is little competition. A ryot must deal with the sowcar of his own village, or want. Land is now in great demand. Before survey it had no saleable value. It now sells at considerable prices, and it is not easily procurable even for money.

* This is a very low average, and if the prices of the previous and following years had been included, it would have been considerably higher.

"*Sattara Collectorate.*—Prosperous, and annually improving. The ryots themselves admit that, where before they had earthen vessels, they have now brass and copper."

There has been much controversy as to the yield of cotton per acre in India, and it may be well to state briefly the estimates which have been given by competent persons, as well as the actual yield which, in many cases, has been ascertained, so as to arrive at an approximate knowledge of the amount. In the following table some data are collected for this purpose, and the estimates cited have, as much as possible, been selected as showing average results. A large number of them were given in reply to questions of Government on the point. The estimated yield of New Orleans cotton is wholly based upon returns from the Dharwar and Belgaum districts; for, it need scarcely be said, that, to have taken the average produce of the experimental culture in other parts of the Presidency would have reduced the final average to a very unsatisfactory point:—

Places.	New Orleans. Estimated yield of clean Cotton per Acre.	Indigenous. Estimated yield of clean Cotton per Acre.	Remarks.
Ahmedabad ..	..	43	Collector's estimate.
Kaira	..	80	Ditto ditto.
Broach	..	80	Mr. Davies' estimate.
Ditto	..	108	Out-turn experimental farm 1843-44 to 1846-47.
Ditto	..	80	Ryots' land same period.
Ditto	..	70	Official estimate of the crop of 1860-61.
Surat	..	94	Collector's estimate.
Ditto		90	Estimated average produce 1834-35 to 1845-46.
Ditto	..	99	Mr. E. E. Fawcett's average estimate.
Ditto	..	87	Official estimate of the crop of 1860-61.
Khandeish	..	50	Estimate of Mr. Simpson, the American planter. He states, "There are differences of opinion prevailing on this point (the average produce per beegah or acre); however, I have had what I consider the best of opportunities for informing myself, and accordingly set it down at not above 2½ maunds, or 200 lbs. kuppas (or seeded cotton) per beegah."
Ditto	..	56	Actual average out-turn of two seasons, reported by Mr. Price, assistant superintendent.
Ditto	..	40	Actual average out-turn of 1850-51.
Ditto	..	64	Mr. Elphinston's estimate of the out-turn of 1849-50.
Carried over..	..	1,041	

TABLE (*continued*)—

PLACES.	NEW ORLEANS. Estimated yield of clean Cotton per Acre.	INDIGENOUS. Estimated yield of clean Cotton per Acre.	REMARKS.
Brought over..	..	1,041	
Sattara	..	40	Sir H. B. E. Frere's estimate.
Ahmednuggur .	..	60	Collector's estimate.
Sholapore	..	40	Ditto ditto.
Kolapoor	..	94	Political Agent's estimate.
Dharwar.....	..	60	Mr. Bell's estimate.
Ditto	74	56	Estimate of Mr. Blount (American planter) of the average of an average year.
Ditto	88	44	Reported by Mr. Shaw as the out-turn of ten acres of his cultivation, and an equal extent of ryots' land adjoining in 1842-43.
Ditto	48¾	30	Mr. Mercer's estimated yield 1843-44 for ryots land. [1843-44.
Ditto	54	..	Actual yield of Koosighul experimental farm
Ditto	95	..	Actual yield of Gurrug farm 1844-45.
Ditto	87	..	Produced on contract for Government (1845-46) on 532 acres at Bunkapoor.
Ditto	50	37	Mr. Mansfield's estimate, concurred in by the American planters, Messrs. Mercer & Hawley.
Ditto	60	..	Official return of the crop of 1860-61.
Belgaum.....	60	30	Estimated by Mr. Channing, superintendent.
	616¾	1,532	
Average	68	63	

The result obtained by taking an average of these estimates seems to be as accurate a valuation of the actual produce as it is possible to form, although, probably, somewhat excessive in the case of the indigenous, but, taking good and bad seasons together, it is not far wrong.

CHAPTER XVIII.

ROADS.

The want of Roads, with illustrations—Development of Trade by their construction—Effect on Indian Cotton of defective means of transit—Roads in the Dharwar Districts—The Ports of Compta and Suddri—The Port of Sedashewghur—Its capabilities—Reasons for its transfer to Bombay—Roads to Sedashewghur—Comparative merits of Compta and Sedashewghur—Roads in Belgaum, Sholapore, Sattara, Ahmednuggur, Khandeish, Guzerat—The Bombay, Baroda, and Central India Railway—The Great India Peninsula Railway: Feeders; Storage—The Valley of Berar—Suggestion by Mr. Hart, Revenue Commissioner, Southern Division, of means to attract Traffic from Road to Railway.

It has been shown that, during the last sixty or seventy years, efforts have been persistently made by the Court of Directors, and by the local Government, to improve the quality of Indian cotton, and to secure, at least, clean supplies. That greater progress has not been made, and that the state in which the staple is still brought to market continues so unsatisfactory, may, in great part, be referred to the deficiency of roads, and the imperfect means of transit. Apart from the actual injury inflicted upon cotton on its way to market, the careless picking of the ryot, and the fraud and extortion of the middle-men, have been perpetuated by isolation. Competition has been excluded, and has sunk in the mire through which it had to struggle to the field of the cultivator.

In his evidence before the Select Committee of the House of Commons, Major General Briggs illustrated the condition of roads in India by referring to circumstances arising out of the absence of a monsoon road between Khandeish and Poona, in 1823. He stated, "At that time grain in Khandeish had fallen from 6*s.* to 8*s.* a quarter. At Aurungabad it was 34*s.* a quarter, and at Poona as high as from 64*s.* to 70*s.* a quarter; but, in consequence of the monsoon, and the want of roads, the grain from Khandeish did not reach Poona. * * * There was a superabundance in Khandeish,

where grain was ruinously low, and great remissions were obliged to be made in consequence; while at Poona, where they had a bad season, grain was very dear. * * * The distance from the Taptee River to Poona is about 300 miles by road, about 40 miles of which, from Poona, was at that time practicable, but the grain brought from that distance was very soon exhausted." The difference in price between grain on the Taptee River and at Poona was about Rs. 29 a quarter, and yet the superabundance of the one district could not be sent to relieve the distress of the other.

In his report on the recent famine in the North-West Provinces, Colonel Baird Smith mentions precisely similar instances there, and speaking of districts in which, although there had been a good harvest, exportation had in many parts created famine prices, he states, "So miserable are the means of intercommunication in many of these districts of supply, that while in one bazar famine prices of Rs. 4 per maund might be ruling, in another not 30 miles off the price would be but about Rs. 1-8 for the same quantity; yet no flow from the full to the exhausted market could take place, because roads were not in existence, and means of carriage unknown."

These instances have been selected to show the effect of imperfect means of communication, because where an article of consumption like grain, urgently required for a hungry population, cannot find its way from place to place at short distances, the difficulty must be doubly fatal in the case of cotton.

In illustration of the rapid development of trade in a district produced by the construction of roads, General Briggs pointed to the road from Bellary to Sursee. He quoted the report of Captain Ditmas, in which it was stated, "When the road was finished in 1840-41, 101 carts travelled upon it in the first year, and in the two years afterwards there were 443 carts plying on it;" and referring to the continuation of the same road to Compta, Captain Ditmas adds, "Incomplete as the road was, the traffic of the port of Compta during three years had increased from £160,000 to £400,000, and the customs had also increased from £4,662 to £18,015 per annum within the same period." In 1848, Mr. Townsend, the Revenue Commissioner, Southern Division, stated to Government, "The agriculture of this Presidency is smothered at the outset by the want of a cheap and easy communication with the coast." [1]

A large part of each crop of cotton never reaches Bombay until after the monsoon. During the long period of its detention in the interior, the wool is exposed to the damp and deterioration of the rainy season without adequate shelter. The owner suffers a serious loss of interest and charges, and the cotton

[1] Returns, E. I. Cotton, 1857, page 242.

suffers a still more serious loss of quality. Mr. A. N. Shaw, in 1848, stated, "I suppose that there never has been cotton from the Southern Maratha Country, the growth of the same season, in Bombay; I suppose they have never had it fresh." [1]

Cotton is exposed to every species of depreciation during its transit to Bombay. Moving along at the rate of one or two miles an hour in rude carts, or on the back of bullocks, over bad roads, the dew and the dust do their worst to it. The bullocks are loaded and unloaded twice a day, generally in the neighbourhood of watering places, and their packs are rolled in the mud. Each bullock consoles himself during the march by keeping his nose in his leader's pack, and steadily eating the cotton. The loss in weight, which has not been compensated by the accumulated dust of the journey, is too often supplied in water at its close.

To quote the words of Mr. T. L. Blane, Collector of Canara, in 1847, with regard to Compta cotton—

"With the exception of the small quantity which is brought in carts as far as Neelcoond, the whole of the cotton exported at Compta is conveyed on bullocks from its place of produce, and to this may be attributed, in a great measure, its inferiority. It is exposed throughout the journey to the sun by day, and the dew by night, to the sweat of the cattle, and the dust when thrown down off the bullocks at the end of each march, and on crossing the Tuddri and other rivers, it is liable to be saturated with water. All these evils would be remedied by its conveyance in carts, particularly if it were partially pressed in the Dharwar district, and the quality and value of the article would be greatly enhanced, while much time, labour, and expense would be saved in its transport." [2]

Much has been done, and is doing, to improve the means of communication, however, but the difficulty of the undertaking must not be altogether lost sight of in the desirability of its accomplishment. The black plains are almost impassable after a heavy fall of rain: all traffic is then stopped. The means of metalling roads do not exist in those localities where they are most required, and stones for the bridges and drains have to be brought from a great distance. Under these circumstances, road-making labours under disadvantages which are little known elsewhere. But without further enlarging upon evils which are generally deprecated, and the necessity of a remedy which is generally admitted, it may be well to offer a few remarks on the means of communication in each district.

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[1] Minutes of Evidence, House of Commons, Answer 3899.

[2] Returns, E. I. Cotton, 1857, page 58.

DHARWAR.

The principal routes by which cotton grown in this district is carried to the coast are—

1. The road from the Kristna *viâ* Kairoor.
2. The road from Nowlgoond to Hooblee.
3. The road from Gudduck, *viâ* Annigherree, to Hooblee.

The three roads converge upon the Hooblee and Turrus line to Compta *viâ* Sirsee and the Dewamanee Ghaut. The distance from Hooblee to Compta is about 120 miles.

4. The road from Bunkapoor to Hangul joining the Compta road at Pala.
5. The road from Savanoor, *viâ* Goothul, Haverry, Aloor, meeting the Compta road at Sumusgee.
6. The road from Raneebednoor, *viâ* Kode, Hawusbhanee, Tilwully, Muckrowly, to Sumusgee, where it meets the above.

All of these roads are practicable for carts throughout the fair season.[1]

The road between Hooblee and Bunkapoor is first-class, and gravelled so far as the junction with the Turrus line; but thence to Bunkapore, it is only a cleared way, though passable for carts.

Hooblee and Bunkapoor may be considered the points of concentration for cotton, in this collectorate, in preparation for transit to the coast, the former collecting the produce of the northern, and the latter that of the southern pergunnas. Hooblee is a place of considerable trade. This is connected with Bunkapoor by a road, nearly half of which, or from Hooblee to the Turrus junction, is first-class and gravelled, and the remainder only cleared, but practicable for carts.

There are at present two routes for cotton from Hooblee to the port of Compta—the one by Turrus, Sirsee, and the Dewamanee Ghaut, which is generally preferred, and the other by Yellapore and the Arbyle Ghaut, not much used early in the season, although later it is more frequented. For five miles from Hooblee the road is excellent, bridged, and drained throughout. The two large bridges on this portion of the line were commenced at the beginning of May 1861, and completed, at some risk, during the rains by the energetic and able exertions of Captain Playfair, the Executive Engineer. About five miles more of the road have been made, and the remainder to Shungutakope, which has been cleared, and is passable for carts, will probably be rendered a first-class road before the next monsoon. The cost of this road from Hooblee to the Madras frontier, by Shungutakope, is estimated at Rs. 62,231. From

[1] Public Works Department, No. 4223 of 1861.

Shungutakope to six miles beyond Yellapore, in the Canara district, the road is made and gravelled, and there, at Iddagoontee, the roads to Compta, *viâ* the Arbyle Ghaut, and to Sedashewghur, *viâ* the Kyga Ghaut, branch off. As has already been mentioned, the chief difficulty of the route thence to Compta is the passage of the Baidly Nullah, which is not yet bridged.

A road is being made to connect Bunkapoor with the main road from Dharwar to Compta at the village of Moondagoor, in Canara. From Moondagoor there is a fair-weather road to Yellapore, where the great obstruction is also the same Baidly Nullah, which interrupts it about Mynhully. At present the Bunkapoor cotton joins the main road to Compta near Hangul.

Hooblee on the other side is being joined to Annigherree, a village distant about 20 miles east, by a first-class road. The estimated cost is Rs 88,838. This road, however, passes through the black cotton plains, and its construction is, consequently, attended with much difficulty. It requires to be embanked throughout its whole extent, and then gravelled. This will probably be completed before the monsoon, but the road will scarcely be ready for traffic before the end of 1862. There is, however, already a track passable by carts during the dry season. The greatest obstacles on this route were three rivers, two of which, at Surgopee and Nolowdee, have been substantially bridged, and the third bridge at Buddrapore is now in progress, and almost complete.

These nullahs seriously impeded the very large traffic of cotton *viâ* Annigherree to Hooblee, and of these the most formidable was the Benehal, whose bed is of the most treacherous mud. There are traditions of its having once swallowed an elephant, and even in breaks of the monsoon, when other roads become practicable, it continued to obstruct the way to Hooblee. The bridge has been built by public subscription.

From Annigherree to Gudduk, 12½ miles further east, there is at present only a country track, over which cotton carts can travel during the dry season, but it will probably be made a first-class road during next year.

A road from Dharwar to Kulghutkee, connecting the former place with the trunk road between Bellary, through Annigherree, and Hooblee to Sedashewghur, has been projected and partly executed. Its estimated cost is Rs. 43,973.

Of these two roads, one would extend from Hosput, on the present Bellary road, through the Raichore Doab, the Dharwar Collectorate, and North Canara, *viâ* Copal, Hullikerry, Gudduk, Hooblee, and Yellapore, to Sedashewghur, and the other from the same point would pass by Savanoor, on the Toombuddra River, Alloor, Sumusgee, and Sirsee, to the ports of Compta and Tuddri, over the Dewamanee Ghaut.

The following grants have been made for roads in the Dharwar district for 1861-62:—

For clearing a line of road from Kode to Hurrihur on the Toombuddra River at the south-east frontier of the district ..... Rs. 8,019

For improving the Sumusgee and Bunkapoor line of road from the intersection of the branch to the Compta road north of Hangul to Bunkapoor..... Rs. 4,785

For clearing a line of road from Bunkapoor, *viâ* Savanoor Luckmeshwur, to Gudduk ..... Rs. 14,850

For clearing a line of road from Gudduk, in the Dumbul Talooka, to Huroor, on the Toombuddra River..... Rs. 9,900

Besides these, several other roads have been planned and sanctioned, and will shortly be executed. The greatest difficulty is found in procuring a sufficiency of labour for these works. Prisoners from the Dharwar jail have been employed as extensively as possible; but Colonel Kennedy, the Superintending Engineer, states, "The people appear so well to do in Dharwar, that they are not disposed to take service on roads." The actual road-work itself is beset with difficulties. A highway for traffic across the black plains can only be made by raising the road above the face of the country, and the gravel necessary to the consolidation of the surface is only obtainable with great difficulty, and at great expense.

Mr. Blane, the Collector of Canara, writing to the Cotton Committee in 1847, made the following observations regarding the port of Compta, supporting his own preference of the Tuddri Port, about ten miles north, by the opinion of Captain Cotton and other authorities:—

"The last point referred to in your letter, viz. the advantages and disadvantages of the port of Compta, and its facilities for loading and unloading country craft, appears to be one of great importance, and deserving of attentive consideration. I have lately returned from an inspection of this port, as well as the neighbouring one of Tuddri, in company with Captain F. Cotton, the Civil Engineer in this district, and I have little hesitation in expressing an opinion that the Tuddri presents so many advantages over Compta as a shipping port, that the time cannot be far distant when these will be sufficiently appreciated to lead to the gradual withdrawal of the cotton trade from Compta to that place. These two ports, with their relative positions in respect to the three ghauts leading down to them, are indicated in the enclosed map, but their respective advantages and disadvantages are derived less from this circumstance, than from the nature of the ports themselves.

"The town of Compta is situated on a small river, or rather backwater, about a mile distant from the port itself, which is little more than an open roadstead, having a headland running out immediately to the north of it, which protects the anchorage from the north-west wind, being that which prevails nearly the whole of the trading season, and renders the bay comparatively calm during this part of the year. It is entirely exposed to the south-west monsoon, and after this commences, it is unsafe for any country vessel to remain there. There is no river mouth or harbour into which the native vessels can enter, and the shipment of cotton is carried on by means of boats bringing down the cotton from the town to the vessels lying in the bay. This operation can only be carried on for about four hours during the day while the tide is high, the depth of water in the river then being about five feet; at low water the river is either entirely dry, or having a depth only of about one foot of water, which is insufficient for the smallest size of cargo boats.

"The port of Tuddri is about 10 miles north of Compta. It presents a large natural harbour, forming the mouth of a considerable river, which runs down from the western ghauts, and is navigable for about 15 or 20 miles, as far as a place named Oopinputnam. Its entrance, which is protected by high hills on each side, has a depth of water over the bar, which, as far as could be judged by two measurements, is about 16 or 17 feet at high-tide, and may be increased during the spring-tides to about 19 or 20 feet. The depth inside the harbour is much greater, being about 25 feet, and in some places more, and this so close to the shore, that vessels of a large size might lie so near as to be laden from the bank without the use of boats at all, and there is ample room for almost any number of vessels to ride in deep water. Captain Cotton seems to consider that it presents greater natural advantages as a port, than any one on this coast between Bombay and Cochin.

"Under these circumstances, it seems strange that the cotton trade should have established itself so completely at Compta, with all its manifold disadvantages; it is probable that this has arisen from a variety of causes. The cotton trade, though now so extensive, must have commenced from a very small beginning. The Neelcoond Ghaut appears to have been the only practicable and available one till within the last few years, and is still that by which the greater part of the cotton is brought down, and it led more directly down to Compta than any pass then existing, and enabled the bullocks to cross the Tuddri at a ford higher up the river, at a time when there was, in all probability, no means of ferrying them over lower down. The port itself also, though so little suited to the large trade which is now carried on there, was not, perhaps, ill-adapted for it at its commencement; delay in shipment could then have

been of little importance, and the entrance into the backwater, being unusually free from surf, would have presented an advantage to a small trade, which was not counterbalanced by any of the circumstances which cannot be otherwise than a great hinderance to the extended trade which has since risen up. The establishment of a custom-house at Compta would at once have fixed the trade to that spot: the merchants who have settled there would be unwilling to move, and the place has gradually gone on increasing with the improving trade, until it has now risen into a considerable and flourishing town.

"But whatever may have been the circumstances which originally led to Compta being selected as the place of export, it appears to me scarcely possible that, under the different aspect which the trade has assumed, it can long continue to command the preference which it has hitherto enjoyed, while a port exists within 10 miles of it in every respect better adapted to a large, flourishing, and active trade. It may reasonably be hoped that the increased facility of communication with the cotton-growing districts beyond the mountains, and the reduction in the cost of carriage, which will be the result of opening a good cart-road from the heart of the Dharwar country down to the coast, to say nothing of the improvement in the quality of the cotton which will be effected by its conveyance on wheeled-carriages in place of bullocks, will lead to a very great augmentation of the quantity of cotton exported from the coast. The shortness of the favourable season appears to render it desirable that the shipment should be carried on as actively and rapidly as possible; but every increase in the quantity shipped must greatly increase the difficulty and delay, where this operation can be carried on for only four out of the twenty-four hours, and must, in the natural course of events, lead to the port of Tuddri being preferred, where large vessels may run in and anchor close to the custom-house, the shipping be carried on all day, and which affords a secure and spacious harbour, in which they might remain, if necessary, during the whole of the monsoon.

"The opening of the Dewamanee Ghaut will bring the road down to a point on the Tuddri River at which cotton might be conveyed to the harbour in boats; and one great drawback to the port of Compta, situated as it is on the southern side of the Tuddri, would thus be obviated, which consists in the necessity of the cotton bullocks having to ford that river, or to be ferried over. At present they have either to be driven across the river loaded, by which the cotton is liable to be saturated with salt-water, or unloaded, and the cotton brought over on the ferry-boat and again reloaded after crossing the river,—a long and tedious process, which would be avoided by transferring the cotton from the bullocks to boats when it reached the river, and bringing it down at once to the harbour.

"Notwithstanding the numerous advantages which the Tuddri appears to present, the merchants who are settled at Compta express a great disinclination to any change, and evince considerable alarm at the idea of its being in contemplation to remove the trade of that place, either by carrying the new road down to the Tuddri, or by any other means. They cannot gainsay the many points in which it has been frequently shown to them that the Tuddri would excel Compta as a port from which to carry on the trade, but they give a number of reasons for remaining where they are, which seem sufficiently satisfactory to themselves. Compta, they say, is a fortunate place: a blessing has attended their trade there; they do not wish to ship the cotton quickly; they do not mind having to bring it on bullocks over the Tuddri River instead of putting it into boats; they consider it rather an advantage that the native vessels should be outside instead of in a harbour, because they have then no excuse for delay in sailing, &c. Add to which, they have built comfortable houses, and some of them warehouses, at a considerable outlay, and there seems but little chance of their consenting to remove; and whatever may be done at Tuddri, therefore, will probably be by order of their employers, or by other merchants settling there, who would, I cannot doubt, after the construction of the ghaut road, very soon withdraw the trade to that port, and then, and not till then, would the Compta merchants open their eyes to its superiority.

"It is to be observed, in explanation of this apparent apathy, that, as all the merchants settled at Compta are only agents for the large native merchants at Bombay, they have little personal interest in facilitating or cheapening the transport of cotton; nay, it may be questioned whether, if they are paid a per centage, or receive a salary in proportion to the outlay of capital which passes through their hands, it may not be rather their interest that the cost should continue larger than that it should be diminished.

"There is only one point urged by them which seems deserving of attention and inquiry. It is that the port of Tuddri is difficult to get out of during the prevalence of certain winds; but it is mixed up with such a variety of other reasons which are evidently frivolous, and they have such a manifest disinclination for any change, that this may fairly be viewed with some suspicion. Captain Cotton considers that this objection has no real grounds, and that the situation of the harbour is so similar to that of other ports on this coast, where no such inconvenience is complained of, that it is not entitled to much consideration. The Committee is probably aware that this port, as well as Compta, was accurately surveyed last year by Captain Montriou, of the Indian Navy, when the *Taptee* was down on this coast, and a reference to his charts and his professional opinion would at once clear up this point, as well as satisfy the Committee of the respective merits of the two ports."

Tuddri, however, has not supplanted Compta, and both are destined to give way before the port of Sedashewghur, which offers still greater natural advantages as a shipping harbour for the Southern Maratha Country and other neighbouring cotton districts.

The Bay of Sedashewghur is about seven miles in width, and, although not entirely free from rocks and shoals, it is, in its southern division, both deep and safe. A very little care may render its whole navigation perfectly simple. The bay is formed by Cape Loliem at the one extremity, and by the Carwar Head at the other, both high and bold projections, the latter, it is said, being visible from a very great distance, and affording a good land-mark for approaching vessels. In beauty it is described as rivalling Dingle Bay and the harbour of Valencia.

The Kalla Nuddeh, or Black River, which flows into the bay, is navigable in all states of the tide to a distance of about twenty miles, as far as Mullapoor, by boats not drawing more than three feet of water, but at full tide vessels of double that draught can pass the shallows. Engineering skill can, without much expenditure, greatly improve the capabilities thus presented. Above Sedashewghur are the Goond and Dandilly forests, whose valuable timber may be floated down the river into the bay. It is said that iron abounds in the neighbouring hills, and, indeed, whether in regard to natural advantages of position or internal resources, Sedashewghur is peculiarly fitted to become an important port of Western India.

In order to ascertain the actual capabilities of Sedashewghur as a harbour, Her Majesty's Ship *Falkland*, Commander Fraser, was despatched to lie there during the monsoon of 1861. This monsoon was a most exceptionally severe one, and afforded an opportunity of putting Sedashewghur as a port of refuge to the severest test. On the 15th of June Captain Fraser reported—

"A ground-swell has rolled in steadily from the W.S.W. since the *Falkland* arrived. It is, however, comparatively slight in the bay, which has otherwise been as smooth as Bombay harbour generally is in the N. E. monsoon. To seaward of Carwar Head, a high ground-swell has been incessantly rolled, which breaks on the sandy beach S. W. of Beitcul Cove in surf as wild and high as I have ever seen in bad weather in Madras. The ground-swell in Carwar Bay at this season resembles (but in a minor degree) that of Madras Roads, sufficient to cause a vessel to roll very uncomfortably when riding across it, and also to cause a surf on the sandy beach of the bay high enough to prevent ships' boats from landing with safety. This, however, is of little consequence, Beitcul Cove, sheltered from all winds, being the natural landing place, and a harbour of refuge for small craft in all weather."

The next fortnightly report was more unfavourable. Captain Fraser stated—

"From the 15th to the 26th instant no marked change took place in the weather, which, with the exception of the usual squalls and heavy rain, was fine for the season; the ground-swell, however, gradually increased, but not to such an extent as to cause apprehension. On the 27th the weather changed much for the worse, blowing in hard gusts from W.S.W. to W.N.W. with incessant rain, increasing swell, and sudden lulls, succeeded by light, variable winds eddying round Carwar Head and across the low land at the head of Beitcul Cove, veering from S.W. to East. These eddy winds have been of constant occurrence since my arrival in the bay, and were then simply inconvenient, as they brought the vessel across the swell, which at the time was of no great height, and also constantly occasioned a foul hawse; but, by bringing the vessel in the trough of the sea now rolling in, it causes her to labour heavily, and strains the rigging, spars, &c. very much. A deep-laden ship would suffer seriously from this cause, nor could loaded boats lie alongside a vessel in such a sea with safety.

"On the 29th the sea broke in rollers across the bay from Carwar Head to Deoghur Island. Towards the afternoon, with the flood-tide, heavy rollers broke in the bay, about half a mile from west to north of the ship.

"This day, although there has been but little wind, very heavy rollers have been breaking in the bay, about a quarter of a mile north of the vessel. At the anchorage the sea is higher than hitherto, rolling in in long, steep ridges, inclined to break. Judging from the great height and threatening nature of the sea at present at the anchorage, it is my opinion that, were a gale to set in from W.N.W., the vessel would be in a very precarious position. As yet Carwar Head has afforded protection while the wind has hung to the southward of west, but when the wind blows home from N.N.W., the sea will, I apprehend, break at the anchorage as it does elsewhere in the bay. Being of opinion that, in such an event, the vessel will be seriously endangered by remaining in her present exposed position, it is therefore my intention, if the weather permits, to moor the ship as close to the entrance of Beitcul Cove as can be done with safety, lightening her for that purpose if necessary. Under these circumstances, it is almost superfluous to add that I consider Sedashewghur Bay as a natural harbour unsafe in the south-west monsoon.

"The fishermen of the neighbouring villages unanimously agree that Beitcul Cove has silted up since the river disembogued to the southward (since Lieutenant Taylor's survey), and that the water in it is perceptibly decreasing year by year.

"Were it feasible to restore the river mouth to its former channel indicated in Lieutenant Taylor's chart, the silting up of Sedashewghur Bay and Beitcul Cove would probably be finally checked, and although in the course of nature the beach would in time gain on the sea, the depth of water in the bay would be thereby increased. It is evident that the alteration of the river's mouth is anessential preliminary to the construction of any other works for the improvement of the harbour, should such be in contemplation. It could, doubtless, be rendered perfectly secure by the construction of breakwaters on the conversion of Beitcul Cove into a wet dock, by throwing a sea-wall across the entrance, and clearing it of the deposit that has choked it up.

"The necessary information to enable a final decision to be pronounced as to the practicability of vessels coming in from seaward in bad weather being able to pass the breakers in safety, can only be obtained by further observation of the bay during a N.W. gale. If the contrary appears to be the case, it will form another material objection to Sedashewghur Bay as a natural harbour of refuge, which, it appears to me, could only be obviated by the construction of a breakwater of great solidity and strength from Carwar Head to Oyster Rock. So long, however, as the river channel disembogues to the southward, the erection of such a breakwater would but facilitate the silting up of the bay. If the breakers do not present an impassable barrier, the conversion of Beitcul Cove into a wet dock, protected by a short breakwater, would, I believe, be the most efficient and economical means of securing perfect shelter, and affording every facility to vessels loading and discharging."

The next report, on the 16th July, was equally unfavourable—

"From the 11th to the 15th instant threatening weather again set in, ushered by hard squalls from the W.S.W. to W.N.W., and violent gusts from across the low neck of land connecting Carwar Head with the main. The sea rapidly rose to a greater height than it had previously attained, and although the vessel had been shifted as close into the mouth of Beitcul Cove as was consistent with safety, it was even there so high, that she rolled and pitched for several days very heavily. For the last three days high rollers have been breaking in all parts of the bay, except close into Carwar Head. In a line from the west end of the head to the mouth of the river, as well as for some distance both inside and outside of this line, the rollers culminate to such a height, sweeping onward in rapid succession in huge ridges and with resistless impetus, that large vessels could not venture to run through them without the risk of great injury, and small vessels would endanger their safety in risking the attempt.

"During the period over which this report extends, there has not been a

day in which the *Falkland* could have succeeded in working out of the bay, from this cause.

"It has probably been blowing hard from W.S.W. in the offing to cause such a sea, the barometer having fallen one-tenth of an inch below its average height. It has again risen, and there is every indication of a favourable break in the weather. I have been compelled to postpone sounding the bay till a more favourable opportunity occurs.

"A current, which does not appear to be a tidal one, but is apparently caused by the reflux of the great mass of water driven by the breakers into the northern part of the bay, and joined by the swollen stream of the river, has, for some days past, been setting from the north along the shore of the bay, and diverging to the westward along the Carwar Head, bringing large quantities of drift with it.

"Should the river not revert to its former channel (the northern one) by the close of the monsoon, I would beg to recommend that the present mouth and bar, as well as the adjacent part of the bay, be re-surveyed."

After this no further bad weather was experienced, and before the end of the monsoon, the river had returned to its former channel, and removed all fear that the bay would silt up.

Commodore Wellesley, who has personally inspected Sedashewghur, thus states his opinion of the port,—"The conclusion, I think, to be drawn from Commander Fraser's reports is, that, except during the first furious burst of the monsoon, the port of Sedashewghur is perfectly safe at all times of the year. Probably during a less severe monsoon than the past, a vessel would not at any period be exposed to danger; but at any rate, if she were desirous of remaining in port during the bad weather, the greatest precaution should be taken. Even if pronounced absolutely unsafe for one or even two months in the year, Sedashewghur would not be singular in this respect. Table Bay, for example, is dangerous for at least four months of the year."

The transfer of North Canara, in which Sedashewghur is situated, from the Madras to the Bombay Presidency is an affair of date. The measure was proposed in 1837 by Dr. Gibson, from considerations connected with its forests, and altogether irrespective of cotton. The Madras Government, however, after a long period of consideration, declined to cede the district, and North Canara, with all its capabilities for the development of our cotton trade, remains almost exactly in the state in which it was twenty years ago. Its line of ghauts still effectually retards the traffic, which, actually, concerns so little the Presidency to which the district belongs. The mere fact that there is

such slight inducement for the Madras Government to expend money in making roads for the Bombay trade, indicates the Presidency to which this district should be attached.

Commercially, North Canara already belongs to Bombay, and geographically the district has little or no connection with Madras. It is within two or three days' sail of Bombay, and two or three weeks' sail of Madras. The trade of the latter Presidency will not suffer from its transfer, and the trade of the former will immensely benefit by its annexation. Its only article of export is timber, and its timber is almost entirely consumed by Bombay. Its connection with the Madras Presidency is almost confined to technical rights and official traditions. If the merchant desire to make remittances, the native bankers of Canara will negociate or draw bills on Bombay, but have no dealings with Madras. Beyond Canara lie the best cotton districts which supply Bombay, and the traffic towards this Presidency must traverse it at several points. The trade of one Presidency, therefore, is at the mercy of the Government of another. The expenditure for Public Works, for the accommodation of this important commerce, which may be wise policy on the part of Bombay, may be comparative extravagance on the part of Madras, and the history of Indian budgets is not of a character to promote trust in financial philanthropy. Madras has quite enough to do at home without disbursing for the wants of Bombay, and a virtually fictitious return of trade will scarcely compensate for the real expense of promoting traffic which is not remunerative. Finally, North Canara derives all its importance from the trade of Bombay, and would be utterly insignificant if its position were regulated by the trade of Madras.

The Port of Sedashewghur, or Beitcul Bay, as it is more probably called, will be connected with the neighbouring cotton districts by two roads. The first diverges from the trunk road leading through Yellapoor to Compta, at Iddugoontee crosses the Kyga Ghaut, and, skirting the bank of the Kalla Nuddeh, leads to the Beitcul Harbour, the distance between the bay and Iddugoontee being about sixty miles. For the first seven miles from the latter place the road has been well traced to a width of about 12 feet, and although in parts the gradient is as high as 1 in 16, the ruling scale is 1 in 30. The next nine miles are traced out with gradients of 1 in 30 for the first three miles, and 1 in 19 for the latter six. This portion of the road passes along a remarkable, narrow ridge leading to a high plateau, but for the following ten miles, extending over the Kyga Ghaut, the road is traced with a maximum gradient of about 1 in 19. The next 14 miles have not yet been traced, but the maximum gradient is 1 in 19, and the average 1 in 30. The remainder

of the road is either untraced, or merely cut to the width of a mere bridle-path, and the gradient is 1 in 19. The portion of this line from Mullapoor to Belloor presents some difficulty from a main spur of the ghauts, about 150 to 300 feet high, which comes down close upon the river, and from Belloor to the bay the road encounters a saddle of the ghauts, 600 or 700 feet in height, over which it will be carried by a regular ghaut ascent and descent, without reverse turn or zig-zag. At present this road is quite impassable for carts, and communication between Sedashewghur and the Dharwar district is in a great measure cut off.

The other road passes to the north of the Black River by Hullihal and Soopa, avoiding the Tuggsepett. From Hullihal to Samzoida, a village about six miles west of Soopa, the road has been laid out to the width of 12 feet, and is practicable for carts during the dry season, and before the close of the year a further portion may probably be opened.

Dr. Forbes thus states the comparative merits of Compta and Sedashewghur as shipping ports—

"The cotton exported from these districts is at present taken to the port of Compta, whence it is conveyed in open native boats to Bombay harbour for final shipment to England. At Compta there is what may be termed an inland creek, in which these native boats might find shelter in bad weather, were it not that a formidable 'bar' prevents them obtaining access to it. They are, consequently, compelled to remain outside at anchor in an open roadstead, exposed to the dangers of a lea-shore, should a storm set in; and during the period of the south-west monsoon (which may be from any time in May till September), they very rarely venture to approach the place. Owing, also, to the imperfect state of the communications with the interior, but a very small proportion of the cotton of each season finds its way to Compta (even from the nearest districts) in time for this boat-transport to Bombay, the remainder being detained at the places of growth, imperfectly stored, and so ill-protected from the wet and damp of the monsoon, that its consequent depreciation in quality, from this cause alone, is computed at no less than one farthing per pound.

"To add to this evil, also, so ill-suited is Compta for the export of produce, owing to local difficulties—such as unbridged creeks, water-courses, &c. in the immediate neighbourhood of the harbour,—that cotton, after arriving at that place, has to undergo no less than five changes of transport before it is deposited on board the native boats in the roadstead, and the result is, that the actual cost of its transport, even thus far on its way to England (about 70*s.*), nearly equals that of its cultivation and production.

"The expenses of its further progress, until deposited on British bottoms in Bombay harbour, may be estimated as follows :—* * *

"*For one Ton or* 14 *Cwts. of Dharwar New Orleans Cotton, valued say at* £20.

	£	*s.*	*d.*
Native boat hire to Bombay	0	6	0
Marine insurance to do.	0	3	0
Extra landing at do.	0	3	0
Native agent's commission.....	0	4	0
Interest of money for one month	0	3	0
Re-boating at Bombay for shipment	0	6	0
Total cost..	£1	5	0

"N. B.—Cotton stows by measurement of 50 cubic feet, or 14 cwts. to a ton.

"I find, from notes taken when I last visited Compta, on my way home, that the expense of conveying one bale of cotton from Monkey Ferry—the spot where it had first to be uncarted—to the native boat in the roadstead was not less than fourteen annas, or 1*s.* 6*d.* sterling, and even then subject to the tidal arrest, the 'bar' being only passable at high water.

"This sum, with the outlay above alluded to for inland carriage and expenses, makes the entire charges on a ton of cotton, *up to its shipment in Bombay harbour*, amount to £4 15*s.*, or about ¾*d.* per lb. (exclusive of final pressing, which need not be included).

"These districts, from being capable of producing very superior descriptions of cotton, have probably received greater encouragement from Government than any other portions of India. Still it appears that the actual cost of transport of their produce, from the place of cultivation to its shipment in Bombay harbour, nearly doubles that of its subsequent freight all the way to Liverpool, which, on an average, may be taken at 50*s.* per ton.

"If to this is added deterioration of quality from the causes mentioned, and the interest of capital sunk during the time lost by the present system of exportation (which rarely admits of the produce arriving at home under eighteen months), some idea may be formed of the disadvantages which India's cotton has to contend with in competing with that of America,—the latter reaching this country (England) in one-third of the time, and the whole cost of its transport being covered by a sum which may be averaged at about ⅝*d.* per lb. * * *

"In the first place, it may be as well to give an estimate of the probable cost of carriage from the interior to this port of shipment (Sedashewghur), when the road leading from it to the cotton fields, now under construction, shall have been completed.

"The distance from the station of Dharwar is about 75 miles, as the crow flies (Compta, the present port, being about 130 miles distant). But the important cotton marts of Seegaum, Kurudghee, or Bunkapoor, may be stated at 85 miles. The new road to them will be uninterrupted throughout, and if kept in proper order, and the cotton be half pressed, a common country cart will carry down with ease 10 cwts. This cart-hire will be Rs. 8½ or 17*s.*, add 1*s.* for the half pressing mentioned, and the expense on arrival at the sea-port will be about 26*s.* per ton of 14 cwts."

Government contemplate the erection of piers for the loading and unloading of ships, as well as the prosecution of other works for the improvement of this port. It is hopeless, at present, to expect the construction of the breakwater mentioned by Commander Fraser, nor would its utility justify the enormous expenditure of a work which in extent, at least, Commodore Wellesley states to be nearly equal to the breakwater of Plymouth. Dr. Forbes thus estimates the advantages likely to accrue from the opening of this port:—

"As far as cotton is alone concerned, the result would be, taking the average freight at 50*s.* per ton, and adding 26*s.* (as above shown) for inland carriage, and say 2*s.* for final pressing, that the produce would be conveyed from the cotton fields to Liverpool at a cost of £3 18*s.* per ton, instead of being subjected to an expense of £7 5*s.* as is the case at present by the Bombay route; or, in other words, that the Lancashire spinners might have it delivered at their own doors at actually less cost of carriage than the Bombay mills have to pay for it at present, which is somewhere about £4 10*s.* per ton."

Every officer of Government connected with the Southern Maratha Country, and every superintendent of cotton experiments, commencing with Dr. Lush in 1830, has, for more than quarter of a century, urged the importance of completing a road through Dharwar to Sedashewghur, and the construction there of piers and warehouses, but, until recently, without much effect. For a considerable time, however, the attention of Sir George Clerk, the present Governor of Bombay, has been directed to the subject, and the locality has been inspected by himself in person. In consequence of his representations, the Secretary of State for India lately ordered a reconsideration, by the Madras Government, of the proposal for the cession of North Canara. That Government, however, have again, unaccountably, opposed a measure which simply transfers the district from one to another, and more appropriate, department of the same Government. The transfer, of course, must eventually take place, and the task of improvement must be committed to those most interested in

fulfilling it.[1] The Manchester Cotton Company (Limited), as well as private individuals, are already prepared to occupy the new site, and Government, encouraging enterprise so calculated to promote the development and improvement of Indian cotton trade, have liberally volunteered to second their efforts. Thanks to the energetic administration of Sir George Clerk, the Bay of Beitcul, once the haunt of pirates and buccaneers, may soon be a safe harbour for many a merchant's ship, and the stream of trade may abundantly overflow the ruined strongholds of the once notorious Angria.[2]

Belgaum.

The main road through this district to the coast has long been that from the Secunderabad line, commencing at Bagulkote; it is a made road, but still requiring some bridges to complete it. This road passes through Kaludghee, Belgaum, and over the Ram Ghaut to the shipping port of Vingorla. This ghaut, however, is a very bad one, and the road is reported to be "just passable, and that is all, and can never be improved." Another road from Belgaum, *viâ* the Parpolee Ghaut and Sawunt Waree, joining the former road at Tullowra, near Vingorla, was sanctioned in 1856, and commenced, but the work was, with so many others, stopped during the mutinies, and though since carried on is not yet complete.

Badamee is connected with the main line by a cleared road to Kaludghee. Nurgoond has a choice of cleared roads—to the main line, joining at Yerakuttee —to the Dharwar and Belgaum road, which it meets at Bagwarree, a little to the north-west of Hooblee, or direct to Dharwar. There is a cleared road from Padshapoor to Belgaum. Much, however, requires to be done in order adequately to open out the resources of this district, and the improvement of the port of Vingorla is essentially requisite.

Sholapore.

The cotton which is produced in the Indee, Hypurga, Immgolee, and Moodeebehal talookas is carried by two fair-weather roads, leading from Beejapore and from Moodeebehal to Sholapore, as also by a cart-track from Ahulla, *viâ* Agar, Khair, Ahurwaree, &c. The Barsee cotton is generally taken to the Barsee road station. Government have ordered the improvement of the

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[1] Subsequent to the printing of these remarks, the Government of India have ordered the transfer of North Canara to the Bombay Presidency, which will now be immediately effected.

[2] The details regarding roads in the Dharwar district have been collected chiefly from the reports of Colonel H. B. Turner, Acting Secretary to Government, Public Works Department, and from information furnished by Colonel Kennedy, Superintending, and Captain Playfair, Executive Engineers.

Pangree Pass, and works for facilitating the crossing of the Seena at Redowa are undertaken, for which a grant of Rs. 4,482 has been accorded. In the present year, Colonel Margary recommended the improvement of four miles of road south of the village of Yaramulla, in the direction of Barsee. He stated, "It would much facilitate the traffic of cotton to the Barsee road station on the rail, if this piece of tract were improved, as nearly all the cotton which joins the rail at this point has to take the line in question." Government accordingly sanctioned it.

The want of accommodation at the Barsee road station is the cause of much loss and inconvenience. This is, probably, in great part inseparable from the formation of a new junction of traffic; but the large sums which have been paid by the Railway Company as compensation for damage by rain to cotton carried on the line, demonstrate the necessity of providing greater warehouse accommodation.

It may generally be said of the whole of this and the neighbouring districts that really good cross-roads for cotton traffic are almost entirely unknown.

Sattara.

Colonel H. B. Turner, in his report to the Government of India, regarding the improvement of the cotton districts of this Presidency, from which much of the preceding and following information about roads has been extracted, states, "The chief cotton-producing districts in the province of Sattara are Walwa to the south, and Beejapore, with Punderpoor, to the east. The Sattara and Kolapoor road runs through the former, whereby a junction is also obtained with the Kurar and Koombarlee Ghaut line leading to the coast.

"There are cleared roads from Beejapore to Sattara and Kurar; there are also cleared roads from Punderpoor to Sattara and Kurar. The Sholapore Railway will convey a great portion of the Punderpoor cotton to the sea, and the entire country intervening belongs to the Sholapore Collectorate. It would prove of great advantage to Punderpoor to have a cleared road to the Railway station. The Collector of Sattara states, 'I have no recommendations to offer on the subject of cotton roads in this province, the latter being already very fairly supplied with cleared tracks, which are annually repaired by Government.'"

Ahmednuggur.

If Ahmednuggur be not very important as a cotton-producing district, a rich stream of cotton traffic from the Nizam's dominions and Berar passes through it over the Imampoor Ghaut. At the beginning of this year, Mr.

Tytler remarked, with respect to this route, that it was one which urgently called for clearance, as it was much frequented, and was greatly out of repair. Captain Finch, the Executive Engineer, wrote, in March 1861, "I will at once undertake the clearance of the line from the foot of the Imampoor Ghaut towards Pyton; but as, after careful inquiry, I have ascertained that the cotton traffic does not enter this district at Pyton, but at a village (Nowgaum) about eight miles lower down the Godavery River, I request permission to take the line by this route. The line under any circumstances would pass through Shewgaum,—the villages met with beyond the Imampoor Ghaut being Koospooree, Miree, Manka, Shewgaum, Chapergaum, Hadgaum, and Nowgaum. The distance from Nowgaum to the Imampoor Ghaut is 46 miles." The importance of improving this road can scarcely be exaggerated, but as there will be occasion again to refer to it a little further on, no further remark need here be made.

To facilitate the cotton traffic of the intermediate producing country, which hitherto has had no adequate outlet, Government authorised the clearance of a road from Ahmednuggur to the Railway station at Patus, several miles of which have already been completed by convict labour. This road has additional importance as a railway feeder.

Regarding the Nassick division of the Bombay and Agra road, Colonel Turner states, that "originally it was insufficiently laid with metal, and the evil was continued by not allowing sufficient thickness, in repairing it, to cover the whole of the road.

"Great exertions have been made to improve it during the last two years," he continues, "but it wants a new layer of metal over the whole. The traffic has been, and is enormous. The Collector of Ahmednugger remarked, 'I am not aware of the existence of any serious obstacles to the transit of cotton in the Nassick districts; all the made roads, however, stand greatly in need of repair.'"

KHANDEISH.

The Superintending Engineer, Central Circle, in the beginning of 1861, wrote as follows:—"The principal cotton-producing countries in or near the Central Circle are the eastern parts of Khandeish and adjacent parts of the Nizam's country, of which latter part Mulkapoor may be looked upon as the principal mart; the eastern parts of the Sholapore and Ahmednuggur collectorates, with those parts of the Nizam's country and ceded districts to the east of them.

"The cotton from the first joins the Bombay and Agra road at Jhorega near Dhoolia; the second joins the Aurungabad and Poona line at the bottom of the Imampoor Ghaut; the last takes partly the line of road from Sholapore to Poona, and partly the Sholapore and Panwell mail road. * * * I have received from the Executive Engineer, Khandeish, a very favourable report of the state of the road from Jhorega to Nusseerabad: no obstacles exist on it of any importance.

"The road from Burhanpoor, which meets the Bombay and Agra road at Jhorega, is used by the carts which carry away the cotton grown in the Sowda, Yawal, Chopra, and Nusseerabad talookas of the district. The quantity of this cotton is, however, by no means large, and it is thought that the existing fair-weather roads suffice for its removal.

"By far the greater portion of the cotton which passes through Khandeish is grown in Berar, and the carts which convey it from the different talookas of that province meet at the town of Kamgaum, in Berar, distant about 40 miles from Jamtee, in the Jamnair Talooka of Khandeish. The route followed by the carts is from Kamgaum through Jamtee, Jamnair, Naree, Musawad, and Errundole. From this last place it is conveyed along the Jhorega and Nusseerabad road and the Bombay and Agra road to Bombay.

"The quantity of cotton thus conveyed is very large, as many as four hundred carts heavily laden with it passing along in a day; and the road, as may be judged by the following description, is altogether unadapted to withstand the destructive effects of so large a traffic.

"In fact, from Kamgaum to Jamtee there is no made road of any description; from Jamtee to Errundole there is a Collectors' fair-weather road, which is easily passable from Jamtee to Jamnair, but which from Jamnair to Errundole is very bad,—so bad, as to cause frequent accidents to the carts, and to necessitate the use of great caution. From Errundole to Jhorega the road varies very much, in some places being easy, in others difficult. The whole of the road from Jamtee to Jhorega is covered with a coat of dust varying from six to eighteen inches in depth, is dreadfully cut into by the cart wheels, with frequent holes, and is altogether in the horrible condition to which heavy traffic invariably reduces fair-weather roads.

"Measures are being taken to improve the slopes into the nullahs on the road from Errundole to Jhorega, which will be completed within the money allowed for the repairs of this road. I have already pointed out to the Collector the advisability of putting the cotton roads in his charge into as good order

as possible. The deep dust, which forms the principal obstruction on these roads, cannot be dealt with, and to fill in the holes would be (as I think) merely to add to the dust without doing any good."

The Great Indian Peninsula Railway which passes through this district, and which is rapidly advancing, will obviate the necessity of much expenditure on main roads, but will, doubtless, concentrate the attention of Government on the provision of feeders. A road is already being constructed to connect Malligaum with the Railway.

Guzerat.

The roads of Guzerat are probably the worst in India. They have acquired so unenviable a notoriety, that it is unnecessary to enlarge upon them here It is essential that good ones should be made to replace the narrow, tortuous, and worn tracks of the province, but the difficulties are immense. The nature of the soil, and the absence of material for metalling, render their construction not only laborious, but seriously costly. The revenue of the Presidency might be sunk in the province without completing the work. Government have, for the present, confined themselves to making as many cleared roads as possible, and the Collectors have been instructed to line them out, and commence their clearance as rapidly as possible.

The Bombay, Baroda, and Central India Railway will soon render effective service to the cotton trade of Guzerat and Bombay. At present the line is open only for 132¾ miles, from Bulsar, south of Surat, through Broach to Doolia, about 8 miles beyond Baroda. Before the monsoon of 1862, however, it is expected that the line will further be opened from Ahmedabad to Golund (222 miles), and that the whole length between Ahmedabad and Bombay will be ready for traffic by May 1863. The freight of cotton in pressed bales is eight pies, or about 1*d.* a ton per mile.

Ahmedabad being distant about 350 miles from Bombay, the cost of conveying a ton of cotton will, therefore, be about £1 9*s.* 2*d.*, or about the sixth of a penny per pound for the whole distance. As yet, of course, this line has not attracted much of the cotton traffic, nor can it expect to do so until the Company are prepared to carry the staple all the way to market. It is no advantage to merchants to send cotton rapidly a portion of the way, and there find no conveniences for its further transmission.

"The Great Indian Peninsula Railway is now opened for a total length of 438 miles, of which 114¼ are in the Concan, including the Mahim branch, 205¼ from Khandalla to Sholapore on the south-eastern extension, and 118½ from Egutpoora to Chalisgaum, on the north-eastern extension.

"A further extension of the north-eastern to Julgaum, 56 miles beyond Chalisgaum, may be looked for in April or May next, and to Bhosawul, 14½ miles beyond Julgaum, where the Nagpore line leaves the main line to Jubulpoor, probably about September next.

"A section of the Nagpore line, as far as Sheogaum, which will be the station for Kangaum, will be opened about the end of next year, to Oomrawuttee about the spring of 1863, and to Nagpore about the end of the same year.

"The contract date for the completion of the line to Jubulpoor is the end of 1864.

"As far as the Committee are aware, the feeders to the railway now open, which have been projected, or are in contemplation, are the following:—

"A road from the Patus station to Nuggur.
"A road from Barsee road or Marheb stations to Barsee village.
"A road from Munmar to Malligaum.
"A road from Chalisgaum to Dhoolia.
"Roads from the Hydrabad assigned districts to the railway station.

"One of the most important roads that could be suggested would be one between Barsee and the Barsee road station. A branch line has often been suggested, and if laid from the main line some miles on the Bombay side of the present station, it would not exceed 14 or 15 miles in length. Barsee, it is well known, is a large depôt for goods from the adjacent districts, the Nizam's territories in particular, and being so favourably situated, it would have been a great advantage if the railway were constructed into Barsee itself. The Seena River offers a serious impediment to the traffic at the Barsee road station during the rains, and on this being represented to the authorities, a pontoon bridge was provided early in the monsoon of this year, and proved of great use to the public.

"The rate for the conveyance of cotton is ·59 of a pie for a Bengal maund of 80 lbs per mile, equal to 16 pies per ton per mile. This rate, it will be admitted, contrasts very favourably with the ruling rates throughout the country for carts, which average from one anna and a half to two annas and a half per mile. The same rate is charged for cotton which is very bulky. As for grain and seed, when it is stated that the railway rate for grain and seed is only 10 pies per ton per mile, the contrast in a favour of the railway rates will be still greater.

"The following is a statement of the quantity of cotton imported into Bombay by rail from the south-eastern line (the principal places being

Barsee and Sholapore), and the north-eastern line during year ending 31st October 1861:—

South-Eastern Line.

		Maunds.	Seers.
November	1860	7,549	0
December	do.....	23,749	0
January	1861	42,933	0
February	do.....	61,432	0
March	do.....	93,590	0
April	do.....	68,260	0
May	do.....	91,490	0
June	do.....	64,391	0
July	do.....	10,258	5
August	do.....	9,558	19
September	do.....	15,429	36
October	do.....	15,480	37
		504,121	17

Or about 40,329,700 lbs.

North-Eastern Line.

		Maunds.	Seers.
March	1861	4,541	0
April	do.	21,138	0
May	do.	81,936	0
June	do.	45,803	0
July	do.	0	0
August	do.	836	0
Sept.	do.	585	30
October	do.	2,151	16
		156,991	6

Or about 12,559,280 lbs.

"In November 1861 the quantity of cotton carried from the south-eastern line was 30,282 maunds, being four times more than that carried in November 1860.

"The following return, obtained from the Commissioner of Customs, of the quantity of cotton and seeds imported into Bombay by way of Panwell, compared with the quantity imported by rail, will show that in three years the imports from the south-eastern line have more than doubled; that during the first year the railway was opened to Barsee only 9,399 tons of these staple products were carried by rail, being about one-quarter of the produce; whereas, during the last year, the railway has obtained more than half of the produce:—

1859-60.

	Cotton.	Seeds.	Tons.
Imported by sea	18,934	23,586	42,520
Do. by rail.....	6,377	3,022	9,399

1860-61.

Imported by sea.....	15,879	16,521	32,400
Do. by rail	16,967	17,130	34,097

"The great increase in the export of cotton and seeds during the period under notice is no doubt attributable, in a great measure, to the facilities afforded

by railway for carriage. There is still, however, a great amount of traffic carried by road; and so long as the interruption exists at the ghauts, it cannot be expected that the railway will obtain all the traffic. But when the railway communication is once thoroughly established, in all probability a single line of railway will be found inadequate.

"The traffic from the north-eastern line has been very small since the opening of the line to Chalisgaum in October last, but is increasing now, and the Committee are informed that the chief portion of the native merchants have promised to consign all their goods to Chalisgaum.

"Much difficulty is experienced in obtaining traffic at any new point to which the railway is opened. When the line was opened to Wassind, in October 1855, it was a considerable time before it was used for the carriage of cotton or seed, although the whole produce of the north-eastern part of the country passed within a few hundred yards of the station, and the Company offered to carry it at a mere nominal charge. The second year after the railway was opened, the place gradually became known, and, on the opening of the line to Chalisgaum, Wassind had become a large depôt for carts, and Chalisgaum being almost unknown to the merchants, and the cartmen entertaining a dislike to any new sphere for work, no engagements could be made with them for carrying goods to Chalisgaum. At one time carts could be obtained from Wassind to Hurdah at a less cost than from Chalisgaum, which is only about half the distance. These circumstances will, in some measure, account for the comparatively small traffic as yet obtained from Chalisgaum."*

The G. I. P. Railway has already offered great facilities for cotton traffic in its line to Sholapore, and these will hereafter be increased when the line is complete.

In a short time the line will be carried through the heart of the Valley of Berar, and offer advantages for traffic to Bombay against which the Godavery will not soon be able to compete.

The full benefit of these railways, however, will not be felt until they are developed by an extensive and judicious system of feeders both on rail and metal. The cotton districts through which they run are almost impassable after the first heavy fall of rain, and the lines of railway will, during the monsoon, be quite isolated from the districts through which they are carried. Either monsoon roads must be constructed so as to enable the traffic of the larger-producing tracts to flow on during the breaks in the rain, or the

* Kindly communicated by Mr. Barnett, Acting Secretary, G. I. P. Railway Company.

main line will effect very little change in the cotton traffic of the Presidency. There will still be press of work followed by total inaction.

In connection with this subject may be mentioned the absolute necessity of providing ample covered storage for cotton at the frequented stations. The staple even now might be pressed on to such depôts, and stored there for transmission along the line. At present sufficient accommodation does not exist at any station in India. The inconvenience of the Barsee road station, to which there is the chief flow of cotton traffic in the neighbourhood, has already been mentioned. During the temporary arrangement on the Bhore Ghaut, Khandalla and Campoolie are equally unprovided with shelter, and even Bombay cannot deliver its cotton from the trucks, during a shower of rain, without exposing the whole to its injurious effect. The Railway Company have in no way provided for monsoon cotton traffic.

In anticipation of the completion of the line through Berar, Government have it in contemplation to construct metalled roads through some of the principal districts as feeders to the railway. Berar has some peculiarities in regard to traffic. Without even cleared roads, it is stated that carts can, without much difficulty, traverse the country throughout the dry season. The principal cotton marts, not immediately on the line of railway, are Oomrawuttee and Kamgaum to the west of the Wurda, and Hingunghaut and Natchengaum to the east of that river. At present the cotton from Oomrawuttee travels to Bombay by the Imampoor Ghaut and Panwell, and that from Kamgaum is carried *viâ* Mulkapoor, Bodwar, to Musawud, where it crosses the line of railway, and flows into the road from Agra to Bombay at Jhorega. Much the greater part of Berar cotton destined for Bombay, even now when carts are the means of transit, reaches Bombay before the commencement of the monsoon. Doubtless, by judicious feeders, very much more of the cotton of Nagpore, Hingunghaut, and Natchengaum than now comes to the western coast may be attracted to the railway. It will be well if Hingunghaut can be induced to supply the Bombay market more liberally with its cotton, which is of better quality than any other now received from Berar. The greater portion of the growth at present goes northward to Jubulpoor and Mirzapoor.

The importance of providing feeders of various kinds for the main trunk of the two lines of railway through this Presidency cannot be exaggerated; the saving in time and deterioration, which would be effected by the substitution of railway for the present road traffic, would be immense. There are, however, many reasons which may render it difficult to induce the natives to abandon their old system, and one of the strongest of these at present is the fact that, while a return freight is obtainable for carts on the line of road,

no employment can be secured for carts which may carry cotton to the line of railway. Those who know the force of habit in the Indian, and his fear of disturbing even the smallest channels of remuneration to which he has been accustomed, will recognise that this must, for a time, oppose the progress of cotton traffic by railway.

In July 1861, Mr. Hart, Revenue Commissioner, Southern Division, brought this subject to the notice of Government, and suggested the following measure as a remedy :—

"Another suggestion which I would offer for the consideration of Government is, that the Railway Companies should be allowed, on certain conditions, to sell salt wholesale, at stations selected for the purpose, where salt warehouses, something on the principle of bonded warehouses, might be established. This proposition is likely to be met with such stock objections as that the plan proposed is not legal, not appropriate, and not likely to be remunerative. To the first of these objections, I would reply that, if worth legalising, it may be made legal by an enactment, which would, at the same time, regulate it so as to make it generally advantageous to the people of the country, to the Railway Company, and to Government. To the objections of inappropriateness and want of remunerativeness, I would reply by begging attention to the following facts :—In some of our English railways, as the Great Northern, and South Wales, the *sale* of coal, which is even in England an article of less equable consumption throughout the year than salt, has been one of the most lucrative operations of either Railway Company. In England, however, a special rolling stock has to be kept up for this traffic, while, on the contrary, in this country, I think that the railway warehouses might be kept supplied with salt by merely sending down to the interior, laden with salt, the waggons which would otherwise be sent down *empty;* so that the carriage of each waggon load of salt would, in fact, cost the Company only the difference between the wear and tear, the grease, and traction of an empty and laden waggon. There would also be this great, though indirect, source of profit—that the salt warehouses on the line would draw thither much of the cotton traffic which now reaches Bombay by other descriptions of carriage, merely because salt has to be brought back by the return carriage. Finally, Government could, without either loss or considerable trouble, arrange with the Railway Company that the latter should pay the duty leviable by Government only on the salt *sold* out of their warehouses. This arrangement would evidently place the Company in a very favourable position as merchants, and enable them to fulfil such conditions as Government might think it necessary to impose upon them for the convenience and advantage of the people, and the ultimate security of its own excise revenue. The conditions for the former

purpose which I would propose would be, that the warehouses be kept supplied so as to meet the wants of the people; that the price demanded should not exceed the original cost of the salt added to the sanctioned cost of railway carriage of the class of merchandize to which salt belongs from the coast to the place of sale. If such conditions as these were agreed on, up-country dealers, and, consequently, their customers, could get their salt cheaper from the railway warehouses, than by sending to a distant mart, and they would naturally not send empty carriage for it, but would send something to forward by rail, for which freight would be realised by the Railway Company, which they would not otherwise have obtained. The security of the Government excise would be easily ensured by occasional examination of accounts of purchase and sale, and of the stock in hand in the several warehouses."

On the 30th October, Mr. Hart again returned to this subject, and added the following particulars to his previous statements:—

"During last season, from conversing with some of the crowds of cartmen whom I observed carrying cotton to the coast on a road parallel and close to the G. I. P. Railway, and evidently in successful competition with it, I became impressed with the belief that, considering all the disadvantages under which cart traffic *ought* to be in such competition, my informants were correct in stating that the employment of their carts in the carriage of cotton further than the nearest railway station accessible to them was, in a great measure, owing to the circumstance that they would, if they delivered their loads at the railway, probably have to return with empty carts, and to lose the return freight which they could now obtain, and to its being therefore profitable to merchants to send down cotton the whole way to the sea on carts, which would return to them with loads of sea salt or imported goods.

"It was under this impression that, when writing on the subject of a proposal for enhancing the salt tax, on which my opinion had been demanded by Government, I suggested, in my letter dated 18th July 1861, a measure which I considered might have the effect of checking any avoidable increase of cost to purchasers of salt, should the duty on it be enhanced, while leading up-country producers and dealers to seek the railway with their produce and goods, instead of carrying them through a tedious journey on carts or bullocks to the sea.

"At the same time, with a view to test the general correctness of my idea on the subject, I wrote, on the 15th of July last, to the Commissioner in Berar to beg that he would furnish me with answers to some questions on the subject. The Assistant in charge of the Commissioner's office has forwarded to me replies from the Deputy and Assistant Commissioners in charge of East and West Berar, which, with the questions prepared by me, are as follows:—

Questions.	Answers from Officiating Deputy Commissioner, East Berar.	Answers from Assistant Commissioner in charge, West Berar.
1. What description of salt is consumed by the bulk of the inhabitants of the country under your charge?	1. Half of the inhabitants consume salt imported from Bombay, &c., and the other half (poor classes) consume the salt manufactured in Berar.	1. Salt imported from the coast is consumed by the bulk of the inhabitants.
2. Whence is salt imported thither?	2. From Panwell and Bundee, manufactured in Joogul, Danuworie, Durriapoor, Kolapoor, and Bateeolee.	2. From Bombay.
3. What is the present average *retail* price of salt in the bazars of ordinarily circumstanced towns, *i. e.* how much does it cost per seer (and state what seer is meant) as purchased by the poor classes?	3. The cost of the first description of salt per seer of 84 Company's Rupees weight is one anna and three pies. The second description per seer of 84 Co.'s Rupees costs nine pies.	3. One anna and four pies is the average retail price of salt per seer of 80 Company's Rupees weight.
4. What was the retail price just before the last rise in the salt duty affected it, and what in A.D. 1840?	4. First description per seer one anna; second description per seer was six pies.	4. The price before the last rise (13th April 1861) in the salt duty was one anna and two pies, and in 1840 eleven pies per seer of 80 Company's Rupees weight.
5. If salt is imported from the coast, on what carriage is it brought, and what is principally conveyed to the coast by the same carriage that returns with salt?	5. Brinjara bullocks and carts. Linseed and cotton.	5. Salt is brought into the district from the coast on carts and bullocks; and cotton and linseed is principally conveyed in the same carriage on return.
6. What is the cost, say per Indian maund of Rs. 3,200 weight (or per cart or tatoo load), of carriage *to* (and from) the mart where the salt principally used in Berar is procured.	6. The cost of salt from Bombay to Oomrawuttee (miles 400) per Indian maund is Rs. 1-3; per bullock load (or one pullah) Rs. 3-8; and per cart or 4 pullahs Rs. 14. The second description of salt manufactured in Berar is generally imported to the large towns in Berar and Nagpore. The carriage varies according to the description procurable; but the cost generally for conveying one pullah per mile is about nine pies.	6. The cost of carriage of salt from the coast to the principal marts in Berar is, on an average, one Company's Rupee per Indian maund of 3,200 Rupees weight.

Government, however, have not deemed it expedient to allow Railway Companies directly to become trading bodies, and the suggestion has not been adopted. It is well worthy of consideration whether a modification of the proposed plan might not be devised, which, avoiding any inconveniences attached to the scheme as it stands, might produce the beneficial results at which it aims.

It is quite certain that more may be done to cheapen the cost and raise the character of Indian cotton, by improving the means of transit, than by exertions in any other direction. There is scarcely an evil of the present system that, directly or indirectly, does not owe its existence or perpetuation to the difficulty of communication. The exposure and delay of transport over wretched roads, in miserable carts, deteriorate the cotton, and offer inducements to fraud. The obstacles to locomotion are effectual barriers against improvement, and prevent the introduction of European agency into the interior. The whole system of extortion and fraud arising out of the monopoly of middle-men is maintained and protected by the difficulty and expense of transit, and the direct demand, which might lead to the more careful cultivation and preparation of the staple, never reaches the ryots. The saving in mere expense of carriage might be slight, but the saving from the consequences of that carriage would be immense.

CHAPTER XIX.

LAND TENURE AND ASSESSMENT.

Land Tenures in the Bombay Presidency—The Ryotwarree tenure—The old Revenue system—Objects of the new Revenue Survey—Its operation—The thirty years' settlement—Rules of Assessment, and Tenure established by the new Survey—Rates on Cotton land—Progress of the Survey—The Regotee system—Sale of Waste Lands—Redemption of the Land Tax—The Indian Ryot—Probable effect of the measure—Advantages of the present settlement—Effect of a total abolition of Assessment—Population—Registration of Contracts—Mr. Sconce's Bill.

As there has been so much discussion regarding the Land Tax of India, and the manner in which it affects the cultivation of cotton, it seems necessary, to the completeness of a work upon the great Indian staple, that some slight sketch, at least, should be given of the existing system of Assessment and Land Tenures.

In this Presidency, and, indeed, throughout India, the whole land appertains to villages; and the lands of each village are divided into fields held upon various tenures, which, as far as taxation is concerned, may be broadly classed under three heads—as rent-free, partially assessed, and subject to the regular assessment. The most general tenure, however, is that known as the Ryotwarree, under which the ryot or cultivator holds his land direct from Government, subject to the payment of what is called Land Tax, but is actually rent. This tenure prevails throughout the Southern Maratha Country, the Deccan, and Khandeish, and it is also general in the province of Berar. The other tenures are chiefly confined to Guzerat and the Concan; and, without entering deeply into their terms, it will be sufficient to state that under them the proprietary right of holders is

more or less complete and invariable, and where holdings are not entirely rent-free, they are, for the most part, subject to the payment of annual dues, which are liable to periodical revision and re-adjustment by Government. In some there exists a system of mutual responsibility amongst sub-tenants for the acquittal of the gross assessment; in others Government have merely transferred to the principal tenant the right to levy the same dues as they themselves would have exacted; and, in a third class, the head-man is liable for an annual payment, and is empowered to exact from his sub-tenants either more or less than the State demand, according to his own convenience. Such of these tenures as do not rest upon absolute proprietary right will eventually be superseded by the new revenue system.

Holders under the Ryotwarree tenure, again, were divided into two classes —the Oopree and Meerasdar. In the Poona and Ahmednuggur collectorates, and in part of Sholapore, the former were mere tenants-at-will, and Government had the power, although they did not exercise it, to eject them at the close of any year. The Meerasdars, on the other hand, had a perpetual and hereditary title to their holdings, and possessed, amongst other privileges, the right to re-enter on the occupation of their land even after it had been long abandoned, and this right was held to extend even to so long a period of abandonment as sixty years. This tenure was confined, in the Bombay Presidency, to the Poona, Ahmednuggur, Sattara, and Sholapore collectorates. Neither of these classes was known in the Southern Maratha Country, and land was there held by a tenure under which the right of occupancy was understood to be secure so long as the assessment was paid, but that right was neither heritable, nor could it be transferred to others, as in the case of the Meeras.

Under the old system of revenue management handed down to us by former native governments, each field or holding was entered and described in the village books, and assessed at a maximum rate, beyond which it was understood that Government would not make any demand. The rate, however, was generally so high, that it could only be paid in seasons of abundant harvests, and consequently, in ordinary years, it was found necessary either to grant remissions, or to allow large balances to stand against the ryots in the assessment books. This, of course, involved the necessity of an annual inspection of the crops, in order to determine the validity of appeals for remission, and afforded great facilities for fraud and petty oppression.

In addition to the Government demand, the ryots were liable to the payment of *huks*, that is to say, tithes or portions of produce from each cultivator's holding, to district and village officers, the collection of which still further

exposed the ryots to extortion and inconvenience. The old system, in fact, was complicated and uncertain. The ryot was perplexed and impoverished by an endless variety of claims, and the Government were not proportionately enriched. The cultivator was often capriciously mulcted of unequal contributions on the one hand, and the State was still more frequently defrauded of legitimate dues on the other. The tenant had no security in his holding, and the landlord had no certainty of his rent.

The Revenue Survey was introduced to remedy these evils—to reduce assessment to a system simple in its operation, and uniform in its results, and so to regulate the action of the land-tax, that, whilst providing an adequate revenue for Government, it might be easy and equitable to the ryot, and develop, instead of repressing, the agricultural resources of the country. The progressive increase of revenue, and the extension of cultivation, which have taken place since its introduction, abundantly prove that the effect of the measure has not been miscalculated.

The first aim of the Survey was to introduce an equable field assessment on plots or fields of a moderate extent. The advantage of thus dividing the village lands into minute portions lay principally in the facility which it afforded to the cultivator of contracting or enlarging his farm, according to his circumstances; for, without the privilege of relinquishing a portion of his land when under the pressure of losses from bad seasons or other causes, the consequence to the ryot might often be ruinous.

Each field was, therefore, accurately measured, its boundaries clearly defined, and it was classified according to the nature and depth of its soil, and other peculiarities, so that every field possessing the same intrinsic capabilities became liable to the same rate of assessment. These operations have been submitted to every test, with a view to securing perfect accuracy, and the precision with which the Survey has been executed could scarcely be surpassed.

This classification, however, does not finally decide the rate of assessment, but a variety of other considerations are admitted in modification, amongst the more important of which may be mentioned climate, position with respect to markets, and proximity to the village as affording facilities for manuring. The aim, generally speaking, has been to base the assessment upon data of a durable character, with due regard to all the extrinsic circumstances which affect the value of a holding. The classification of land irrigated from dams or tanks is made with special reference to the abundance and source of the supply of water, but it is unnecessary here to enter into details on that head.

This Revenue Settlement has been fixed for thirty years, during which period no advance in the rates can be made; and these being based upon the produce of average seasons, no remissions are now granted. At the termination of this period, although there may be a re-adjustment of rates, Government have abandoned their right to dispossess the tenants; but, on the other hand, the ryot may, at any moment, relinquish his holding. The only way in which the title of the ryot to his land can be forfeited is by his failure to pay the rent or assessment. His right of occupation is hereditary and transferable. So long as the rent is paid, he may do whatever he pleases with the land: he may cultivate, build on it, convert it into a tank, or transfer it wholly or partly to others. The following extracts from the Rules of the Revenue Survey will prove that these assertions are strictly correct:—

"*5th.*—Every cultivator in whose name any field, or share of a field, on whatever tenure held, is entered in the village cultivation returns, is to be considered the holder of such field or share; and so long as he shall continue to pay the survey assessment due on it, he cannot be ejected or deprived of his right by any revenue authority; but, in the event of his failing to discharge the full assessment, Government reserves the power of ejecting him from any field, or share, of which the assessment shall, at least, be equal to the balance outstanding, the defaulter retaining, however, the privilege of determining the particular field or fields to be so relinquished.

"*6th.*—In the event of a holder of Government land dying, his fields or shares are to be entered in the name of his eldest son or next heir, should he or his representatives agree to take them.

"*9th.*—Whoever has a field, or portion of one, entered in his name in the Government accounts, may have the said field or portion transferred to the name of any other person agreeing to cultivate the same, on his making a written application to that effect, in the usual 'razeenama' or petition to resign."

In fact, the only condition attached to his tenure is that of discharging the Government land-tax; and, far from being a tenant-at-will, he has a perpetual lease, only subject to a modification of the rent at the end of thirty years, and with power to relinquish his holding at any moment should it not prove advantageous. The risk in this instance is entirely against the landlord, and the tenant has all the advantages of a perpetual lease without its attendant responsibilities. Such a contract is only possible where the landlord is Government, and where the interest of the landlord is so intimately connected with

the prosperity of the country. The ryot's title to his holding is beyond dispute so long as he pays his rent, and by the field assessment he is enabled either to relinquish any portion, or to add to the extent of his farm as circumstances may render it desirable. In the very rare instances in which Government have sold the holding of a ryot to recover the amount of land-tax, the surplus over the amount of their claim has always been paid to the ryot.

The following is a statement of the rates of assessment on cotton lands throughout the Presidency:—

Collectorates.	Rate of Assessment per Acre.						
	Rs.	*a.*	*p.*		*Rs.*	*a.*	*p.*
Dharwar	0	6	0	to	2	0	0
Belgaum	0	7	5	„	1	12	0
Poona	0	2	6	„	1	6	2
Ahmednuggur	0	5	0	„	1	0	0
Sholapore	0	5	8	„	0	15	10
Sattara	0	6	0	„	1	8	0
Khandeish	0	7	0	„	2	8	0
Surat old rates	5	3	4		Average.		
Ahmedabad do.	2	11	6		Ditto.		
Broach do.	4	4	0		Ditto.		
Kaira do.	1	0	0	to	8	0	0

The progress of the Survey may be stated as follows:—

Belgaum	commenced	1849-50,	completed	1857-58.
Dharwar	do.	1842	do.	1860.
Poona	do.	1836-37	do.	1856-57.
Ahmednuggur	do.	1839	do.	1853-54.
Sattara	do.	1853, not yet completed, but nearly so.		
Khandeish	do.	1851, about half completed.		
Broach, Surat, Ahmedabad, Kaira		In progress.		

Some relief from the former inconvenient and burdensome taxation has been granted to the cultivators in Broach and other parts of Guzerat by the introduction of the Begotee system. This simply imposes a rate upon every beegah or acre, based upon a rough estimate of its productive qualities. Previously, the prevailing practice was to levy a crop rate according to the

nature of the cultivation; but, although the Begotee system is a great improvement, it is, in its turn, destined to be displaced by the more equitable and exact survey settlement.

The following is a Return of culturable lands in Government villages, taken from the Returns of 1858-59, distinguishing between those under cultivation and those that are waste :—

Collectorates.	Cultivated.		Waste.		Total Culturable Land.	
	Acres.	Beegahs.	Acres.	Beegahs.	Acres.	Beegahs.
Northern Division.						
Ahmedabad.....	272,337	212,632	157,584	214,880	429,922	427,512
Kaira	....	478,224	....	214,390	....	692,614
Broach.....	....	797,142	....	59,499	....	856,641
Surat	....	740,488	....	276,119	....	1,016,607
Khandeish	491,843	1,443,172	357,670	1,640,718	849,512	3,083,891
Total of N. D..	764,180	3,671,658	515,254	2,405,606	1,279,434	6,077,265
Southern Division.						
Poona	1,598,885	....	141,186	....	1,740,070	....
Ahmednuggur....	2,875,125	....	458,961	....	3,334,087	....
Sholapore	2,238,956	....	307,418	....	2,546,373	....
Rutnagherry	380,196	....	....	....	218,221	....
Belgaum	1,476,430	....	282,078	....	1,758,508	....
Dharwar	1,297,726	....	203,216	....	1,500,942	....
Sattara.....	1,738,211	....	339,367	....	2,077,579	....
Total S. D..	11,605,529	....	1,732,226	....	13,175,780	....
Grand Total..	12,369,709	3,671,658	2,247,480	2,405,606	14,455,214	6,077,265

Tanna is excluded from the above return because the variety of measurements in use in that collectorate prevent their being reduced to any common standard.

In the case of Rutnagherry the figures are only an approximate of the true amount.

Where Acres and Beegahs are both shown, it is because the district is only partially surveyed; the Acres representing the surveyed, and the Beegahs the unsurveyed portions.

These figures, however, must not be accepted without considerable reservation, and, except in the case of Khandeish, it will be found that the extent of really culturable waste land is not so large as might at first be supposed; divided amongst numerous villages of each district, it does not exceed 100 to 150 acres for each. It may safely be asserted that this waste land consists chiefly of the worst soil in each district, presenting very little inducement to the ryot to bring it under cultivation, and still less affording a remunerative opening for the European. The waste land in Khandeish may be an exception to this, but it is to be doubted whether the portions of that province in which it is most abundant possess a climate suited to the European constitution. It should also be borne in mind, that, from the scantiness of population, no great extent of waste land can immediately be brought under the plough, without allowing a portion of that which is now yielding crops to become waste. The cultivation of waste land is quite as much dependent on labour as on capital.

By a recent resolution of the Governor General of India, it has been decided to give effect to the following measures:—

I. The sale of waste lands in perpetuity, discharged from all prospective demand on account of land revenue; and

II. Permission to redeem the existing land revenue, by the immediate payment of one sum equal in value to the revenue redeemed.

The price to be paid for unassessed land is not to exceed Rs. 2½ per acre for uncleared land, and Rs. 5 per acre for land free from jungle. These rates to remain in force for five years, from the 1st January 1862, but subject to revision after that period.

The price to be paid in redemption of land-tax is fixed at 20 years' purchase at the existing rate of assessment. The tenure obtained will be that of a heritable and transferable property, held in perpetuity free from all demands on account of land revenue, or of the Government.

It is to be feared that many who are entirely unacquainted with the climate and people of India may build unreasonable hopes upon this measure, which has been forced from Government by the pressure of a public who are not acquainted with either. There can be no doubt that, until European energy and enterprise are brought into contact with the natives of this country, the progress of improvement will be slow and unsatisfactory. All, however, who know India are aware that European agency cannot successfully be employed in the actual cultivation of the soil. A quarter of a century has produced

very little change in the circumstances which led Sir J. R. Carnac to say, "Cotton culture holds out no inducement for any private person, who knows what he is about, to engage his capital in any speculation on a large scale." The whole of the cotton experimental establishments abundantly tested and proved that Europeans, cultivating the soil, could never compete in economy, or compensating results, with the husbandry of the ryots. Generally speaking, the whole of the work of his farm is performed by the ryot and his family, and their labour is given with all the good will of self-interest, and all the constancy of personal concern. It is as impossible to compete with such efforts by hired labour, as it is for the European to perform that labour himself, under an Indian sun. Hired labour in India, so far as the labourer is concerned, is a contract to do as little work as possible for the highest possible wages. Colonisation for the purpose of actual cultivation is a hopeless undertaking.

Until the introduction of the thirty years' settlement by the new Revenue Survey, the ryots, Meerasdars included, had, generally speaking, been mere tenants-at-will under their native governments. The new system has given them a settled security, for which they had neither been led to look by habit nor by precedent. The alleged uncertainty of the present settlement has as little effect upon their agricultural arrangements, as a tax upon hair-powder would have upon their toilet. The present system of cultivation has been adopted, and will be continued, from considerations wholly apart from any fixity of tenure. The thirty years' settlement has not repressed a single improvement in the ryot's holding, and the perpetual settlement would not stimulate a single alteration.

Attentive students of English discussion on the state of the Indian cultivator will have observed, that he is endowed with two distinct personalities to suit two distinct points of view: with chameleon-like facility he assumes a very dark hue when he is placed on the dark spot of cotton cultivation, and he rises into bright intellectual and moral colours when he stands in the light of the land-tax. The ryot, as cotton cultivator, is an ignorant savage, tilling the earth upon a barbarous and primitive system, and drawing a scanty produce from its liberal fertility, more by good luck than good guidance. His ploughing is merely the scratching of the soil with a crooked stick; his sowing is a rude broad-casting of the seed at unnatural seasons; his rotation of crops is regulated by ignorant caprice, and his whole efforts are supposed to be paralysed by his abject poverty and indebtedness to the sowcars. The ryot, as martyr to the land-tax, is an acute and intelligent farmer, of the same

stamp as the "canny" Scotch agriculturalist, who knows well how to improve his farm, but is deterred from any actual step by the danger of a possible increase to his rent looming in the thirty years' distance of the settlement. He is a keen and close calculator, who will not expend one anna in improvements which, a generation later, might afford the pretext for a grasping Government to extort a higher assessment.

If the British public, after looking upon this fancy picture and on that, could but see the real ryot "in his habit as he lives," many perplexed theories might be set at rest. The naked truth that would stand before them, draped with a quarter of a yard of calico, might lead opinion to that *juste milieu* which it is apparently so difficult to discover. The genuine ryot cultivates his land upon a system which, though primitive, is found well adapted to the circumstances of soil and climate. His plough is regulated by the power of his cattle, and the strength of the ploughman. His seasons have been prescribed by the experience of centuries. He is often poor in the English acceptation of the word, but, with the few wants of the Hindoo, is not in bad circumstances. He has not, in general, much capital beyond the stock of his farm, and he is frequently obliged to borrow at heavy interest the means of carrying out the more expensive operations of cultivation, repaying the advance in its produce. He is the creature of habit, averse to change, and afraid of innovation. He meets most suggestions for his improvement with the philosophical assertion that he is content with things as they are. Practically speaking, the Indian is quite incapable of the foresight which casts bread upon the waters, that it may be reaped after many days. He lives from hand to mouth as his forefathers have done, and he has neither the desire nor the means to redeem a light annual rent by a considerable present payment, for the advance of which he will have to give usurious interest, which will cripple him more than the land-tax. If he possess the requisite capital, it is not likely that he will invest it in a purchase which will virtually save him only the five per cent. of the land-tax, when he can any day place the same in the bazar at 12 or 15 per cent. interest. It is right to observe, however, that although this is a true picture of what the ryot has long been, and of what a considerable part of the class still is, the whole are rapidly improving in means, and a very large number are rising into substantial ease, and possess capital in the shape of carts and herds of bullocks, as well as in money.

Another circumstance which will prevent the ryots from redeeming the land-tax, even if they could, is the fact that they have no guarantee that the revenue thus surrendered by Government will not eventually be made good

by some other cess. Indeed, they have the positive certainty that any deficit will so be met. Well-informed natives in the interior have already advanced this contingency in proof of the uselessness of their taking advantage of the measure. The extent of the redemption is limited to ten per cent. of the revenue of any district, and it may, perhaps, be fortunate if few avail themselves of the privilege. The funded purchase-money will not compensate for the abandoned revenue, and if it be requisite to meet a further deficit in the budget by new taxes, to which the people are not accustomed, in lieu of a moderate rent, which has been paid for centuries, it may be found that in India "a rose by any other name" will by no means "smell as sweet."

The probable effect of the measure will be simply to change the lordship of the soil. The sowcars will, no doubt, either directly or indirectly, become the purchasers of ten per cent. of the best land in each district, and the revenue which Government abandon will ultimately go into the pockets of these individuals. Instead of being the tenant of Government, a landlord whose direct and indirect interest it is to promote his prosperity, inasmuch as the prosperity of the ryot is necessary to the prosperity of the Empire, the ryot will probably become the tenant of the sowcar, who can gain more from his distress. The extortion and oppression complained of, now that the ryot is comparatively free, will probably increase when the possession of the land is superadded to a lien on its produce. This measure will strengthen the hands of the very class whom it is the interest of European agency to weaken, if cotton is to be improved, and legitimate profits to the agriculturalist are to stimulate him to increased care in cultivation. Instead of a moderate rent fixed for a period of thirty years, which is an age to the ryot, he will probably become a mere tenant at the will of the sowcar, and his rent may be settled upon very different principles from those which now regulate the land assessment.

The rate paid under the new survey regulations is a very much more moderate rent than any known in England, and the lease is altogether one-sided, binding the landlord and not the tenant. Government cannot eject the ryot who pays his rent, but the ryot can, at any moment, give them notice to quit. There is a guarantee in this very one-sidedness that what is wanting in the binding power of the lease will be supplied by the advantageous nature of its terms. At the end of thirty years the lease must be renewed, and, for the same reasons of self-interest, it can scarcely be doubted that the terms will, at least, be equally favourable to the ryot. The actual circumstances of the country, and its state of progression, render a perpetual settlement unad-

visable, and there is less reason why the Government of India should make a perpetual settlement now with the Indian cultivator, than there is for the English landlords to grant perpetual leases to all their tenants. The thirty years' settlement is sufficiently long to enable the ryot to calculate on the fruits of his care and foresight, and sufficiently short to admit of equitable re-adjustment, according to altered circumstances, and it is, therefore, more advantageous than one which admits of no accommodation.

The effect of a total abolition of assessment, so far as the world are concerned, was stated by the committee appointed in 1846 to inquire into the state of the cotton trade, and that committee was composed of men who probably knew as much of this country as any who could have been selected. They stated—

"When it is considered that the Government in this country is, in a great majority of cases, the real landlord, and that the assessment levied is practically in no respect different from the rent which a landlord would exact, it becomes evident that, supposing that rent to be fixed at an equitable amount, the surrender of the Government claim to assessment would not cheapen the cost of production, unless means could be found for preventing the occupant of the land from appropriating to himself the amount of produce surrendered, which is clearly impossible.

"For the reason above stated, we feel convinced that the total abolition of the land assessment, or its reduction below the standard of a fair rent, would act in precisely the same manner as the transfer to the farmer of the landlord's rights in any country in Europe. It could, we think, have but a temporary effect in cheapening the cost of production, from the inevitable tendency which such a measure would have, in a long-settled country like India, to raise up a class of landlords to fill the place now occupied by Government."

The effect of a redemption or abolition of the land-tax, so far as the ryot is concerned, may be approximately estimated. The Jagheer States of this Presidency are virtually under precisely the same circumstances as those districts are likely to be, in which, by the redemption of assessment, land becomes free from Government management, and dependent on individual or native regulation. Captain W. C. Anderson, Superintendent of the Revenue Survey in the Southern Maratha Country, gives the following picture of Jagheer lands :—

"The jagheerdars occupy a position very much more favourable than that of

the zemindars of Bengal; and, if the zemindaree system were capable of doing the great things for the country which its advocates represent, the Jagheer States should be flourishing in the highest degree, since they are held to a great extent free,—certainly on far less onerous terms than those which any ordinary zemindars could expect to obtain, and, consequently, a much greater proportion of the revenues should be available for the improvement of the country. In reality, however, we find most of the jagheerdars deeply in debt, and their revenues, instead of being devoted to the improvement of their estates, wasted in debauchery and in keeping up a crowd of useless retainers; the good intentions of any occasional well-disposed incumbent are rendered of no avail through the incumbrances on the estate bequeathed to him by his predecessors; anything like fixity of tenure is unknown; the standard assessment is so high as to be absolutely incapable of realisation in all but extraordinary years; the unrealisable balance is kept hanging over the unhappy cultivator, and is used as an engine to screw as much as possible out of him in the case of the occurrence of an extraordinarily good season; land is very generally given out on a special bargain at rates below the standard agreed upon between the ryot and the jagheedar's officials, but still not at rates sufficiently liberal to dispense with the necessity for remissions; the holder in these cases, and practically in all cases, is ousted at the close of any year if a higher bid is made for his land. It is not necessary to depict the consequence of such a system on the condition of the people." [1]

The probable effect of the act which permits the redemption of the land-tax may be summed up thus:—It will depress the ryot, and elevate the sowcar. It will substitute the capricious uncertainty of a tenure-at-will for the security of a perpetual lease, without its attendant liabilities, and with the assurance of an equitable re-adjustment of the rent at the end of thirty years. It will put additional gain into the purse of the middle-man, and render more difficult the competition of the European; and, whilst it may deprive the ryot of much inducement to increased care in cultivation, it will not promote the introduction of English capital, nor will it overcome the obstacles to English colonisation.

In connection with cultivation in India, the following table and diagram, showing the amount of population in each district, and the proportion to the square mile, may not be uninteresting:—

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[1] Returns, East India Cotton, 1857, page 1042.

GSL

Diagram shewing the Population to the Square Mile in each of the undermentioned Districts in 1857.

Prepared by W. R. C.

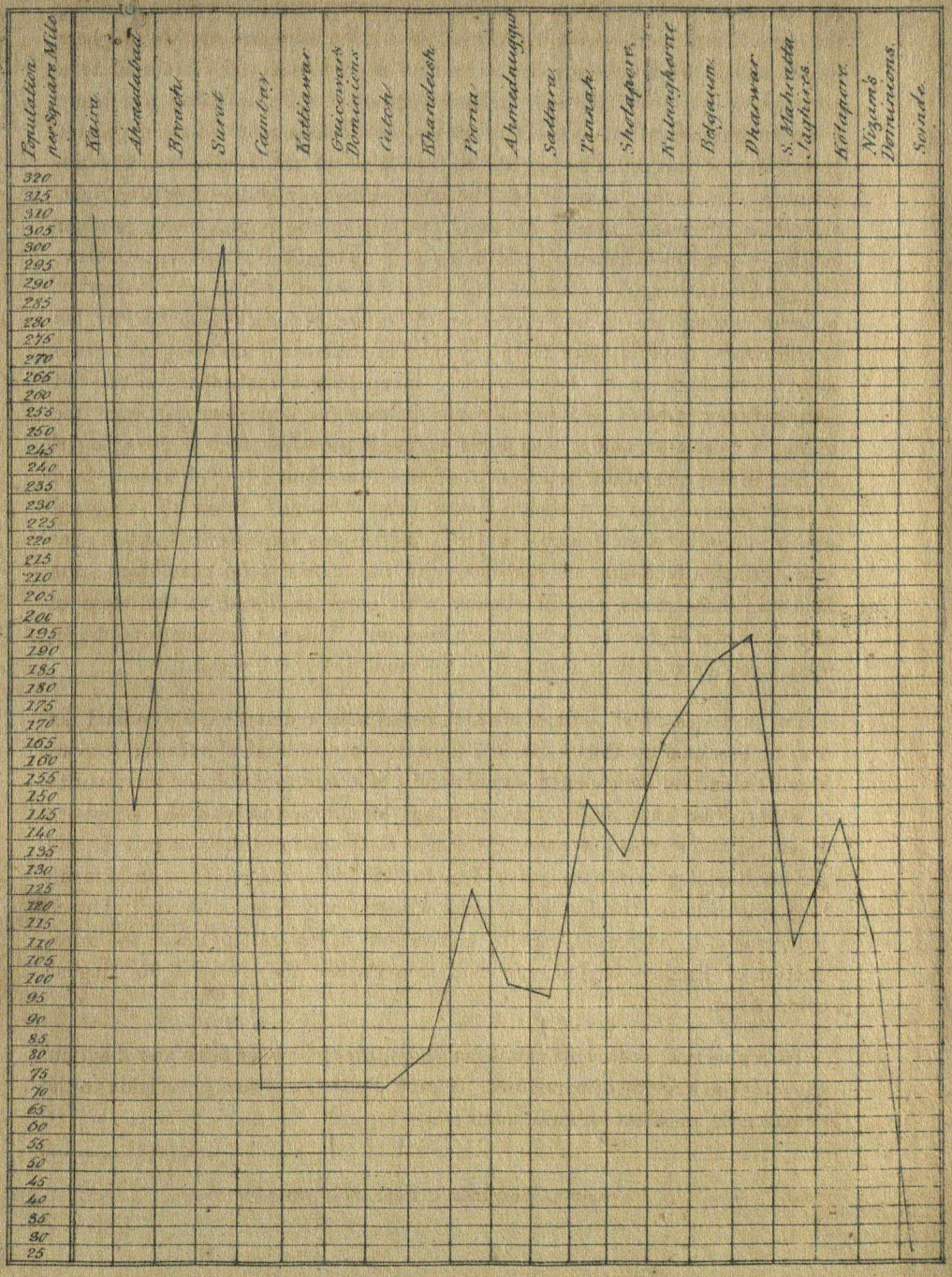

Table showing the Population of the undernoted Districts, and the proportion to the square mile in each, in the year 1857.*

Districts.	Area in Square Miles.	Population.	Proportion to a Square Mile
Ahmedabad	4,356	650,223	149·27
Broach	1,319	290,984	220·60
Kaira	1,869	580,631	310·44
Surat	1,629	492,684	302·66
Tanna	5,795	874,570	150·91
Khandeish	9,311	778,112	83·56
Poona	5,298	666,006	125·71
Ahmednuggur	9,931	995,585	100·25
Sholapore	4,991	675,115	135·26
Rutnagherry	3,964	665,238	167·81
Belgaum	5,405	1,025,882	189·80
Dharwar	3,837	754,385	196·60
Sattara	10,222	1,005,771	98·39
Sind	63,599	1,768,737	27·80
Nizam's dominions	95,337	10,666,080	111·87
Baroda—Guicowar's dominions	4,399	325,526	74·
Cutch	6,764	500,536	74·
Southern Maratha Jagheers	3,700	410,470	110·93
Kattiawar	19,850	1,468,900	74·
Kolapoor	3,445	500,000	145·13
Rewa Kanta	4,879	361,046	74·
Sawunt Waree	800	120,000	150·
Cambay	500	37,000	74·
Mahee Canta	3,400	150,000	44·11

There is one direction in which judicious legislation would do more to promote the introduction into India of English capital and enterprise, than any sale of waste lands, or any power to redeem the land-tax, and it is the provision of means for the due registration and protection of contracts for produce. Some short time ago two Bills were proposed to the Legislative Council of India for this purpose—the one brought forward by Mr. Beadon, and the other by Mr. Sconce. Mr. Beadon desired to make the breach of contract a penal offence, and the provisions of his Bill were evidently framed with a special reference to Indigo planting, which then occupied a large share of public attention in Bengal. Mr. Sconce's Bill, less influenced by party feeling, provided equitable protection to both the contracting parties, and did not, like the other, deal out criminal penalties to the ryot, and merely civil consequences to the merchant. The desire of the community to secure too much led to the inevitable result of getting nothing. The just and moderate Bill proposed by Mr. Sconce was lost, and the one-sided and objectionable

* Taken from Returns to House of Commons, 1859, page 10—13.

measure introduced by Mr. Beadon, which destroyed it, was, fortunately for the credit of England, set aside by an order of the Secretary of State. It is not improbable that further reflection may have modified such momentary imprudence, and that a Bill of the nature of Mr. Sconce's might now receive pretty general support. The following were its principal clauses:—

A BILL

To provide for the Registration and for the better enforcement of Engagements for the Cultivation and Delivery of Agricultural produce.

Preamble.

Whereas it is expedient to provide for the registration and for the better enforcement of engagements for the cultivation and delivery of Agricultural produce: It is enacted as follows:—

Appointment of Registrars.

I. The local Government of any Presidency or place may appoint in any district one or more public officers or other persons to be Registrars for the registry of written engagements executed by cultivators for the cultivation and delivery of any article of agricultural produce; and such Registrars shall hold their offices for the registry of such engagements at such stations or places as the local Government may from time to time determine.

Notification thereof.

II. Upon the appointment of any such Registrar in any district, the local Government shall notify the appointment in the official *Gazette*, and shall cause a notification of the same to be published in the several Civil Courts of the district and elsewhere as may be thought necessary. The local Government shall also fix a date from which within such district the registry of engagements under this Act shall take effect, and the date so fixed shall be specified in the notification aforesaid.

Registrar to satisfy himself of due execution of contract.

III. On the presentation of any such engagement for registry, the Registrar shall not register the same unless it appear to him that the cultivator by whom the engagement bears to have been executed personally executed the same. In every case such cultivator, and the person in whose favour the engagement is executed, or their respective agents, shall appear before the Registrar, and be examined by that officer. Also the identity of the cultivator (if present), or the execution by him of the engagement (if absent), and the authority of his agent to appear for him, shall be attested by not less than two credible witnesses, being residents of the village in which the land engaged for is situated, or in which the cultivator resides.

IV. The substance of the statements made before the Registrar under the next preceding section by the parties or their agents and the witnesses shall be given in the register, and be certified by the Registrar; and such statements so certified shall be taken to be the evidence given by such persons in the matters aforesaid. All registers shall be in the form annexed to this Act.

Statements made by the parties to a contract to be altered in Register.

VII. If any person shall have given an advance in money to a cultivator under a written engagement, stipulating for the cultivation, during the year or season on account of which the advance is made, of any article of agricultural produce on land of certain defined limits in the occupation of such cultivator, and for the delivery of the same to the person by whom the advance aforesaid was paid, such person shall be held to have acquired a lien on the crops so engaged to be cultivated and delivered; provided that such lien shall not affect the preferable right of any person to whom the rent is due from the land described in the engagement in respect of the year or season aforesaid, or the right accruing lawfully to any person from a contract of earlier date.

Person advancing money for cultivation on specified land to be deemed to have a lien on the crop.

Proviso.

VIII. When any person shall have acquired a lien as aforesaid on any crop of agricultural produce, any other person who knowing of such lien shall take delivery of such crop, or shall, for his own benefit or the benefit of any other person, induce the cultivator to break the engagement executed by him, shall, on the institution of any suit preferred against him by the person holding such lien, be liable to an award of such an amount of penalty or damages as might be awarded against such cultivator under the terms of the engagement executed by him.

Penalty for third party knowingly purchasing, &c. crop on which there is a lien.

IX. Any person holding any such lien as aforesaid on any crop of agricultural produce, who shall have reason to believe that the cultivator thereof has done, or is about to do, any act for the purpose of evading the delivery of such crop as stipulated in the engagement for the cultivation of the same, may bring before any Civil Court of competent jurisdiction a suit to declare and secure his right in the crop aforesaid; and pending the decision of the suit, besides such orders as may be lawfully made by way of injunction or otherwise under the provisions of Act VIII. of 1859 or other law, it shall be competent to the Court to put the plaintiff in possession of the disputed crop on such terms as to the custody, re-delivery, gathering, or reaping of the crop, and the eventual fulfilment of the engagement,

Plaintiff may, in certain cases, be put in possession of disputed crop, pending suit.

and as to the security to be given by the plaintiff for the due performance of such terms as the Court may direct, provided that any order so made may be varied or set aside by the Court on application made by any person dissatisfied with such order.

Compensation to defendants.

X. The provisions of Section XCVI. Act VIII. of 1859, as to awarding compensation to a defendant, shall apply to suits described in the foregoing section, and to the orders made in conformity therewith.

Defendant may be called upon to give security for due performance of contract.

XI. Any person holding such lien as aforesaid on any crop of agricultural produce, who shall bring a suit before a Court of competent jurisdiction for the recovery of damages on the failure of the cultivator who executed the engagement to cultivate the land therein agreed to be cultivated, may move the Court, pending the decision of the suit, to require such cultivator, being a defendant in the suit, to give adequate security for the complete performance of the contract. In such case, after the examination of the plaintiff, and the consideration of such evidence as the Court may call for, if material loss be likely to accrue to the plaintiff from the land not being cultivated as agreed upon, the Court may require the defendant to give security for the performance of his contract to such an amount, and within such time, as the Court may direct; and if the defendant shall not give the security so required, the Court may put the plaintiff in possession of the land, provided that such possession shall not extend beyond the season for the cultivation and clearing of the crop engaged for, and provided that such possession shall be taken, subject to the eventual determination of the Court as to the payment of compensation and costs between the parties.

Saving of rights of Zemindars, &c. for rent due.

XII. Any person taking possession of any crop or any land under Sections IX. and XI. of this Act, shall take the same, subject to any remedies which may by law be open to any Zemindar or other landholder to whom rent on account of the year then current is due in respect of such land, as if the person taking such land or crop was the cultivator thereof.

The Criminal Procedure Bill has provided for all fraudulent dealing in regard to contracts, and the Small Cause Court Bill will quicken the legal remedy for the ordinary breach of these engagements. Such a measure as the one just quoted therefore, with some additional simplification and abreviation of the civil process, would provide all the protection which commerce requires, and all the indemnity which justice authorises. This subject merits the immediate and earnest attention of Government.

CHAPTER XX.

CONCLUSION.

With the view of stimulating the ryots to increased care in cotton cultivation, the Government of India, in August 1861, determined to offer the sum of Ten thousand Rupees, during two successive years, for the largest quantity of cotton, combined with the best quality, produced upon any one estate in the Presidency, the cotton being brought to any port of shipment by the month of June. The extent of land not to be less than thirty acres, all belonging to one property.

This resolution, however, appeared too late for the purpose of encouraging increased cultivation during the present season; the extent of land required for successful competition was, therefore, reduced to 15 acres. The Bombay Government, taking into account the peculiarities of this country, the distance from each other of the different cotton districts, and the character of the cultivators, decided that it would produce no benefit to give the amount in one sum. Such an award would, probably, never be heard of out of the immediate district, and, if heard of, would not be believed. It was, therefore, resolved that the sum should be divided into four equal parts, and awarded as detailed in the following Resolution:—

"Government consider that the Rs. 10,000 should be divided into four equal sums, and that separate rewards should be offered for the four following descriptions of cotton, grown by *bonâ fide* cultivators, *i.e.* persons occupying a Government holding, or a plot of alienated land, at the commencement of the Revenue year, viz:—

1*st.*—Guzerat indigenous cotton.

2*nd.*—Khandeish indigenous cotton.

3*rd.*—Deccan and Southern Maratha Country indigenous cotton.

4*th.*—Foreign varieties, such as American, Egyptian, Sea Island, &c.

And that four prizes for each variety or description will be offered; the 1*st* prize to be one of Rs. 1,000; the 2*nd* to be Rs. 700; the 3*rd* to be Rs. 300. There will thus be—

4	Prizes of	Rs. 1,000 =	Rs. 4,000
4	Do. of	„ 700 =	„ 2,800
4	Do. of	„ 500 =	„ 2,000
4	Do. of	„ 300 =	„ 1,200
		Total .. Rs.	10,000

"The districts which will be considered to have a claim to compete for the prizes to be given to each description will be as follows:—

I.—*For Guzerat Indigenous.*

Surat, Broach, the Guicowar's districts, Kaira, Ahmedabad, and Kattiawar.

II.—*For Khandeish Indigenous.*

Khandeish and Berar.

III.—*For Deccan and Southern Maratha Country Indigenous.*

Sholapore, Ahmednuggur, Belgaum, Sattara, and Dharwar.

IV.—*For Foreign varieties.*

The whole Presidency, including Berar, the Guicowar's districts, and Kattiawar.

"As the time for sowing is past, and rewards cannot now stimulate increased cultivation, the limit of the holdings may be reduced to half the size proposed by the Government of India, *i.e.* to 15 acres, all belonging to one cultivator." [1]

These prizes will be awarded by the Bombay Chamber of Commerce.

In connection with the Bombay cotton trade, it may not be uninteresting to state a few particulars with regard to the progress of Spinning and Weaving Companies in this Presidency. The number of looms and spindles now at work in Bombay may be detailed as follows:—

		Spindles.
Oriental Spinning and Weaving Company.....	Throstle	21,672
	Mule ..	23,280
	Looms 465	
	On the way do. 444	
Cowasjee Nanabhoy's Company	Mule	24,000

[1] Revenue Department, Compilation No. 1065 of 1861.

		Spindles.
Cowasjee Nanabhoy's Throstle Mill Company ..	Throstle	10,000
	Mule ..	10,000
Victoria Spinning Company ....Mule..		5,000
Besides these, the following are now building Mills:—		
Bombay United Spinning Company.....	Throstle	10,000
	Mule ..	10,000
Looms 330		
Coorla Company	Throstle	10,000
	Mule ..	10,000
Looms 320		
Manockjee Petty's Spinning and Weaving Company	Throstle	28,000
	Mule ..	28,336
Looms 1,028		

and about the same number of looms and spindles in the "Royal and Great Eastern Company."

In Broach there are 20,000 spindles at work, and in Ahmedabed 4,000 spindles, making the number of spindles in the Presidency little short of a quarter of a million.

The highest counts of yarn generally produced are Nos. 16 and 20. The cotton used in spinning these numbers is principally Broach and saw-ginned Dharwar, and, in working, 18½ to 19 ounces of these growths turn out a pound of yarn. Other classes of Indian cotton require 21 to 22 ounces, or more, of wool to produce a pound of yarn. Each spindle works off about 17 ounces a week. Recently, as an experiment, one of these Companies imported 50 bales of Georgia Upland cotton, which, mixed with about one-third of saw-ginned Dharwar, produced very good 40 and 50 counts of yarn.*

For upwards of half a century Government have desired, and have endeavoured, to promote the improvement of Indian cotton. During this period the hope that India might ultimately replace the United States, as the source of cotton supply, has vaguely existed in Great Britain, rising into eagerness in moments of distress, and sinking into indifference on the return of abundance. For upwards of half a century Indian cotton has occupied the unsatisfactory position of a mere *pis-aller* for the American growth, reluctantly purchased

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* I am indebted for this information to the kindness of Mr. W. F. Hunter.

when the latter has been dear, and instantly abandoned when it has become cheap. From the similarity of actual circumstances, and the very slight change which has taken place in the character of the staple, there is no reason to suppose that the present appetite for Indian cotton will survive the American blocade, or that the present demand is less fickle than that which preceded it. The position of American cotton is not shaken in the English market by the present scarcity, and the Indian staple is not established on any more solid basis, because necessity has driven manufacturers to use it. The exceptional nature of the demand gives an exceptional importance to the Indian growth, but when usual course is resumed, Surats will return to their usual level.

There is absolutely no reason whatever why Indian cotton should now be more favourably received than it has hitherto been. Its quality is unaltered, and its price has increased. Under such circumstances, the sudden conversion of British manufacturers leaves grave doubt of a speedy relapse. Small as the import of Indian cotton has always comparatively been, England has relinquished much of it without regret, and the re-exports of the growth have far exceeded those of the more abundant American supply. The three diagrams annexed exhibit the comparative imports and re-exports of American and Indian cotton, and the effect of the price of Georgia Upland in regulating the Indian supply. In glancing at them, it will be remembered that, from distance and dependence on seasons, the effect can only follow the cause at an interval of one or two years. It will be seen that, in consequence, the fate of Indian cotton has generally been to be stimulated by hope, and depressed by subsequent disappointment.

It is important that the actual position of India, in regard to cotton supply, should be clearly defined. The pleasant illusions of temporary demand must not be allowed to conceal the less agreeable features of sober reality. The expenditure of some lakhs of rupees in cotton experiments, and the experience of a century of the cotton trade, have, at least, furnished data for distinct conclusions, and it is now time that the case should be rightly understood. Leaving the other Presidencies to speak for themselves, the following results are clearly deducible from the facts of cotton cultivation in Bombay:—

Exotic cotton cannot be successfully cultivated on a large scale in the Bombay Presidency, except in a limited portion of its southern districts.

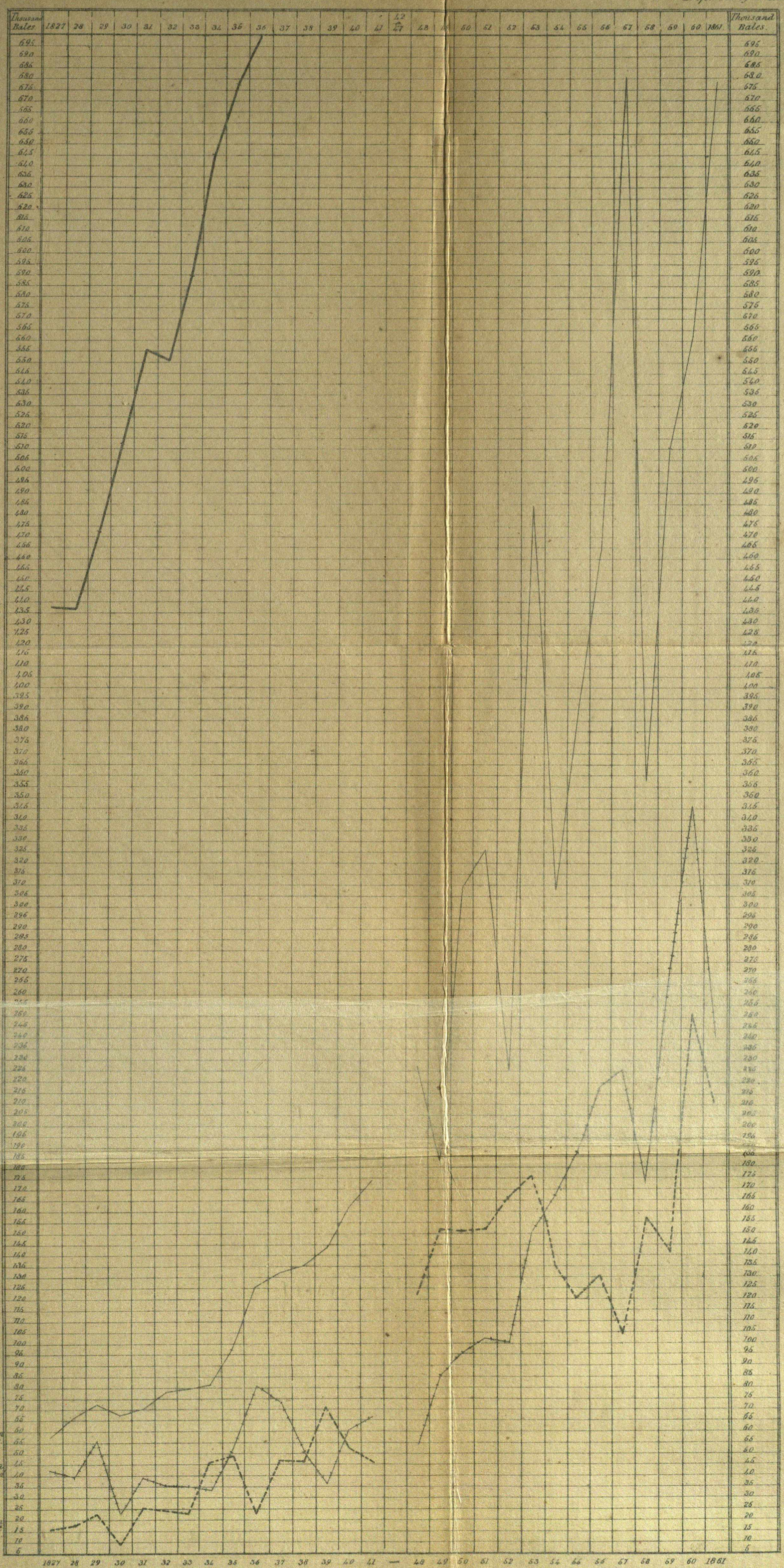
Indian cotton may be improved in cleanness, and somewhat reduced in cost, but the general characteristics of the staple will not be materially altered.

GSL

Diagram showing the Imports of East India Cotton into Great Britain from 1827 to 1841, and from 1848 to 30th September 1861, also of American for the first ten years of the period and the quantities of both re-exported.

American Imports ——— East Indian ———— American Re-exported - - - - - East Indian .....

Prepared by W.K.C.

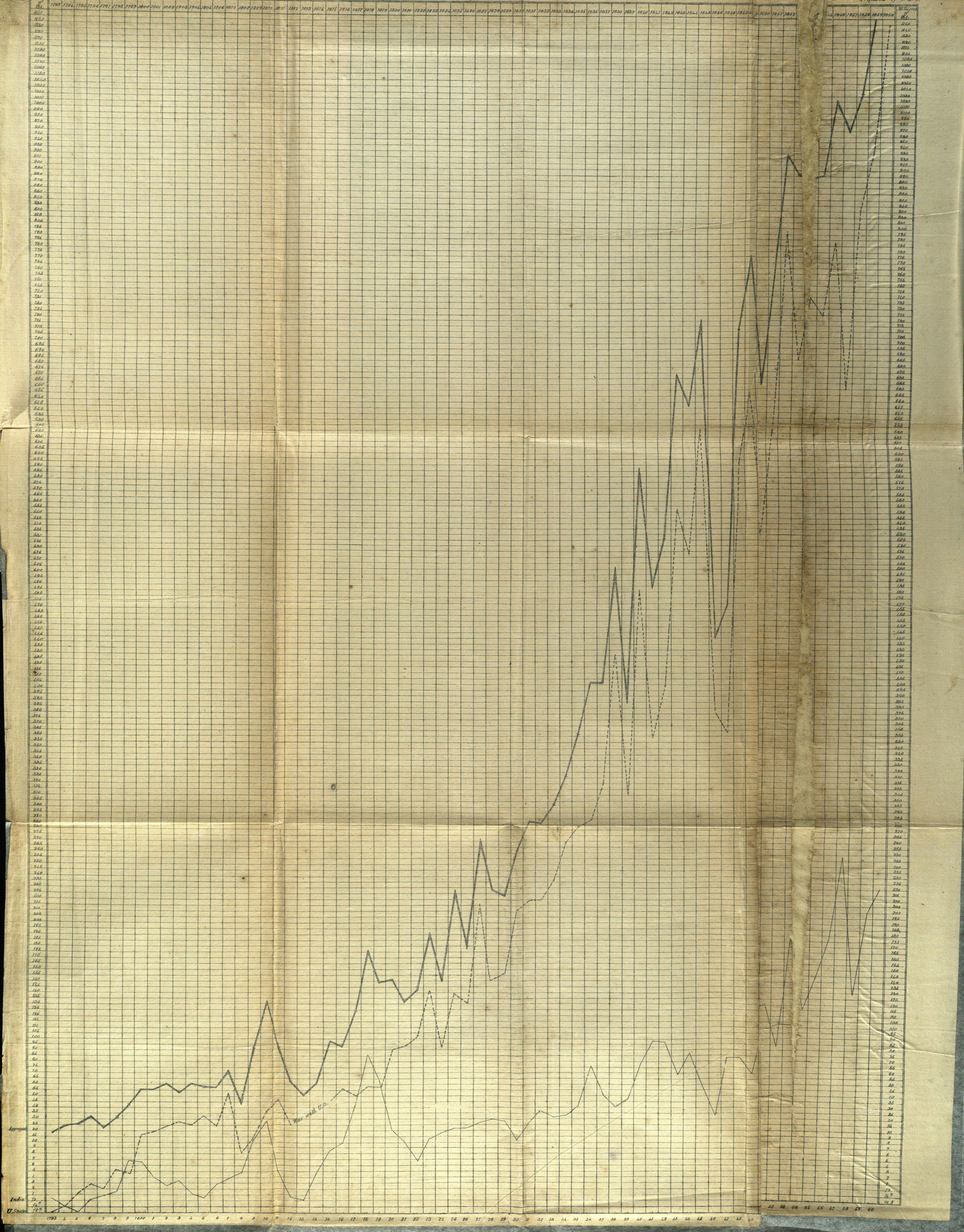


Imports of Cotton into Great Britain from 1793 to 1860 in millions of lbs.

Aggregate Importations from all Quarters_____ From America_____ From India_____

341
348

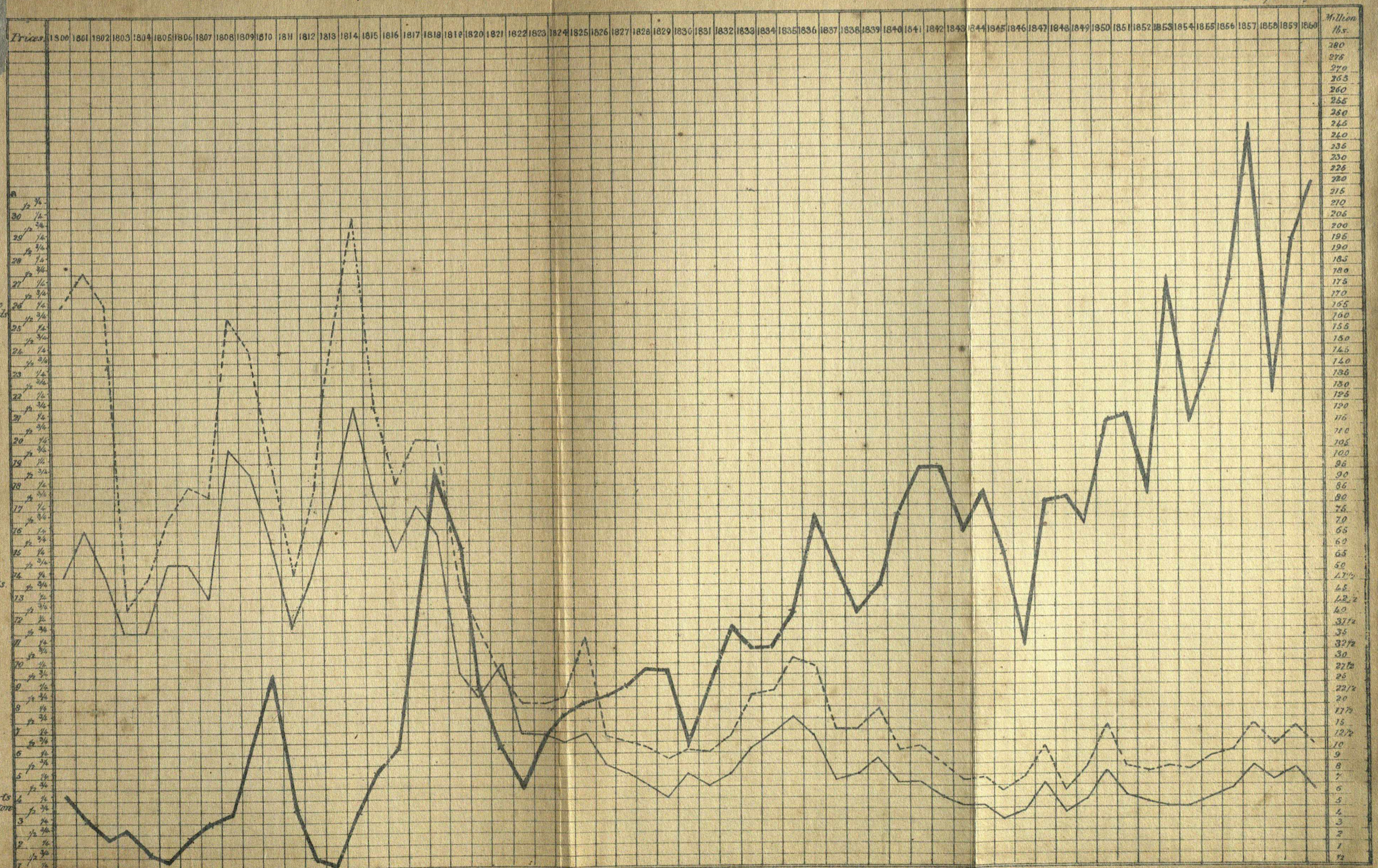
Prepared by W. R. C.



Imports of East India Cotton from 1800 to 1860, and relative Prices of Georgia Uplands and Surats, for the same period.

Imports Cotton ———— Price of G. Uplands - - - - - - - - - - Price of Surats ————

Prepared by W. R. C.



GSL

In so far as this quality of cotton is serviceable to the manufacture England, India can compete with America; but if a finer description be required, India cannot adequately supply it.

Unless, therefore, such alterations in machinery can be devised as may render the manufacturer indifferent to length and fineness of staple, and of the probability of this others must judge, India is not likely to replace the United States.

It seems evident, then, that Indian cotton must continue to hold a subordinate place in European markets, and that there is a point at which its competition with other growths entirely ceases.

It is almost impossible to state with any approach to accuracy the quantity of cotton produced in this Presidency. The annual returns of cultivation do not include alienated land, and the produce of the neighbouring districts of supply can scarcely be accurately estimated. There is, however, no doubt that there still is room for a considerable extension of cotton cultivation, should remunerative demand invite it.

A glance at the climateric diagrams in this volume may enable the reader to judge why the cultivation of exotic cotton has failed in this country. These diagrams would have been more perfect if the monthly rain-fall at New Orleans could have been added, but the data for this do not exist in Bombay. The failure of exotic cotton, when cultivated on a large scale, may be reasonably attributed to the violence of Indian seasons. As for garden experiments, they are much worse than useless, and had not their occasional results, produced by an altogether disproportionate expenditure, mislead sanguine minds, the true position of India in regard to Cotton would, long ere this, have been perceived, and energy might have been directed to points where it might have been beneficial, instead of being frittered away in watching and chronicling the results of cotton cultivation in a flower-pot.

HSS

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