sharp. It is everywhere opaque. It is readily scratched with a knife, the powder being of the same colour with the part scratched. It is tough, it effervesces strongly with nitric acid, which although it reduces the whole to powder, dissolves only a part, probably about a half. The strongest heat, that I could give it with a small charcoal fire, continued for two days, did not reduce it to lime. It indeed became white, attracted water with a strong effervescence and a hissing noise, and rent into many fragments; but it did not fall to pieces, the quantity of other matter retaining the lime.

Some parts, chiefly those which are white, have very different characters from the above. In many parts, and these of some extent, the stone has been reduced to a kind of soft substance like chalk, but rather harder and harsher. In a few parts, especially in the small nodules, it does not leave a white stain on cloth nor on the fingers, when handled; but, when a large mass, it generally does both, and is called Kaliya. This kind of substance, the nearest to chalk, that I have seen any where, except in England, is most usually disposed in large beds, which fill galleries, as it were, formed in the stone, 4 or 5 feet wide, and as many high, and running through the mass in very irregular directions. A man rents the privilege of digging this substance. He employs 5 people for 2 months in the year, who during that time dig about 100 *mans* (lbs. 82 each) and deliver them to petty traders who beat, sift and with a little water form the Kaliya into little balls, which are sold all over the country to the women that spin cotton, who rub it on their fingers.

In other parts again of the stone, generally in small masses, the white matter puts on the granular appearance of a granite, and looks as if composed of fat quartz intermixed with mealy quartz, and red martial veins. This also is acted on by the nitric acid, which totally destroys the mass, but leaves a still greater proportion of insoluble powder. In no part could I observe the slighest trace of animal nor of vegetable exuviæ. The nearest rock to it is on the opposite side of the Ganges, about 7 miles distant. On the other side there is no rock within the Company's territory.

I can only account for the appearances of this rock, which are highly singular, by supposing that originally it was porphyry, which by some process of nature has gradually changed

the nature of most of its particles into lime; and if the process is not stopped, may in time become pure chalk. It is a kind of calcareous petrifaction of porphyry, just as we have siliceous and calcareous petrifactions of wood, where the form is perfectly retained, but the matter is quite changed.

The strata of the country in other parts, consist entirely of clay and sand, as in Dinajpoor. The clay is in general very indifferent for the potter's wheel, is mostly of various shades of ash-colour when dry, but blackish and hard when moist. It is only in some parts that it contains any small stony concretions; but these are found wherever there is red clay, which however is very uncommon. The best potter's clay is in the southern parts of the district.

The sand is generally very light-colured; but in some places is stained black, apparently by an admixture of the mud of marshes, which I have described in Ronggopoor under the name of Dol. In the northwest corner of the district I observed some yellow ferruginous sand, which the natives consider as well fitted for making mortar. Gravel and small stones are found in most of the rivers, as far down as about the parallel of Krishnagunj. In the Mahanonda there happens to be none near Sannyasikata, as I mentioned in the account of Ronggopoor; but lower down I observed very extensive beds.

There are no mineral springs, nor is there any mine. The springs are numerous, but among the natives none is in any request, nor is their water ever used. Indeed they almost all rise in bogs or marshes overwhelmed with frogs, snakes and stinking aquatic plants, so that they have no kind of affinity with the pure fountains of mountainous countries.

Water by digging wells, is generally found at no great depth. In the southern parts of the district the wells in free soil are usually from 15 to 20 cubits deep, and in stiff clay from 20 to 30 cubits. At Manihar it was said, that the usual strata found in such situations were as follows. In loose soil; first, soil 5 or 6 cubits; second, coarse white sand 3 or 4 cubits; third, fine sand of different colours to the water. In clay lands; first, soil, 3 cubits; second, black hard clay 10 to 15 cubits; third, reddish clay containing small stony concretions, 5 to 7 cubits. In the northern parts the water is usually found at much less depths, often at 4 cubits from the surface, but usually at from

8 to 14. The soil is 2 or 3 cubits; then is commonly found a stratum equally thick containing much sand, but some clay (Balu Sundri), then as much of a hard black potter's clay, becoming ash-coloured when dry. Then pure sand, in which the water is found. It is sometimes mixed with pebbles. The clay is often altogether wanting; and is commonly very scarce near the surface. The potters usually procure it on the steep banks of rivers, by the action of which it has been exposed. The water found in the red clay is not good. That found in sand is abundantly clean. In general the well water is very good, and except when the sand in which it is found is stained black, it must be considered as vastly preferable to that of either tanks or rivers. In sandy soils, the sides of the wells are always secured by rings of potter's ware, which are not necessary where the soil is stiff.

In many parts of the district, especially in old mango groves, the earth would seem to be strongly impregnated with a muriate of soda, as the cattle are fond of licking these parts, and a culinary salt is prepared from this earth by boiling. On old mud walls, that have been sheltered from the rain, a saline matter often effloresces. This by Europeans has usually been supposed to be nitre, and indeed it may be a nitrous salt; but it would not seem to be the nitrate of potash; for in some operations the natives require both substances.

I have not yet had an opportunity of analyzing the specimens of these saline earths, which I took, with an exactness that would enable me to speak precisely on their nature. In the division under Thanah Gondwara, I heard of another saline earth called Us Mati, but I did not hear of it in time to view the place. It is however said, that the washermen of the neighbourhood collect it for bleaching linen. There can be therefore little doubt, but that its chief saline ingredient is the carbonate of soda, which a little farther west is found in vast quantities.

CHAPTER VI.

AGRICULTURE OF PURANIYA.*

In the Appendix it is estimated, that, besides 404 miles of land fit for the plough, which at present are in fallow, there are 4103 square miles actually occupied; and in this I do not include, what pays rent for pasture or for grass and reeds, that are preserved for thatch, but only what is occupied by houses, gardens, plantations and cultivated fields. For an estimate of the manner in which this occupied land is employed, and of the various crops, that it produces, see Appendix.

No attention is paid to these distinct cultivations, and plants of the various classes are not only sown on the same ground at different seasons of the year, but are even intermixed in the same crop. This practice of mixing the crops seems to be much more general in this district than either in Dinajpoor or Ronggopoor. It, no doubt on the whole were a series of years taken into account, diminishes the produce very considerably, not only as one article injures another by its growth, and as the reaping of the earlier articles does more or less injury to the later; but as it is more exhausting, and the ground prepared for one article is less fitted for the production of the others, than if it was prepared for only one. The practice has however one most important advantage; it renders the annual average produce of each farm more equal; for if the season is unfavourable for one thing, it will more probably suit another, so that every man is more secure from being destitute, and on the whole there is less danger of that total failure, which might produce famine, the greatest of all evils. The constant succession of crops from the same fields, although by exhausting the ground it no doubt dimi-

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* Dr. Buchanan acknowledges his obligations to Mr. Ellerton of Guyamati and to Mr. Smith of Nathpoor for the observations afforded to him on this head.—[Ed.]

nishes the general produce; yet, as the whole seldom fails, tends to prevent the same evil, and ought therefore by all means to be encouraged. The vast variety of articles cultivated, and the numerous different sorts of each, seems also highly advantageous, as enabling the farmer to suit his crops better to the various soils and circumstances of the season, than could be otherwise done. Much subject for experiments, highly important, concerning the various advantages of each, still remains untouched; but the farmers of this district have paid much more attention to the subject than those towards the east, and especially those of Ronggopoor. It is true, that the seasons here seem to be more uncertain, which is probably the reason, why the people have made greater exertions; but on the banks of the Tista and Brahmaputra the variations in the floods of different years would require more attention to this subject, than the people have bestowed, and many lands now considered as useless in Ronggopoor would, by the people here, be made to produce a great variety of useful articles.

Here it must be observed, that a great quantity of seed, of many different kinds, is sown without any previous culture. The farmer merely scatters the seed among the mud, at the commencement of the fair weather, and is at no other trouble with his crop, until he comes to reap it. This is performed in two situations. One is among the growing rice, when approaching to maturity, as is commonly practised towards the east; but here the custom is not only more extended, but a much greater variety of articles is thus sown. It does little or no injury to the rice, and, although the after crop is seldom heavy, it costs almost nothing. The other situation is on the banks of the great rivers, Kosi and Ganges, where, as the floods retire, large spaces are left covered by mud, and free from weeds. Such a happy and favourable opportunity for sowing seed might be found in many places near the Brahmaputra. I am not sure, however, that the people there do not adopt a better plan. They wait until the mud dries so far, that it can once at least be ploughed, before the seed is sown, and thus avoid the risk of losing their seed by any accidental return of the flood. I believe, however, that such returns are more frequent in the Brahmaputra, than on the Ganges. Although this mode of sowing grain without

previous culture is perhaps not ill suited to some places of this district, it does not require any particular encouragement, the indolent habits of the people prompting them to carry it to a length, that in many cases perhaps is injurious. Towards the west, where these habits increase in strength, they have carried their personal indulgence still farther. One kind of the spontaneous rices (Uridham), which are found in Bengal, and which has very long awns, is a very common weed in low marshy lands. In most parts the farmers are at the pains to remove it; for if the precaution is not used, in fields that are favourable for its growth, it would in the course of a few years choke the kinds that are cultivated, as its grain, when ripe, is shaken by the least wind, and remains in the mud until the following year. Many careless farmers in the western parts have allowed this inferior grain to overrun their fields, and content themselves with saving as much of its grain as they can; enough is always shaken to serve for seed, and they are at no sort of trouble, but with the harvest. This indeed is very scanty; but the grain is considered as a food of extraordinary purity.

Culmiferous plants.—The quantity of spring rice reared in the marshes behind Gaur far exceeds what I have any where else observed. It is chiefly reared upon the banks of marshes, which gradually dry, as the spring advances, but which always retain water in the centre sufficient to supply the fields, to which it is raised by machinery. This land is unfit for any other crop. Between the 16th of September and the 14th of November the farmer ploughs a plot on the edge of the marsh, then full of water. This serves for a seed bed, and for every bigah, that he intends to reap, he sows $\frac{1}{10}$ of a bigah. The seed, before it is sown, is made to sprout, by steeping it 36 hours in water, and then keeping it in a warm place covered with grass. The bed is filled with water, and reduced to mud, among which, during the time above mentioned, the seed is sown. It springs rapidly, and between the 16th of October and the 11th of January it is transplanted twice, lower down on the side of the marsh, as the water retires. At each transplanting it occupies double the space it did before. Between the 12th of January and 11th of April it is finally transplanted, so that for every bigah, that was sown, it now occupies ten, the seedling

land, and all, that has been used in the successive transplantations, being again employed. About one half of the whole is finally transplanted in the first month of the season, and is extremely productive; five-eighths are transplanted in the 2nd month, and give an indifferent crop; and three-eighths are transplanted in the 3rd month, making so miserable a return, that the practice would seem to be bad economy; but the people would be otherwise idle. The crop is reaped between the 12th of April and the 12th of June. An industrious man with a pair of oxen can cultivate, in the season (9 months), 10 bigahs Calcutta measure, the seed of which, at from 8 to 10 sers (80 s. w.), will be about $2\frac{1}{4}$ *mans*. The produce of one half transplanted early, at from 8 to 10 *mans*, a bigah,=45 *mans*; of five-eighths transplanted during the middle season, at from 7 to 4 *mans* a bigah,=16 $\frac{1}{16}$ *mans*, of three-eighths transplanted in the late season, at from 2 to 3 *mans* a bigah,=3 $\frac{2}{16}$ *mans*: total produce 54 $\frac{3}{16}$ *mans*, leaving nearly 52 *mans* after deducting seed. This is a very poor return for a man's labour for 9 months. The watering is very troublesome, but the ploughing and weeding are very easy, and the early crop is uncommonly certain.

The summer rice (Bhadai) is a very important crop, as will appear from the tables. There is not such a variety as in Ronggopoor, but considerably more than in Dinajpoor. The most remarkable kinds as named in the dialect of Mithila, are as follows:—1st. Loki. 2d. Ginodha, both somewhat fine, and sown on high land. They are usually followed by a winter crop of pulse, seeds for oil, wheat, or fine transplanted winter rice, some of which has pulse sown amongst it, when nearly ripe. 3d. Sasarphul, a coarse grain sown on high land. This is usually followed by linseed or barley. All these are often sown, intermixed with Maruya and Maghuya-arahar, or sometimes with a pulse called Tulbuli, which nearly resembles the Thakuri of Dinajpoor, and which ripens among the stubble. 4th. Ajan, a coarse grain sown on lowland. This is mostly followed by transplanted rice. 5th. Kabatmani, a coarse grain sown on lowland. This is late and does not admit of a second crop. These two are often sown intermixed with winter rice to a much greater extent than in Dinajpoor. Such are the names and kinds in the western parts of the district. These used

in the eastern resemble those in Ronggopoor and Dinajpoor. None is transplanted.

In some parts the people preserve for fodder the tops even of summer rice. It seems to be a mere prejudice that it is hurtful to cattle; and when the weather happens to be favourable, much of the straw of the summer rice might be preserved. Broadcast summer rice admits of a crop of China, taken from the same land in spring, before it is sown.

In this district there is raised a very small quantity of the rice, which is reaped in the end of September or beginning of October, and which in the dialect of Mithila is called Sati. It is probable, that a little is also raised in Dinajpoor, although it escaped my notice; for in some ceremonies of religion it is considered as necessary.

The winter rices in Mithila are called Aghani and Hengwat; the former signifying the month, and the latter the season, at which they are reaped. One manner of cultivating winter rice, which is practised on some sandy land near the Kosi, deserves particular notice. This land, called Sorah, produces in the beginning of the rainy season a crop of long grass, which is cut and given to the cattle. Between the 15th of July and the 15th of August the field is ploughed twice, and sown broadcast with winter rice of several kinds, all very coarse.

The varieties of winter rice are very numerous, and the study of these is highly important to the practical farmer, for the different kinds vary much, as being better or worse suited for different soils and elevations; but their names differ in almost every petty vicinity; so that it would be endless to detail them.

The coarsest kinds are sown broadcast on the lowest lands, and entirely by themselves. In even one part of one estate (Pergunah Dharampoor Zila Nathpoor), I heard of no less than 18 different kinds, and the list was probably far from being complete. One of them called Pichar, is more than usually liable to break, when it is beaten to separate the husk. The grain is not lost; but is not so saleable as that which remains entire. Where the land is exceedingly low these kinds are sown between the 13th of March and the 11th of April; but the common seed season is in the following month. This crop not only admits of pulse (Khesari), being

sown among it when growing, and allowed to ripen among the stubble; but the pulse is sometimes mixed with mustard (Rayi). or rape seed (Sarisha), when it is sown among the growing corn. In the same manner are frequently sown, among this rice when growing, various other kinds of grains, such as the field pea, rape seed, mustard, and barley.

The kinds of winter rice which are sown broadcast along with summer rice, are not so numerous nor so coarse, and they are sown on higher land between the middle of February and the middle of April, but it seldom springs until long after, when a good deal of rain has come. The kind of millet called Kaun is sometimes sown together with the broadcast winter rice, and the same is practised with the pulse called Harimug.

One kind of winter rice, sown broadcast by itself on middling high land, ripens between the middle of October and the middle of November. The others are two months later The winter rices that are sown broadcast in this district, except three or four kinds, are reckoned to keep equally well with any transplanted rice. Although therefore this kind of cultivation ought to be more valuable than in Dinajpoor, it is not so eagerly followed, and much of the waste land in the southern parts of the district would appear to be very fit for the purpose. It is, however, one of the greatest crops in the district.

In Dinajpoor a particular class of rices is preserved for middling high land; but in this district all the above mentioned kinds of winter rice are transplanted on land, which is usually covered to about one cubit in depth. Where the water commonly rises to a greater height they are sown broadcast. These kinds are not improved in quality by being transplanted. Khesari is sown among them, when nearly ripe, and grows among the stubble. If the crop on this land has been spoiled either by too much or too little water, the field is usually cultivated with wheat or barley, or the latter mixed with mustard, or with mustard and lentils.

The class of winter rices, which is raised on high fields, is transplanted between the middle of September and the middle of October; but here it is only in favourable circumstances that it admits of a previous crop. The favourable circumstances are a stiff soil (Matiyal), which enables the

field to retain moisture, and early showers in spring, which permit such a soil to be cultivated. When the farmer is contented with one crop, as is most usual, it is heavy; when he takes a crop previous to transplanted rice, this is trifling, and the value of the first is inferior.

These finer rices, as in Dinajpoor, will not grow on very low land, while most of the rich free soil, that is high, is here preserved for winter crops of other grains. In this district I heard of no fine winter rice which equals that of the clay near the Karatoya, so as to be ranked with the fourth or finest class of rices in Dinajpoor.

The seed sown without preparation, as in Dinajpoor, is by far the most common practice. Summer rice is never sown by being dibbled. A bigah of land, if the seed is sprouted, requires 10 sers, while a ser less suffices, where this operation is not performed. The people here seem to pay a good deal of attention to weeding their rice, especially the summer crop on high ground. Before harvest they do not imitate the people of Dinajpoor in laying their rice down as it approaches maturity. The reward that is allowed here for the troublesome operation of removing the husks from rice is much smaller than any where else that I have been.

At Puraniya the owner gives 70 sers of rice in the husk for 40 sers of clean grain, when the operation is performed without boiling. Now, according to the experiments related in my account of Dinajpoor, 70 sers of rice treated in this manner ought to give 45 sers of good entire rice, leaving 5 sers or one-ninth of the whole for the woman's trouble. Besides this, she would have $3\frac{365}{1000}$ sers of broken grains, not so saleable, but equally nourishing.

When the operation is performed by boiling, the woman gets 13 sers of rough rice, and delivers 8 of clean. According to the experiments which I have stated in my account of Dinajpoor, the women from 13 sers of rough rice should procure $9\frac{767}{1000}$ sers of clean, leaving for her trouble $1\frac{787}{1000}$ or rather more than 18 per cent. of the whole. The instrument almost everywhere used, where the rice is to be cleaned on a large scale for exportation or retail, is the pestle moved by a lever (Dhengki). What the good women clean for the use of their own families is almost always done with the common wooden pestle and mortar; and I perceive a considerable dif-

ference in the effect of the two operations. Where the ordinary pestle and mortar is used, and the rice has been boiled, as was done in the experiments at Dinajpoor, few or none of the grains are broken; but when the heavy pestle raised by a lever is employed, the quantity of broken grain is always considerable. It is equally wholesome food, but is not saleable. Two women usually beat in company, and their ordinary morning work is to clean 65 sers ($82\frac{1}{16}$ s. w.) in two days. They therefore in that time procure about $113\frac{1}{2}$ lbs. avoirdupois of clean grain of which their share is almost $18\frac{3}{4}$ lbs. or $4\frac{684}{1000}$ lbs. daily for each. It must however be observed, that the people admit of no such profit. They say, that 65 sers of rough rice on an average give only from 43 to 44 sers of clean. The cleaner, on this supposition, in place of 18 per cent. receives only a very little more than 8 per cent. and the woman's daily gaining would be only $1\frac{855}{1000}$ lb. of clean rice. In the eastern parts where grain is measured, the reward is higher as in Kharwa, where a woman receives 24 measures of rough rice, and returns 10 measures of clean grain. Two women are there supposed in their usual morning work, to be able to beat 20 sers (92 s. w.) According to the experiments I have made the quantity of rough grain would be cubical inches 2267, the quantity of clean grain would be 1255 cubical inches, and after giving $\frac{1}{2}\frac{0}{4}$ parts to the owner they would have for their daily trouble 310 cubical inches or $11\frac{1}{2}$ lbs. of clean grain. From this it would appear, that where the reward for cleaning rice is high, the women clean little; and where the reward is low, they work hard, so as to make almost as high wages.

The manners of preparing rice, called in Dinajpoor Chira, Khai and Muri, and here Chura, Lava and Murhi, are not near so commonly used in the western parts of this district; but rice parched (Bhuna), without any previous preparation, is much more eaten, and the people more frequently grind their rice, and form it into the kind of cakes (Bhaka), which are usually boiled like a pudding.

Wheat is much more used here than in Dinajpoor. Except rich and luxurious people, who have the finer kind (Mayda) separated, the whole wheat is reduced to coarse flour (Ata), from which little bran is separated. This is always mixed with cold water, and formed into the cakes (Roti), which the

Hindus toast in an earthen platter. They are totally unacquainted with the art of fermenting bread; but at the capital some Moslems know the mystery of baking. In some parts the straw of wheat is given to cattle, in others it is neglected.

Barley is sometimes sown on the banks of the great rivers as the floods retire, without any previous culture. It is much used by the poor. Half of it is first beaten to separate the husks; it is then ground to meal, and formed with cold water into cakes, that are toasted. The other half is beaten, then parched, and then ground into meal, which is mixed with cold water and salt. This is called Chhatu. The natives have not the art of boiling it, so as to form porridge. In some places barley straw also is given to cattle.

Maruya or the *Cynosurus Corocanus* of Willdenow, which from a minute difference in the fruit, Gærtner has chosen to call by a new name *Eleusine*, is much used, especially on the west side of the Kosi. The Maruya is ground in a hand-mill, sometimes having previously been parched, sometimes not. The meal is formed with boiling water into cakes, that are toasted. The straw is often given to cattle. In poor soils this is cultivated, as in Dinajpoor, with the *Cytisus Cajan* and rice, which form a valuable crop.

A good deal of maize, Indian corn (*Zea Mays*), called here Makkai, is used. The people like it, but they imagine that it occasions fluxes. The experiments which the natives have tried on its cultivation show, that in their hands at least, the sanguine expectations which might be formed from the experiments tried at Ronggopoor, would not be realized. The grain is sometimes parched, and eaten with salt; or it is dried, ground into meal, mixed with cold water, and formed into cakes that are toasted. The leaves and fresh stems are sometimes given to cattle; but the quantity is so inconsiderable, that the natives are not sensible of any advantage; and near Kaliyachak, so slow is the progress of knowledge, that the people who give all manner of other straw to their cattle, burn this as being totally unfit for fodder. The cattle however are voraciously eager to procure it, which is perhaps the reason why it is neglected by the natives, who would have a great difficulty in preserving the crop.

Janera, or the *Holcus Sorgum* of botanists, in this district

is a less considerable crop than maize. The natives think it more wholesome, but not so palatable. It is used in the same manner; but when parched, if exposed two nights to the dew, the grain swells out like the preparation of rice called here Lava. Cattle eat the stems and leaves, but not eagerly. In some places there is only one kind, and what I saw was everywhere that which has a white seed; but in Dhamdaha the people reckon three kinds: Gehungya, Narkatiya and Raksa, which I did not see.

The kind of millet called Kaun (*Panicum italicum*), and China (*Panicum miliaceum* E. M.) in some parts of this district are much cultivated, and in times of scarcity the cultivation has with great advantage been much extended, especially that of the latter, which ripens quickly and with very little rain. The China is of two kinds, called Bhadai and Vaisakhi, according as it ripens in spring or in the middle of the rainy season. A very little Bajra, the *Holcus spicatus* of botanists, is reared in this district. It is but a poor grain, and does not deserve encouragement. The quantity is too trifling to have obtained a place in the tables of produces.

There are two other kinds of millet, which are reared in a more considerable quantity. The one is called Sama or Kheri, and does not seem as yet to have been introduced into the systems of modern botanists; but Dr. Roxburgh in his manuscript collections, I believe, calls it *Panicum frumentaceum*. It has a very strong resemblance to the *Holcus Sorghum*. The other is called Kodo, and is probably a species of Paspalum, which I know grows in Tirahoot. Both are very poor grains; and in a country producing so many better kinds seem to deserve little attention.

Leguminous Plants.—On the whole the most common pulse here is the Mash Kalai, which has seeds of a green colour, with a white eye. I have not seen this plant in a state fit for ascertaining its botanical appellation, as it is confined to parts of the district which I did not visit in the proper season. The name Max given to a kindred plant by European botanists, according to the Portuguese orthography, is the same with the Mash of the Hindu dialect, or the Mas of Calcutta; but so far as I can judge, the Max of botanists is the Thakuri of this district, and of Dinajpoor, which in Ronggopoor is indeed called Mas, but produces a pulse of very different

qualities, which is readily distinguished by its colour. On the banks of the Ganges the Mas is reared in vast quantities, and is often sown on the mud, as the river dries up without any ploughing, and ripens without any sort of trouble. There it frequently forms the common diet of the natives, is ground into meal, and formed into cakes, which are toasted. In other parts however, it is only used like other pulse, that is to say, it is freed from the husk and split, forming what is called Dal. This is used in two manners, first, mixed with rice, boiled and seasoned with oil or butter, and salt and spices, it forms Khichri, very much used in cold weather. Secondly, fried with oil or butter, and capsicum, salt and turmeric, it forms what we call a curry, but by the natives here this also is called simply Dal. In this district a preparation called Bari is made from Mash. The entire pulse is steeped a night in cold water, then the integuments are rubbed off with the hand. The pulse is then beaten in a mortar, or rubbed on a stone, with some water until it forms a paste, into which small pieces of the cucurbitaceous fruit called Kumra are put; to these are added salt, the carminative seed called Mauri, and sometimes Assafœtida. The whole is formed into small pyramidical plums, which are dried in the sun and used in curries or stews. These are most commonly made in the dry season, and then will keep three months. Here cattle will eat both husks and straw of the Mash, and the latter is sometimes kept for them. The natives imagine that this pulse is cooling.

The Max of botanists here as in Dinajpoor, is called Thakuri, and is readily distinguished from the foregoing by its seeds when fresh, being black and green mixed. When old they become almost entirely of a dirty black. It is reared in most parts of the district; but on the whole in much less quantity than the former.

Khesari (*Lathyrus sativus* W.) is a very common pulse. It also is prepared in the manner called Bari, for which the Dal of this pulse is steeped for about six hours, and then treated as already mentioned. It is also ground into meal (Besan), which is used by those who make sweetmeats. On the banks of the great rivers it is often sown as the floods retire, without the mud having undergone any culture.

In this country vast quantities of the *Cytisus Cajan*, called here Arahar, are cultivated. There are two kinds, that from

the months in which they ripen are called Maghi and Vaisakhi. The latter is of the finest quality, and is sown by itself on a good clay soil, or placed in hedges round other crops, especially round sugar-cane, and is the kind raised in Ronggopoor and in the south of Dinajpoor. Some smaller pulses are occasionally intermixed. The Maghi is sown on poor sandy lands, sometimes by itself, but more commonly mixed with summer rice and Maruya, as described in Dinajpoor, in the northern parts of which a good deal is reared. This kind is also sown mixed with a variety of other articles. The seed of either kind will fail, if it is attempted to be managed like that of the other. The stems of Arahar in this district, owing to the scarcity of bamboos and reeds, are frequently used for making the fences which surround the native huts.

The pulse, which in the western parts is called Badam, is the *Cicer arietinum* of Linnæus. In the eastern side of the district it is more usually called Chana or But; and in other places it is called Dhangga. The kind with a white flower is everywhere called Kablibut, and sells dearer; but very little is produced. This is considered as a pure offering to the gods, while the variety with a red flower is only fit for man. It is reckoned a heating food, and by the natives is never given to cattle, being too high priced. It is used mostly split (Dal), which is done by drying it two or three days in the sun, and grinding it in a hand-mill. It is also used merely parched, and eaten with or without a little salt or oil. Thirdly, it is sometimes merely steeped in cold water until it swells, and then it is mixed with a little salt or extract of sugar-cane. Fourthly, it is ground into flour (Besan) for preparing sweetmeats. Masur or the lentil is much cultivated, and is used only when split (Dal.)

A good deal of the poor pulse called Kurthi or Kulthi, mentioned in Ronggopoor, is reared in this district, and is the food that is used by the natives to fatten cattle. It is imagined to be very heating. Men however eat it in curries. Before it is ground, in order to separate the integuments it must be dried over the fire. The common field pea (Matar) is also a good deal cultivated, and is only used split. There are two varieties, Maghi and Vaisakhi, one of which ripens in winter, and one in spring.

The *Phaseolus Mungo* in this district is a good deal cultivated, and is called Hari and Vaisakhi Mug. It is used both split and for making the kind of balls called Bari. It may be split and freed from the husks, either by drying it over the fire, or by oiling it, and exposing it to the sun before it is put into the mill. I heard of a species called Seha Mug or Mahanonda, which probably has some near affinity to the foregoing; but I did not see it. It is often sown on the banks of rivers, without any previous culture; but is raised to only a trifling extent.

The Meth Kalai of this district is the *Phaseolus Minimus* of Rumph, which in Ronggopoor is called Kheri, and only a small quantity is reared. It is used split, and is considered as very heating. The integuments are separated by parching, before it is put into the mill.

Bora is a leguminous plant, which I have not seen; but in most parts of the district a little is reared. Like Khesari it may be split, without either previous oiling or parching. It is used also in the kind of balls called Bari. The Barbati is a pulse very nearly related to the above; but its seed is vastly smaller. I am told, that it is the same with the Labiyah of Ronggopoor, which is the *Dolichos Sinensis*.

Plants reared for Oil.—In the greater part of the district these may be considered as the staple article of cultivation; for although on the whole greatly inferior in value to the grains, which serve as food, yet they are the great object of commerce, and that by which the greater part of the rent is paid. The most common are the two species mentioned in my account of Dinajpoor under the names of Sarisha and Turi, which there I have considered as species of *Sinapis*, and often called mustard; but perhaps they approach nearer to the Rape-seed of Europe, and I shall now call them by that name. The two species differ in points, which are so minute, that they do not deserve much attention. In Dinajpoor indeed it was supposed, that the one is more productive of oil than the other, and that there was a difference in the quality of the two oils; but neither the people of this district nor those of Ronggopoor seem to be aware of these circumstances; and I am uncertain, whether this is to be attributed to their want of observation, or to the opinion of the people in Dinajpoor having its origin in imagination. I have not

been able to ascertain this circumstance, because the native nomenclature for these plants, in this district, is so confused, that, without seeing the plant growing, I cannot trust to purchasing the seed; for the same names are applied to both very irregularly. These names are Sarisha, Maghi Sarisha, Turi, and Kajali, and in different vicinities these names are applied in opposite senses.

The species of Radish (*Raphanus*), the seed of which is used for producing oil, in this district is reared in great quantities, and is a very luxuriant crop: but the natives prefer the oil of the rape-seed. This plant is here also called Tora; but is more commonly known by the name of Purabi Sarisha or old rape-seed, having perhaps been the kind, that formerly was alone cultivated. It is also called Se-uti Sarisha, or white rape-seed, the grain being much lighter coloured than that of the other kind.

Rayi, or the *Sinapi Amboinicum* of Rumph, is what should properly be translated mustard, as it has qualities similar to the European plant of that name. Much more is reared in this district than towards the east, and it is sometimes sown on the banks of rivers without any previous culture: but more commonly it is a winter crop after summer rice. In the south part of this district I heard of two kinds said to resemble the Rayi, and which are called Gangrayi and Rayichi Sarisha. I had no opportunity of seeing them. Nor am I certain, that they are different from the common Rayi.

The Tisi or linseed in this district is a common article of cultivation. It in no respect differs from the flax of Europe: but I doubt whether a supply of seed could be sent from hence. It ripens in March and April, and might no doubt be forwarded to Ireland and Scotland in abundance of time to be sown in the following year; but it seems doubtful, whether its vegetating powers could be preserved through such a long voyage, and the freight would probably be too heavy. The climate would, I am persuaded, be no objection; as the plant here grows in the cold weather, which is not hotter than our summers. The price here for the last two years has been about 1 rupee for 40 sers of 82 $\frac{10}{16}$ s. w., which is about 84 $\frac{3}{4}$ lb. avoirdupois. The experiment however seems worth the trying, and a few hundred weight might be sent home to be given to experienced farmers, who might ascertain its

quality. In this country the plant is of a very diminutive growth, which seems to be owing partly to its being sown too thin, so as to allow it to spread into many branches for the sake of the seed; and partly to the want of that moisture, which the luxuriant crops of Ireland enjoy. I have no doubt, that, were it occasionally watered, and sown thick, its crops would be highly luxuriant, and yield a flax equal to that of Egypt. The oil is used for the lamp alone. At Calcutta it has been tried by painters; but, probably owing to a difference in the process for expressing, it has been found exceedingly inferior to that brought from Europe at an enormous expense. The Indian process, in all probability, expresses a great part of the mucilaginous matter along with the oil.

The *Ricinus* in this district is raised almost entirely for the oil, (Castor oil) which is used for the lamp. In a few parts, it is cultivated in fields of a poor soil, in which it is sown with turmeric the *Phaseolus Mungo* and cotton, or with cotton the same pulse and the *Corchorus* that is used as a green vegetable, or with ginger and cotton or with turmeric, cotton and the *Cytisus Cajan*, or with a yam (Diosiorea Suthni) and cotton. In some places again it is mixed with Rape-seed. When sown in these fields the Ricinus is always the small green species, or the *Ricinus communis* of Willdenow. In many parts of the district the large Ricinus, that is the Pandi Avanam of Rhede, and the Ricinus of Rumph, is often the only shelter, or at least the most common, which the natives enjoy round their huts. Here the plant perfectly agrees with the description of Rhede and Rumph, as on account of this shade it is permitted to live for seven or eight years, and grows to be a kind of small tree, like Elder. I am now told, that the Pat Erandi of Bengal would live in the same manner, were it permitted; but, as every year it becomes less productive, the custom there is every year to destroy the plant, and to sow fresh seed. It is the kind with the green stem, that in this district is most common. In the parts, where the Mithila dialect prevails, the Ricinus is called Erengri. In the western parts it is called Eranda. In this district is reared a rather larger quantity of *Sesamum* than grows towards the east. There is cultivated only one kind, which is that sown in the rainy season, and called Krishna

Til. Having thus detailed all the articles cultivated, I shall make some remarks, that are common to all.

In this district one of the most heavy charges, attending the cultivation of grain, is the reaping and thrashing. No man in tolerably easy circumstances performs any part of this labour, farther than to watch, in order, as much as he can, to check the pilfering of the labourers, in which, however, it is alleged, that few have great success, and indeed many of the higher castes are too proud and indolent to pay sufficient attention to their interests.

Except in a few parts towards Dinajpoor the servants, who hold the plough, are not engaged for the time of harvest; but are then allowed to share in the profits of reaping. Each master endeavours as much as possible to secure its advantages to his own servants and dependents; because at other seasons he gives them inadequate wages, and without an extraordinary profit at harvest they could not subsist. In many cases, however, the proprietor is not able to confine the profits to his own dependents, and many people, especially old women, rush upon the field to assist in the labour and spoil. This is especially the case with the fields of the plants, which are reared for producing oil, and with those of pulse. The rate of hire is lower for these than for rice by in general about $\frac{1}{4}$ part; but the opportunity for pilfering is greater, and weakly persons can go through the whole labour; as the grain is usually beaten or rubbed out from the husks on the field, and the seed alone is carried to the farmer's house.

The harvestof rice and other culmiferous grains is carried on in the same slovenly manner, that is usual in India. The reaper merely cuts off the ears and carries them home to the farmer, by which means the straw is greatly injured, and a great part of it is neglected, or left on the field to be eaten by the cattle. This part is called Nara; and, if wanted for thatch or fodder, other labourers must be hired to cut it, and carry it home. The small quantity of straw cut with the ears is called Poyal, and is the most usual, and in some places the only fodder.

The whole straw, that is reaped, and the grain are carried home on the labourers shoulders, and cattle are never employed for the purpose, a degree of stupidity, that seems

astonishing. In most places the same people both reap, and thrash the grain. The rate is always fixed by a share of the produce, which varies for rice from one-fifth to one-eighth part of the whole crop; for which the people cut off the ears, and carry them to the owner's house, beat them out, and deliver the grain clean to the master. In other parts one set of people only cut and carry home the ears, and get one-ninth bundle of the ears. These allowances however are not all. In some parts every man, who cuts, is allowed to bring his wife to the field at noon, in order to take him some refreshment, and then, besides what she pilfers, she avowedly takes about 2 sers of grain, for what is called Khari or Lara. Besides the reaper, when he goes home in the evening, carries with him a small bunch of ears, which usually contains as much grain as his wife took. In other places it is only the servants of the farm, that are allowed this indulgence.

Where the same people reap and beat out the rice, they usually tread out the grain with their own feet, rubbing the ears until the whole is separated, and the miserable nature of this operation seems to be in some measure the cause of the enormous expense. At Dhamdaha, where the reapers do not thrash, the farmers furnish cattle for treading out the grain, and the expense is a trifle, $\frac{5}{100}$ of the crop. The workman gets 3 sers (72 s. w.) of rough rice a day, and in that time 2 men with the use of four oxen can tread out 10 *mans* or 400 sers of grain. This however is far from being clean; but in such a state it is often sold. Of 200 measures of rough rice, as taken by accident at different times from the common market, I found, that they contained more than 12 $\frac{1}{2}$ of impurities; and, in the operation of cleaning, they lost rather more than 2 per cent. of their weight.

The expense, as I have said, attending these operations is enormous, partly from the avowed allowance and partly from frauds, at the extent of which the farmers can only conjecture, and which must differ much from the various degrees of individuals care. In their conjectures different people varied very much, some saying that the reaping and thrashing costs one-fourth of the whole crop, and others alleging, that one-eighth part is sufficient. In all the estimates of produce, which I received, this expense was deducted as is usual in this district, where every means are taken to conceal the produce, owing to

the rents having often been levied according to the nature of the crop. In stating the gross produce I have not ventured to make an allowance for these frauds; but have only added to the net proceeds the avowed rate of hire.

In all the western parts of the district the rice and other grains are preserved, during the rainy season, in vessels made of unbaked clay, which have generally covers of the same matarial; but this, although of the utmost consequence, is too often neglected, because it is attended with some more trouble. Where there is a cover, a circular hole is made near the bottom. This can be stopt with a plug, and the grain can be taken out as wanted. These vessels are called Kuthis, and are very useful; for, if the cover is well fitted, the grain is not absolutely spoiled, although the hut is burned which is a very common occurrence. If there is no cover, a great part is lost, although towards the bottom some part is generally saved. The loss from this is so great, that those who are so negligent ought perhaps to be fined; were it not that this might encourage a system of interrupting domestic privacy, that would be a greater evil.

These Kuthis might with great advantage be introduced in Bengal, where the loss of grain by fire is enormous. They are made by the men and women at their leisure hours, and cost little or nothing. Their use is however attended with considerable inconvenience; for they occupy so much room in the wretched huts of the natives, that scarcely space enough remains for the poorer people to stretch themselves out to sleep. In the dry weather, therefore, the people prefer keeping their grain in pits, which occupy no room, and are entirely secure from fire, which at that season is exceedingly common. The pit is lined with straw, filled with grain, and covered with a good coat of earth. In the rainy season the soil is too damp to admit of these pits being used; but they are by far the safest and most commodious receptacles for grain. Merchants and great farmers have granaries like those in Dinajpoor, and are equally negligent about fire, a circumstance, that would seem to require the interposition of the police.

Profits on this kind of cultivation.—On this head I have little to add, or alter, from what I have said in Dinajpoor. The expense of harvest, as I have said, is here enormous,

and ought to reduce the profit of the farmer lower than in that district; but his ploughman's wages are lower. This lowness of reward is again made up to these men by the profits which they make in harvest, so that on the whole there seems to be little or no difference in the gains, that in the two districts attend the cultivation of grain, when it is conducted by the farmer's own stock. Those, however, who employ men to cultivate for a share, usually make less than in Dinajpoor, because they are at the expense of reaping their half of the crop, which deducts at least one-seventh part from their gross proceeds. Careful men, even allowing them neither to keep stock, nor to labour, have as a profit the difference between the rent and six-fourteenths of the value of the crop. This profit is so great, that many subsist by its means alone; and even on very inconsiderable portions of land, such as 30 or 40 acres, find a means of subsistence without either manual labour, or stock.

Plants cultivated as Vegetables for the Table.—In the Appendix it will be seen, that I have estimated the land in kitchen gardens at 85,000 bigahs, and that about 6600 bigahs in the fields are cultivated with vegetables for the table. This is not however the whole. Several plants belonging to this class, which are cultivated on a larger scale, or that are reared along with articles belonging to other classes, have been referred to separate heads, which I have done, wherever I have been able to procure an estimate of the quantity or particular value of the produce. The articles, to which I allude as vegetables cultivated in the fields, are generally in very small plots, in which a vast variety of things are intermixed; but the most important are the Baygan, capsicum, sweet-potatoe, mallow, and cucurbitaceous fruits. The supply is therefore more copious than in Ronggopoor, and many people make gardening a profession. It must, however, be observed, that in both districts, as well as in Dinajpoor, but more especially here, a very great proportion of the vegetables are reared on the roofs of the huts or on little arbours, that are contiguous; and that this proportion has not been brought to account.

The profession of a gardener, both among the Hindus and Moslems of this country, is considered as very discreditable, and the people, who practise the art, are therefore so stupid

and fearful, that I could procure from them no sort of account of either their management or the produce of their gardens, on which the smallest reliance could be placed. Each family has a garden, which contains from about one-third to one-sixth of an English acre, but they do not live by the produce of this alone. They buy by wholesale the vegetables, which the farmers rear, and retail these at the markets, and they occasionally plough or assist in the other labours of husbandry. They water their gardens from small wells, and pay a heavier rent than many of those who cultivate grain; but not more so than what is paid by many of the low tribes.

Plants used as warm seasoning.—Ginger is every where raised in a quantity sufficient for the consumption of the country, which is not very considerable. This is commonly raised in gardens. That which is reared for exportation is chiefly cultivated on poor lands, as I have mentioned in my account of Dinajpoor and Ronggopoor. In such situations it is mixed with a great many other articles. I have not yet seen the flower of the ginger, that is cultivated here in the fields; and shall not venture to give an opinion on its botanical name; but like that found at Goyalpara its leaves are hairy. It would therefore seem to be different from the plant, which Dr. Roxburgh has seen (As. Res. XI. p. 28), as he quotes as synonymous the *Inschi* of Rhede, and the *Zinziber majus* of Rumph, both of which plants have smooth leaves.

Turmeric also is reared in the gardens of every part of the district for the consumption of the country, which is very great. Some is also exported, and this is reared on fields of a poor soil, intermixed with a great variety of other articles, as will be seen in the tables of produce.

Capsicum is not so much used here as towards the east; but still great quantities are reared. Two kinds of onion are cultivated here: one called simply Peyaj, the other called Behariya, as having come from Behar. These I suppose are the same with the Choti and Baro of Ronggopoor; but this I have had no opportunity of ascertaining. The Peyaj is sometimes called Pun Peyaj, and is raised from seeds. The Behariya is also called Dorangga, is propagated by separating the roots into different portions; for each root produces many bulbs, and each bulb like garlic is composed of several

subdivisions, each capable of yielding a plant. The Pun Peyaj grows in the same manner. Garlic Rasun is not so much used here as in Ronggopoor. It is the same with the garlic of Europe. Methi or fenugreek is not more used than in Ronggopoor. I have only seen four carminative seeds that are used here, and they are less employed than in the east.

Plants cultivated for what the Natives call Tarkari.—The Baygan is the most common plant of this kind, and is found of three species or varieties. The first and most common has no prickles on its leaves or flower, and the fruit is of an oval shape. At Bholahat this was called Kala Baygan; but it must be observed, that even of the most common plants the native nomenclature is extremely confused. At Bholahat also they had another Baygan, which had prickles on the leaves and flower, and its fruit was round like a large apple, and was called Ram Baygan. In Dinajpoor this name was given to a plant growing wild, which I take to be the *Solanum Zeylonicum;* but the Ram Baygan of Bholahat is cultivated, and is the *Solanum insanum* of Willdenow. In the western parts this prickly kind grows much larger, and is called Golta.

The third kind, on account of producing fruit at all seasons, is called the Bara Masiya Baygan. It is prickly all over, and has a cylindrical fruit. It is not common, I indeed observed it only in the division of Bahadurgunj, and it seems to have escaped the notice of the two great Dutch botanists of India. In the western parts I am told, that they have a cylindrical kind, but it has few prickles, and is called Chenguya.

The European potatoe near Puraniya, and also near Nathpoor has, by the exertions of Mr. Smith, come into very general use, not as common food, but as a Tarkari. In other parts it is totally neglected. The *Convolvulus Batatas* is much cultivated. In most parts of this district the Arums or *Caladiums* are much neglected; in others they are very much cultivated. At the capital, and all towards the north of it, a small kind is in very common use, and I observed many fields planted with it alone.

West from the Kosi the gardeners rear much of a kind called Arbi, which some allege to be the same with the above; but owing to manure it grows more luxuriantly. Without

seeing both in flower, which I have not done, it would be impossible to say whether or not they are of the same species. Their appearance, however, is different, and they require a different treatment. The roots of the Arbi, when ripe, weigh from ½ to 1 lb., and many adhere to one cluster of stems, which proceed from a common origin. In the beginning of spring a cutting of a root, containing a young shoot, is planted. In the rainy season many thick fibres grow from the bottom of the shoot, which is elongated into stems bearing leaves. From among these proceed several new shoots; each producing a cluster of these stems, contiguous and adhering to the first. Towards the end of the rainy season, many roundish bulbs form under ground adhering to this collection of clusters of stems, and are in full maturity from the middle of December to the middle of January, when they are taken up, and kept in a pot for use. They do not preserve longer than a month, as when they begin to shoot the bulb withers. Not only the bulbs, but the stems which support the leaves (*petioli*), and the young leaves when about to shoot, and while still rolled up, are eaten.

In the same parts the people raise an *Arum*, called Aruya or Moranggi Kachu, which has a round root weighing 8 to 10 lbs. The people have never observed the flower. It is ripe in October and November, when the stems die, and the roots are dug up as wanted for three or four months. The roots are cut for seed, and in May and June are planted out in considerable fields, about a cubit distant from each other. If they get manure, a bigah of six cubits a Katha will produce 30 *mans*, which sell at about 6 anas for the *man* ($82\frac{1}{7}$ s. w. the ser). If the manure is neglected, as is usually the case, the produce is a third less. At this rate a Calcutta bigah or one-third of an acre, if manured, would give $13\frac{1}{3}$ *mans*, worth very nearly five rupees. The weight will be about $13\frac{3}{4}$ Calcutta *mans*, or 1131 lbs. The soil suited for this root is poor sandy land, which is very low rented; but the cultivation is rather troublesome, as it is mostly done with the hoe. The root is often used as a Tarkari; but many breakfast entirely on it boiled, sometimes adding a little salt or oil, and often without any seasoning. The younger leaves and stems (*petioli*) are also used as green vegetables (Sak Tarkari). From its appearance it comes nearer the *Caladium*

sativum of Rumph than any other species that I have observed; but, if it is of the same species, it does not grow nearly so luxuriantly as that plant does at Goyalpara.

Yams or *Dioscoreas*, called Alu by the natives are here very much used, not only as Tarkari; but many people make an entire meal on these roots, as is done on potatoes by some nations of Europe. They are boiled and eaten with a little salt or oil, if the people like these seasonings. It is very possible, that several species may have escaped my notice, and that these, which I have seen, may be called by very different names in different parts; for except in such great articles as wheat and barley, the native nomenclature of the productions of nature, even of those in very common use, is extremely confused.

The most common, and that which is cultivated on the greatest scale, is the Suthni. This approaches very near to the *Dioscorea aculeata* of the Encyclopedie, or to the *Combilium* of Rumph, which in the account of Ronggopoor has been mentioned under the name of Kangta alu; but this wants the thorny branches, by which the root of that kind is defended. Cuttings are planted in large fields of a sandy soil between the middle of April and the middle of June, sometimes by itself, sometimes mixed with the *Cytisus Cajan*, to which are sometimes added cotton, sometimes the *Corchorus* that is used for greens, or the *Hibiscus* which is used for making ropes. The plant is allowed to lie on the ground, although, were it supported, it would climb like the others of the same tribe. The roots are oval, and about the size of a potatoe, a great many being suspended from the bottom of one stem. The inside is of a pale yellow colour. The produce is said to be very great.

The other yams are cultivated in gardens alone, on a small scale, and their stems are allowed to climb upon the trees or on posts.

Very nearly related to the above is a yam, here called Mau Alu. The root of this is surrounded by many prickly branches, like the Kangta alu of Ronggopoor; but it differs in a few particulars from that plant, and it has no resemblance to the Mau Alau of Goyapara or the *Ubium palmatum* of Rumph. It is confined to the eastern parts. In this district the Mau Alu of Goyalpara is called Ratuya, and is

distinguished from that which follows, by having 6 or 8 longitudinal membranes running along its stem. The root within is a pale yellowish or red.

The best and most common garden yam in this district is the Khamba alu, which is the *Dioscorea alata* of modern botanists. This has a green stem with four longitudinal membranous wings, and, is the *ubium vulgare album* of Rumph, but his red variety, or the Katsjil Kalengu of Rheede has been introduced from the West of India, and is the finest yam, that I have ever tasted. The root is perfectly white, and free from strings, and I think is far superior to such potatoes as grow in India. It differs as a botanical species very little from the Devipat of Ronggopoor, but has no prickles.

There is another yam called Karchuki, which is occasionally planted in the western parts of the district. The bulbs, which grow on the stem above ground, are alone eaten. These do not exceed ½ lb. in weight, and are usually smaller, from 1 ounce upwards. When the stems fall on the ground, so that these bulbs receive nourishment from thence, they grow larger, but acquire a bad taste, and are unfit for use. A bulb is put in the ground about the 1st of March. The plant rises about the 1st of June, and is allowed to spread over huts, hedges or trees. The bulbs are ripe for eating from the middle of September to the middle of November and then, if not collected for use drop to the ground, where they take root. The bulbs do not keep, and must be used as they ripen. The common Radish is very plentiful in the eastern parts of the district; but in the western is less used. There are two kinds, one white, and one red, which is most common. Both have long roots, and only differ in colour. In the dialect of Mithila, they are called Muri. The red kind is called Makar from the season in which it ripens, and Dhengri from the hardness which it acquires when it is old. The white is called Newari, probably from having been introduced from Nepal, which is inhabited by Newars. This kind is a month later. Carrots are only used by people to eat raw, or as a medicine for cattle, that are valuable. Those who have large herds, on this account, cultivate this valuable root in considerable plots.

Plantains in many places of the district, especially near the

Kosi and Ganges, are exceedingly scarce, and almost every where are extremely bad, and fit only for being used as Tarkari. This I am told proceeds entirely from want of care. Mr. Smith brought some of the fine kinds from Calcutta, and planted them near Gondwara, where they succeeded very well, and the fruit was much admired by the neighbours: but no one has thought of propagating the kind, although it may be said to require almost no trouble.

In the western parts no one uses the stems for eating. The leaves of all kinds are used as platters; but the supply is very scanty. All the kinds ase used in cookery, and all are occasionally allowed to ripen, and are eaten as fruit. The kind of which the stems in Dinajpoor are eaten, and the leaves reserved for platters, is in Mithila called Athiya, and is used in the same manner as the others.

The Jhingga of Ronggopoor is known by the same name in the eastern part of this district; but in the western it is called Jhingni, and in the rainy season is one of the most common vegetables. In this district is also another species of *Luffa*, of which I find no account in the botanical works, that I possess. It is called Satpatiya Jhingni, and may be readily distinguished from the former in having its fruit disposed in clusters, (*racemus*); instead of there being only one fruit to each leaf. It grows at the same season with the common Jhingni. It is usually reared on the roofs of the huts, or on the dry hedges by which these are surrounded; while the common Jhingni is most usually sown in the fields. Still more related to the Dhandhul is another species of *Luffa*, which is common in all parts of this district, and is called in various parts Ghi Tarai, Ghira, and Ghiura. A few seeds are dropped, in the beginning of the rainy season, near the hut, and the plant is allowed to climb on the roof, or along the fence. The fruit is fit for use in the beginning of the cold season, while it is green.

Plants cultivated as Greens.—These plants, which in the dialect of Bengal are called Sak, in that of Mithila are known by the name Bhaji, or plants fit for being fried. They are much more used than in Dinajpoor and Ronggopoor. Among these I shall first take notice of the species of *Amaranthus*, the leaves of which are used as a green, and the stems as Tarkari, and begin with the *Blitum indicum album* of Rumph,

which Willdenow says is his *Amaranthus polygamus*. There are in this district three varieties, which have obtained different names, and by the natives are considered as distinct species, although I cannot discover any mark, by which a botanist would allow, that they can be distinguished. They all are in season at the same times and possess the same qualities; so that distinguishing them, were it even possible by any clearly marked characters, would be of little utility. I suspect, however, that among them may be found the different species of *Amaranthus* called *polygamus*, *Gangeticus* and *oleraceus* by Willdenow, as I cannot, with any certainty, refer them more to the descriptions of one than to those of the others.

In the south-east corner of the district I found a kind resembling the above, but abundantly distinguished by wanting the bristly ends, that the flowers of the others have. It is perhaps the *Amaranthus oleraceus* of the Encyclopedie. In Gaur it is called Rarhi Ponka.

One of the most common greens of this country is the Gendhari of the Mithila dialect called Notiya or Khuriya in Dinajpoor, and in the adjacent parts of this district. It is almost every where cultivated, although in many parts it grows wild. Although this is the *Blitum terrestre* of Rumph, which by modern botanists is called the *Amaranthus tristis*, I can find nothing in the plant, by which it can be distinguished from their descriptions of the common European plant, that they call *Amaranthus Blitum*. It differs from the above mentioned kinds in lying flat on the ground, while they grow erect. In some places different names are given, according as the stems are red or green, but these differences seem to be owing to mere accidental circumstances.

The Konka Notiya of Ronggopoor is in some places known by the same name (Kankanatiya) in others it is called Lal Sak and Kankakhuriya. In the dialect of Mithila its proper name would appear to be Rota. In the cold season this vegetable is a great deal used, especially towards the western parts of the district. In the central and northern parts of the district, a great many sow *Chenopodiums*, of which they reckon many different kinds, but they were so confused in their nomenclature, that I can say nothing positive on the subject. The only one which I can refer with

tolerable certainty to the descriptions of European botanists is the *C. Botrys*, which was called Jhali Dulali, and has leaves divided into many narrow lobes.

The others have entire leaves. The wild kinds are here called simply Bathuya, and are low crooked plants, whereas the cultivated kinds are tall and straight, and their foliage being thick and long is very ornamental. Both wild and cultivated kinds differ in colour, some having green stems and leaves, while others have these parts beautifully stained with red. I perceive no other differences, on which any dependance can be placed, and in the eyes of a botanist these are of very little or no importance.

A good deal of spinach is used in the eastern part of this district, and the European kind is beginning to spread about the capital. In the western parts spinach is not known. The seed is always made to sprout by steeping it in water before it is sown. The Mallow or Lapha (*Malva verticillata*) is much used in the cold season, and entire fields are covered with it. The *Trigonella corniculata* is a little used about the capital, where it is called Piring. The Fenugreek is more used, especially with fish.

In some parts of the district I am assured, the *Corchorus*, which is used for cordage, is the species called by botanists *Olitorius*, while that used as a green is the *Capsularis*, just the reverse of what is the case in some other places; but whether or not this is universally the case, I cannot say; not having been prepared for such a difference in the application of two very distinct plants to use, I have not everywhere been able to ascertain the point. The *Corchorus*, that is used for the pot, is however everywhere of a distinct species from that used for ropes, and in the dialect of Mithila is called simply Patuya, while the other species is called San Patuya, and near the Ganges Meghnal or San. In Ronggopoor both the *Capsularis* and *Olitorius* were used for making ropes and paper, and the latter was reckoned to be the best material; while another species which I have seen no where else, was reserved for the pot. This kind of pot-herb is much used. The *Basella lucida* is very little used. In the dialect of Mithila it is called Pore.

The *Phlomis biflora*, or perhaps *decemdentata*, which in Ronggopoor is called Munijholok, in Gaur is called Ratan,

and there a little is cultivated. The *Carthamus* or Kusum is a very common green and is sown in fields to a considerable extent. It gives the flowers as a dye, the leaves as a pot-herb, and the seed for oil, without its growth being in any manner affected; so that it is a valuable plant.

At Puraniya, I found a species of *Brassica* called Karim, which is cultivated as a pot-herb, but seems little to deserve notice. I have not been able to trace it in such botanical works as I possess. The natives here reject our cabbage, and indeed almost all our vegetables, whether from motives of religion, or from a difference of taste, I cannot say, a satisfactory answer on such points being seldom procurable.

Plants for acid seasoning—Are not much used in this district. The most common by far is the mango and near Gaur the tamarind.* In every part a little of the sorrel (*Rumex*), called by the natives Chuka, is cultivated; and is the only herb of an acid kind that can be said to belong to this class. The *Hibiscus cannabinus* is indeed in universal use, but it is reared chiefly on account of the ropes, which are made from its bark, as will be afterwards mentioned.

In the western parts of the district they reckon two species of lime, the Jamir and Kagji. The Jamir is the *Citrus*, which in Ronggopoor is called Gongra. This seems to be represented by Rumph in the 2nd figure 26th plate, 2nd volume of the Flora Amboinensis; but cannot be reconciled with the description which refers to that engraving. In this valuable work, it must be observed, that owing to the carelessness of Burman the editor, such transpositions are common.

In the south-east part of the district I found a lime called the Kuruna, which is probably different from that so named in Ronggopoor, because its fruit is strongly though agreeably acid, and highly odorous. It is oval, ends in a point like a nipple, is smooth, juicy, and about four inches in the length of its longer diameter, and is one of the finest kinds that I know, but seems very rare.

The *Carissa Carandas* is here sometimes but rarely used, as an acid seasoning in cookery, and is to be found in some native gardens. The Europeans in this district seem to have paid less attention to gardening than in Ronggopoor, and

* A small species of fish preserved in tamarinds is agreeable food. Ed.

their fruit and vegetables are in general very inferior. The only thing among them which I saw, that could deserve the name of a garden, was that belonging to the Commercial Resident at English Bazar. About Gaur, indeed the soil and climate are probably favourable; but in the other parts, I suspect, these are little adapted to at least the Chinese fruits. At Nathpoor in the year 1810, the peach, Leechee, and Loouquat entirely failed, and the Wampee did not ripen until very late. There were some bad apples, but no plums nor pears. The Avocado pear has not, so far as I observed, been introduced. It is probable, that owing to the dryness of the climate the vine would thrive, but this has not been attempted. Pease, cabbage and other common vegetables succeed well enough; but the artichoke, which thrives so well at Patna, and which would probably answer in the north-western parts of the district, has been neglected. Mr. Smith has introduced the Jerusalem artichoke at Nathpoor, where it grows most luxuriantly. The natives seem to look at it with total indifference, although I should have imagined that it would have suited their taste remarkably, being well fitted for curries; but they have an aversion to taste anything that was not known to their fathers.

The fruit of the natives is altogether execrable, except just in the south-east corner, where there are fine mangoes. In many parts there is scarcely even a pine-apple, which here requires less trouble than a cabbage does in Europe; yet this and the mango are the only fruits which the natives possess, that Europeans would consider as entitled to the name, the plantains are very bad. The Guyava is not common, and very inferior. The Papiya is common, and is called Papita.

The *Eugenia Jambos* is pretty common. The *Citrus Decumanus* is just beginning to be introduced, and so little pains is bestowed on it, that it is scarcely eatable. The mulberry, as a fruit, is deservedly neglected, being of a very poor quality. The pomegranate is very common and very bad. Some natives have the peach in their gardens, but the fruit is wretched.

The *Anona reticulata* in all situations is totally abominable. The *Anona squamosa* is here very bad. At Bholahat some of the natives had trees of the *Eugenia Mallaccensis*. The musk melon is totally unknown; but they have two kinds of

the common melon *Cucumis Melo* L.) both very insipid, although they have a fine scent. The one on the outside is finely variegated with green and yellow. The other, which is straw-coloured without variegation, is called the honey melon. They are both ripe in the rainy season. On the sides of the Ganges water melons are much cultivated, but in other parts they are very scarce. There are three kinds of the *Cucumis sativus*, the Bhadai and Vaisakhi Khiras, and the Songyas.

Flower gardens are almost entirely neglected. Those who sell garlands pick the flowers from a few bushes or trees, that grow half wild about the villages. In the whole district I observed just four gardens belonging to natives, that could be considered as intended for ornament, and these were of no great size, and far from neat. The largest and neatest is at Nathpoor, and belongs to a Hindu merchant. Next to that is the one at Bahadurgunj, belonging to the Munsuf, a Brahman. At Arariya are two. A few plants are cultivated as medicines, or sometimes as perfumes. The Kalajiri or *Nigella sativa* is reared in the fields, as will be seen by the tables of produce.

The Kashni is a species of *Chicoreum*, the seed of which is much used in medicine. I have seen it in Nepal, and it is sown in this district, in quantities sufficient for the demand. The seed has little or no taste nor smell, and probably little efficacy; but it is used in hæmorrhoids. One sicca weight washed, rubbed in a mortar into a paste, and mixed with a little sugar and water, is a dose given internally. The common cress is used only as medicine.

The Isubgol is probably the *Plantago Asiatica* of European botanists. Like the *Psyllium*, a plant of the same family, its seeds, when thrown into water, become mucilaginous like sago, and afford a fine nourishment for those who have febrile complaints. In this country they are also used as an external application in hæmorrhoids.

In this district two species of *Ocymum* are reared in gardens, and possess seeds with nearly similar qualities. The history of the Indian *Ocymums* given by the systematic botanists of Europe is attended with considerable difficulty, so that I cannot refer these plants, with much certainty to the systematic names; but, so far as I can judge, the finest plant

by far of the tribe, which here is called Ban Tulosi, is the *Ocymum gratissimum* of the Encyclopædie: it is no doubt the *Ocimum citronatum* of Rumph (vol. 5. plate 93, fig. 1.) and is probably the Kattu Tirtava of the Hortus Malibaricus (vol. 10, plate 86), although the anthers of that plant are white, and those of our plant are yellow; but in every other point, except this trifle, the description given in that work is applicable to our plant. Both the Hindi and Malabar names signify the wild *Ocymum* or Basil; but the plant is usually cultivated near the houses.

The other species, I think, agrees with the description given in the Encyclopédie of the *Ocymum hirsutum*. In Bengal it is called Babuyi Tulosi, and in the dialect of Mithila the plant is called Najbo. It seems to me to be *Ocymum Indicum album* of Rumph (vol. 5, p. 263), and the Soladi Tirtava of the Hortus Malabaricus (vol. 10, plate 87). In Malabar the Hindus consider this plant as sacred to Vishnu; but that is not the case in Bengal, where the Muhammedans have selected it as an emblem of their faith. The seeds of both plants seem to possess nearly the same qualities, are considered by the natives as cooling, are called by the same name Tokhmaraingya, and certainly, like sago, are a fine nourishment for weak stomachs in febrile disorders.

Near the huts I did not observe the *Acorus verus*, but in many places they rear other plants, which are often sold. The *Hibiscus Abelmoschus* or Kasturi is reared in some places, for its seeds, that have a smell like musk, which is called by the same name. The natives dry the seed over the fire, grind it with a little water, and rub the paste on the skin and among the hair, in order to give them a perfume. It would not answer with our European ladies, who imagine that their colour adds to their beauty, but the Indian girls do not think that they suffer a loss by a trifling change of hue.

Many people rear near their houses a plant called Beada, although it is also found wild; but it requires little or no trouble, and it is convenient to have it at hand. The root is always used fresh, when it is almost as yellow as turmeric, and has little smell. Its taste is a mixture of bitter and sweet, with little or no pungency. It is rubbed between two stones, and the paste is applied to any part that is in pain, when the cause of the disease is supposed to arise from cold,

or is accompanied by swelling. It is also toasted, and given internally to people, whose bellies are supposed to be swelled from heat.

The name Beada is said merely to signify, that the plant is not ginger, but implies, that, although not the true ginger, it has a very strong affinity to that plant, which is in some measure true. It is the *Zinziber Zerumbet* of Dr. Roxburgh, mentioned in his valuable paper in the 11th volume of the Asiatic Researches. Notwithstanding his authority in general, is uncommonly good, I think that this is the *Lampujum minus* of Rumph (vol. 5, p. 148). His Lampujum is, I have no doubt, the *Zinziber Cassumanar* of Dr. Roxburgh, for he says, that the root has a strong aromatic smell, which is the case with the Cassumunar, but by no means with the Beada. The name Zerumbet, given to this plant by Linnæus and others, had probably be better changed, if I am right in supposing, that it has arisen from a wrong quotation of Rumph. Nor should it follow the synonyme of Rumph to be given to the Cassumunar. Rumph nowhere says that his *Lampujum* is the *Zerumbet*; he allows, indeed, that it may be called a wild species of that root, or rather of Zedoary; but he appropriates another chapter for the description of the true Zerumbet (vol. 5, p. 168). Particular attention ought to be paid in quoting Rumph; as he is the author, who gives by far the best account of the uses and qualities of Indian plants.

In the same manner is raised a plant called Kachur, which is evidently the same name with Cachur, said to be the Hindi appellation of the *Curcuma Zerumbet* of Dr. Roxburgh; but the Kachur of this district has not the stain on the leaves, by which Dr. Roxburgh distinguishes his species. I have not seen the flower, and therefore shall not pretend to say whether it is the Zirumbed of Rumph; but like that its leaves are supported by long stems (petioli). Its root, when fresh, is pale yellow deepest in the centre, and has a strong smell, which the natives consider as agreeable; but I cannot say that it strikes me as such, although it is not at all offensive. Its taste has a strong warmth like ginger. It is cut in thin slices and dried, and is then rubbed with water to a paste, which is applied to the skin as a perfume. The dry root re-

tains its smell and colour, but loses a considerable part of its pungency. In the western parts it is reared almost in every garden, and is sold by the druggists at almost every market. The powdered root is also given internally as a carminative.

Another kind of turmeric, called Kari Haldi, is reared in the same manner. The root is cut in pieces and dried, and the powder is given with warm water in case of costiveness, which it is said to remove. About two or three drams form a dose. The dried root has a warm bitterish, but not disagreeable taste, and its smell, in my opinion, is more agreeable than that which the natives use for a perfume. Its colour is not black, as from its name one might expect, when dry it is pale, approaching to white, but when fresh it is a pale yellow, rather darker, however, than that of the former, and it has then less smell. The name, Kari, seems to be owing to the stains on the leaves, which mark this clearly as the *Curcuma Zerumbet* of Dr. Roxburgh. The name Kachur or Cachura seems, therefore, even in the Hindi dialect to be given to two distinct species described by this able botanist; and concerning these there are considerable difficulties. This plant with the stained leaves, from that circumstance, is evidently the *Kua* of Rheede, who particularly mentions it; and the *Kua* of Rheede is no doubt the *Amomum Zedoaria* of Willdenow, who quotes the figure of Rheede as being a good representation of the plant, which he means; yet Dr. Roxburgh considers his Zerumbet as different from the *Zedoaria* of Willdenow, although he admits that the root of the latter is the Zedoary of the shops. I cannot either agree with Dr. Roxburgh in supposing that the Kua of Rheede, and the Zirumbed of Rumph are the same. One has flowers, proceeding from among the centre of the leaves, and may be the Kachur of this district; the flowers and leaves of the other grow quite separate, and spring at different seasons. It is true, that a native of Malabar called the plant of Rumph Kua; but whoever trusts to the confused nomenclature of such people will be miserably deceived. Rumph, in describing the Zirumbed says, that he has never seen the plant which produces the genuine Zedoary.

Plants reared for making Thread or Ropes.—The *Cor-*

chorus is by far the most common. It is probable, that as in Ronggopoor, both the *capsularis* and *olitorius* are cultivated for the fibres, but it was the *olitorius* alone that I saw cultivated for this purpose. This plant and its fibres, in the dialect of Mithila, is most usually called San, to which particular attention ought to be paid, as this is the name, which in Bengal is given to the *Crotolaria juncea*, that here is called Gor San. The *Corchorus*, however, in various parts of this district is also known by the names Pata, Patua, San, and Meghnal.

Next in the extent which it occupies is the *Hibiscus cannabinus*, from the bark of which, in the southern parts of the district, the common cordage of the country is almost entirely made. In these parts it is said to be sown in fields, which produce nothing else; a practice that I have observed nowhere else in India: and in the northern parts I know that it is always intermixed with other things; especially a few seeds of it are dropt among turmeric and ginger; but in such small quantities as to deserve no notice, and it is chiefly used there as an acid seasoning, as I have before said. In the tables I omit altogether this, and consider only what is reared for cordage. It seems to me a very coarse material, far inferior to the *Corchorus*, but it sells for about the same price, and its produce is not greater, nor have I had any opportunity of trying any experiments on their respective qualities. In most parts of the district it is called Amliya Pata, on account of the acidity of its leaves; but in others it is called Chandana.

In most parts of the district no more *Crotolaria juncea* is raised than serves the fishermen to construct their nets; but the commercial resident at Maldeh has at Jagannathpoor a subordinate factory for procuring this material. The neighbouring country on the Mahananda and Nagar seems to be well fitted for the purpose, as much of the soil is rich, and as at all seasons the rivers facilitate the conveyance of the chief factory.

Cotton in this district is but a trifling article. There are several kinds, mentioned namely, Kukti, Phaguni Bao, Bhadai, Tibki, Bara, and Bhujaru, but I suspect, that one kind is often called by several names, and that in different

places the same name is given to different kinds. The only kind that I saw growing was by the people called Bhoga or false cotton, and it is not mentioned as being cultivated for its wool.

The Kukti is the most remarkable, its wool having the colour of nankeen cloth, and it seems in fact to be the same material with what the Chinese use in that manufacture; for the greater part of what is used in this district is brought from the hills subject to Nepal. I have not seen the plant growing, and cannot therefore speak of its botanical appellation. I am told, that what is called Bhadai, at least in some places, is of the same kind, that is, it has wool of the same colour; but it ripens at a different season. Some people allege, that the Phaguni has also a red wool; but that the season, at which it ripens, is different. It would seem to be an object worth the attention of government to send annually a bale of this red cotton to Europe, until it was ascertained whether or not it would answer as a material for our own manufacturers. Should this be found to be the case, any quantity might, in the course of a few years be procured by making advances, and without these it would be difficult even to procure one bale. The greatest quantity now reared in the district is immediately south from Puraniya, and it might be procured there by the agent of the commercial resident, who superintends the manufacture of salt petre. From the season, in which it is sown and reaped, I presume that the Tibki is the same with what grows in Dinajpoor and Rongopoor in the rainy season, and which appears to me to be the *Gossipium Javanicum* of Rumph, vol. 4. p. 34.

The Bhugaru grows in the dry season, and its wool is of a good quality. It is probably of the same kind with the fine cotton that is raised in Serkar Ghoraghat, being cultivated nearly at the same time, and in the same manner. The cotton called Bara is the finest kind raised in this district. At present its cultivation is confined almost entirely to the vicinity of Gaur; but in the north-west of the district there is much land, that would appear to be fit for its production. This is a valuable plant, requiring little trouble in cultivation, for watering is unnecessary, one sowing lasts two years, and with only one hoeing on the second year, gives two crops. In

order to give an idea of the manner, in which the people here swell out their accounts of the expense of cultivation, I shall detail what was stated to me on this subject.

To 30 ploughings (in reality 8 or 10) 2 rs. 8 anas. To sowing (really 1 ana, or 1 *man* for a day) 1 r. To hoeing to cover the seed, 8 anas. To seed (it could not be sold) 2 anas. To a hoeing in the second year, 10 anas. To two years' rent, 1 r. 4 anas. To gathering six-sixteenths of the crop, 4 rs. 8 anas. Total 10 rs. 8 anas. Produce, 4 *mans*, at 3 rs., 12 rs. Neat profit 1 r. 8 anas.

The real price is 4 rs. a *man*, and the gathering at six-sixteenths of the crop would be 6 rs., making the total expense 12 rs., and the neat profit 4 rs. The actual expense, so far as I can learn, may be about 8 rs. It may seem extraordinary that this cotton should sell only at 4 rs. a *man* (40 sers of 75 s. w.) even by retail, for almost the whole is sold by the farmers in that manner; while at the places of Ronggopoor, where the coarse cotton of the Garo hills is spun, this money would only purchase 23 sers of the same weight; yet there is no reason to suppose that I have been deceived in this point; many indeed alleged, that the price of the cotton of this district is not so high as I have stated. This being mentioned to the people, who on such occasions are always provided with an answer, they said that the cotton of this district contained so much seed, that it yielded no thread; yet on inquiry at the spinners of the two places, I found that directly the contrary is the case. I found at Borovari in Ronggopoor, that 144 pounds of Garo cotton gave only 30 pounds of thread, while at Bholahat in Puraniya 100 pounds of cotton gives 35 pounds of thread. In all these calculations, however, we can place no great reliance. The operations are performed with such different degrees of care, and the people are so totally ignorant of accounts, that it would be rash to rely upon results drawn from their reports.

Plants cultivated on account of their Saccharine juice :— Exclusive of the palms, mentioned among the plantations, the only plant of this description is the sugar-cane. The cultivation of this valuable article is chiefly confined to the banks of the Kankayi and their vicinity, where it is carried to a great extent, but is performed in a most careless and unskilful manner, so that the produce is truly wretched. A want of attention to manure and to weeding are the grand features of neglect, although a good deal of injury arises from a want

of proper selection in the kind. A very little of a most wretched kind called Nargori, from its resemblance to a common reed, is used, and gives almost no juice. The greatest quantity is of the very poor kind called Khagri, from its resemblance to a large reed of that name. It does not grow thicker than the finger, and in my account of Dinajpoor has been already mentioned. A larger kind is called Bangsa from its being thick like a bamboo, but the magnitude of this is only thought great, from its being compared with the others. It differs from the Kajali of Dinajpoor in its stems being entirely yellow. Towards the frontier a very little of this Kajali also is raised. In the whole district I did not see a field of good growth. This could not be attributed to the soil, which in that vicinity is remarkably rich; but is entirely owing to the want of care, which is so great, that I scarcely saw one field, of which the cattle had not been allowed to eat a considerable portion.

Little or none of the extract, that is prepared in this district, is made into sugar, the few manufacturers that are, being chiefly supplied from Dinajpoor. The quantity reared is not quite adequate to the consumption, and some is imported; but the difference is not considerable, as some is again exported. The farmers reduce the produce still lower, than I have stated, but I do not think, that dependence can be placed on what they said; and they reduced it by deducting all the expense of labour, that is paid in kind, which is a considerable proportion. The amount of the produce stated in the tables is supposed to be the whole extract procured from the canes growing in the district. About equal quantities of the pot and cake extracts are prepared.

It must be observed, that the whole produce stated here would not pay for the expense, which in Ghoraghat is bestowed on the cultivation; but the expense here is a trifle, and the farmer has a considerable profit. The reason of so little trouble being bestowed, probably is, that little or no additional rent either direct or indirect is laid on the land producing sugar. In my account of Ronggopoor I have stated, that in the parts of the same estate, which belonged to the Bordhonkuthi family, and were low rented, no one would take the trouble to cultivate sugar-cane, while on the share, that belonged to Dinajpoor and paid a high rent, this

valuable plant was cultivated with the utmost care. The low rent of most parts of this district, and the total disregard paid to the quality of the soil in the rate of assessment seem to have prevented the people from any attention to rich crops, and where the sugar-cane has been introduced, it receives very little care or expenditure, and its returns are scanty in proportion. In some places they do not bestow even the smallest quantity of manure.

Plants used for chewing and smoking:—Tobacco, as usual, is by far the most important, and about a half of the whole is reared in the vicinity of the capital. All the parts to the North and East of that town are equally favourable, and why it has been there neglected, I cannot say. The supply is however rather more than sufficient for the consumption. It is of a quality inferior to that reared near Ronggopoor. There are said to be three kinds named Mandhata, Arena, and Ghangira. The first is thought to be the best and largest leaf: the last is very small, and has more powerful narcotic effects.

Betle leaf is the next most important article, although much less in use than even in Dinajpoor. It is raised exactly in the same manner as in that district. Hemp (*Cannabis sativa*) is raised in the rich clay land of Gondwara. The quantity of land employed is very trifling, being stated at 25 Calcutta bigahs. The produce is stated much higher than I allowed in Dinajpoor, and I believe accurately, for the produce stated there appeared so extravagant, that I was unwilling to allow it. The average produce stated here, reducing weights and measures to the Calcutta scale, was 6 *mans* a bigah, double of what I allowed in Dinajpoor, but not more in probability, than what actually grows. The small extent of ground adequate to supply the whole market with this drug, and the consequent ease, with which the cultivation could be superintended, is an additional reason for adopting the plan I have proposed for raising a tax on this substance. Even now however there is great reason to suspect, that much is privately reared in hidden corners: as is also the case with the poppy, none of which is avowed. The quantity of this however is so small, that I have not entered it in the tables, although some perhaps is raised in almost every village, at least in the western parts of this district. Ca-

techu, Ajoyan, Mauri, and Dhaniya are also chewed, and are the produce of the country, but I have already mentioned them. Among the plantations are a few Betle-nut trees; but so insignificant, that their produce need not be taken into the account.

Plants used for dying:—On this subject in particular I am very much indebted to Mr. Ellerton for the communications, with which that gentleman has favoured me; and wherever there are a soil and situation similar to those in his vicinity, I can advance with a great certainty of my account being tolerably accurate.

The factories under the management of this gentleman are all in the south-east part of the district, including the divisions of Bholahat, Sibgunj, Kaliyachak, Gorguribah, and Manihari. In these there are in all 17 factories. Of these I know, that 15 contain 101 pair of vats. The other two probably may contain 10 pair so that on an average each factory contains between 5 or 6 pair of vats. The vats are in general from 20 to 22 feet square. Now five of the factories under the management of Mr. Ellerton contain 30 pair of vats, rather more than the medium are scattered through the above space at considerable distances, and may therefore be considered as a fair example of the whole, only that every thing in their establishment is on a better, but more expensive footing than I have seen any where else in Bengal; and in few have I seen such attention paid to gain and deserve the esteem of the natives. This care indeed, so far as I could learn, could not well be carried to greater lengths. Having premised so much, I shall mention a statement of the produce, on an average of seven years, of the factories under charge of Mr. Ellerton, and then extend it to the other factories in this part of the district.

Bigahs of ground for which advances were made, 26,000 =96,200. Bigahs of ground supposed to have been actually sown, 20,000=74,000. Bundles of plant actually received, 240,000=8,88,000. *mans* (74 $\frac{1}{5}$ lb. nearly) of Indigo procured 680=2,516. It must be observed, that the bigah, by which Mr. Ellerton reckons, is only 76 cubits square, so that each vat on an average requires very nearly 600 Calcutta bigahs to be actually sown, and that every 10 bigahs Calcutta measure actually sown produce nearly 133 bundles of weed, a

little more than was stated as the average produce of Ronggopoor; but, if we consider, that for every 20 bigahs sown, Mr. Ellerton supposes, that the farmers undertake to cultivate 26, and that the gentlemen of Ronggopoor calculated by the land for which they made advances, the difference will not be very material. Had Mr. Ellerton calculated by the lands, for which he made advances, 10 Calcutta bigahs would produce 117 bundles in place of 100, which the Ronggopoor gentlemen allow; but I suspect that Mr. Ellerton's bundle is only $3\frac{1}{2}$ cubits in circumference; such at least I know is the custom in the other parts of the district, and Mr. Ellerton mentioned no differnece. In Ronggopoor the bundle is usually 4 cubits round; the difference therefore will be next to nothing. The price given here to the farmer, being $\frac{1}{17}$ of a rupee for the bundle, will make the actual produce to the farmer from what he really sows worth 1 rupee 1 ana 7 pice. It must be farther observed, that on an average it requires 350 bundles to make one factory *man* of indigo, weighing nearly 74 $\frac{2}{5}$ lb.

I now proceed to detail the different soils and methods of cultivating indigo in these parts, as described by Mr. Ellerton. The greater part of the indigo is raised on land which gives a winter crop of pulse or rape seed, and occupies the place of a crop of rice or millet, which were it not for the indigo, would be sown on the same ground. In some few high places the indigo is preserved for seed, in which case no other crop can follow; but in the part of the district, of which I am now treating, the quantity of this is small. In this land the indigo is usually sown in February, and when the season is favourable, is reaped before the inundation rises. If this is late, and there are many showers in spring, there are sometimes two cuttings from the same field; but on an average of years the quantity thus procured is altogether inconsiderable. When the inundations rise early the crop is often entirely lost, and in general it suffers more or less. In moderate seasons this falls heavier on the manufacturer than the farmers, at least where those are treated with indulgence, which is shown at the factories under the management of Mr. Ellerton; for the farmers know that their weed expands exceedingly by being under water, and if they think that they can secure it, they allow it to soak two or three days, in which

time it is not absolutely rotten, and is taken by Mr. Ellerton, but produces a mere trifle of indigo, to which may be attributed the small quantity of dye, which that gentleman procures from a given number of bundles.

Another description of land is very low, on which the only crop that could be sown instead of indigo, is summer rice or millet, and the farmers seldom part with any of this description called Jaliya, that is not of a very poor soil, or that is not overrun with weeds, so as to be almost unfit for grain, and that is not very low rented. These lands are sown at the same season with the others, are liable to the same accidents, and never produce any seed; but as the land is low and moist, it is less dependant on the early showers of spring, without which the others fail, or cannot indeed be sown.

There is another manner of cultivating indigo, in which the seed is sown in October, and this also is done on two different kinds of land. The first is on the banks of the great rivers, where there are spaces covered with sand, that produce a very scanty vegetation in spring, and are never regularly rented, but in a few parts are sometimes cultivated with water melons, and other cucurbitaceous plants. If the sand does not exceed one foot in thickness, and rests on a tolerable soil, this kind of land has been found highly favourable for indigo, and it is almost the only kind which the farmers would with satisfaction cultivate. The seed is sown in October as the floods retire, and with little or no previous culture, and the plant afterwards requires little or no care nor expense. The moisture then in the sand enables the seed to germinate, and sends a sap root down towards the richer soil. Until the root reaches this, the plant almost resembles a fibre; but, no sooner does it reach the soil, which is preserved moist by the sand, than it requires vigour, and the driest seasons and most scorching winds produce little or no effect on its subsequent growth; for no soil seems to prevent evaporation so powerfully as sand. This indigo is less liable to accidents than the other, not only during its growth, but during the crop season, as such land is generally pretty high, and is late of being flooded.

The other land fitted for sowing indigo in October, is that which produces a winter crop, either as the only harvest of the year, or as succeeding rice or other grain that is reaped

in summer. This indigo is most usually sown along with rape-seed, which is plucked in January, and leaves the indigo to ripen in spring. Sometimes the indigo is sown along with wheat or barley, but as these are sown in November, and ripen later than the rape-seed, they are less fit for the purpose.

One great advantage has been found to attend the October cultivation of indigo as fitting it for the lower parts of the district. In favourable seasons it comes early to maturity, and towards the bottom of the stems ripens its seed, before the season for cutting the plant arrives. When this happens, the seed may be picked from the growing plant, without material injury, and in one year Mr. Ellerton procured from one small factory between 300 and 400 *mans*. He paid for this at the rate of 5 rs. a *man*, and had he not used it, he might have sold it for 12 rs. It must be observed, that Mr. Ellerton furnishes the farmers with seed at 3 rs. a *man*, and that it often, as I have said costs 12. Where seed is scarce, as in this part of the district, this plan of giving the farmers a higher price for it, than is charged to them seems judicious; and if followed in Ronggopoor, would soon no doubt procure abundance, and on the whole cost the planter less than he at present pays.

It must be observed, that both October crops, so far as I learned, are unknown in Ronggopoor; and that here they never sow indigo on the land, that is to be cultivated with transplanted rice, a practice that generally occasions disputes between the farmer and manufacturer. The price given here, even making an allowance for the difference of the size in the bundles, is much lower than that given in Ronggopoor, and seems totally inadequate to induce the farmers to cultivate the plant. This will be evident from comparing the produce and expense of indigo and summer rice, the place of which the former almost always occupies. The average produce of summer rice Mr. Ellerton takes at 7 *mans* the bigah of 76 cubits, and states that it is worth 6 anas 8 gandas a *man*; that is, the produce is worth rather more than $2\frac{3}{4}$ rs. while he states, that the produce of the same bigah in indigo is on an average only 1 r. or 12 bundles; but this statement of the rice is too high. Mr. Ellerton proceeds on his estimate by calculating the produce of a given number

of bigahs of rice, that have been reaped; but in the vicinity of the Ganges this would not give a fair average of the produce; for much of these crops that are sown in spring are totally lost, and never at all reaped, and in such situations rice is still more uncertain than indigo. Mr. Ellerton indeed calculates that of 10 bigahs sown, even in good years, not above eight are reaped, which will reduce his average to nearly what I was informed by the natives, who allowed from 4 to 6 *mans* of rice as the average produce, besides the expense of harvest, making the average produce probably about 5½ *mans*, worth rather more than 2 rs. or double the value of the indigo. It is true that the whole expense of the cultivation of summer rice, in ploughing, weeding, watching, and reaping, may be nearly double that of indigo; for in the three first operations very little pains is bestowed on this plant, and unless it is near the factory, the manufacturer pays the expense of carriage, while, as I have said, the charge for reaping corn is enormous. The land also on which indigo is raised, is in general poor and low rented, and where it is the only crop, does not pay more than 4 anas a bigah, or one-quarter of the produce. Still, however, the rice is no doubt a more profitable cultivation; and in fact, the farmers (except on the poor sandy land that will not produce rice) are exceedingly backward to undertake, or continue the cultivation; and many of the landlords discourage their tenantry from engaging in it, by every means in their power.

I have already, in Ronggopoor and Dinajpoor, had occasion to dwell on the discontent of both tenants and landlords, and the causes, which the different parties assign. Mr. Ellerton's opinion deserves the highest regard, not only from his long experience and thorough knowledge of the natives, and from the nature of his temper, which is said to be uncommonly mild, for I have not the honour of being his personal acquaintance, but from his being merely employed to manage the affairs of gentlemen, who in the whole concern have shown a liberality, to which I know none superior. He is decidedly of opinion, that the dislike, on the part of the landlords, proceeds entirely from the fear which they have of their oppressive conduct towards their tenantry, being brought to light by the Europeans. This may be extended to almost all the higher rank of natives who enjoy high pri-

vileges, who, I am afraid, are often very unjust towards their poor neighbours, and most of them, I am pretty well assured, wish never to see the face of an European. They hold out indeed as an excuse, the difference of manners, such as our eating beef and pork, which they cannot behold without abhorrence and contempt, and the whole conduct of our women, which they consider as totally destitute of decency; but I am inclined to believe, that the reason assigned by Mr. Ellerton has too much foundation in truth. As I have before said, however, it does not appear to me, that an Indigo planter is bound to become a knight errant to redress grievances; and his conduct, in that respect, ought if practicable to be such, as to set at ease the minds of the landlords and other powerful natives. It so however happens, that some planters gain the farmers to their side by giving them advice and assistance as to procuring redress, and no doubt such people often have found the farmers willing, on account of this protection, to supply them with indigo; but this seems a very difficult and delicate plan of conduct. Others again induce natives to farm the rents of large tracts of land, supply them with money to discharge their engagements, and employ the influence, which these men acquire as agents for the landlords, to ensure an extensive cultivation. This is a still more delicate plan, bordering on oppression, and seems to me very dangerous, considering the trust and credit, that must be given to the native agents, very few of whom in this district are deserving of either. The most usual inducement, however, besides kindness of treatment, such as Mr. Ellerton and many others on all cases show, is the advance of money without interest. For every 20 bigahs which the farmer sows, according to Mr. Ellerton, this gentleman, before the cultivation begins, advances at least to the value of the average produce of 26 bigahs, and I am persuaded, that the common rate of advance is still much higher. Had the farmer borrowed the money from a native merchant, and no one cultivates indigo, that would not have been under the necessity of borrowing, he would have, in the first place, been obliged to repay the amount of the loan, in grain or other produce, at the low price given when the markets are glutted at harvest, by which he would lose from 15 to 20 per cent. 2ndly in place of giving 40 sers for the man, he

must have given 50, which is an addition of 25 per cent, not only on the capital but on the interest; and, if he fails in the delivery of any part, he takes the deficiency, in part of a loan for the next year, at double its amount. Such a ruinous manner of raising money the poor farmer avoids by dealing with manufacturers of indigo, none of whom charge any interest, for what is repaid with produce. Some indeed charge the legal interest of 1 per cent a month, for what is not repaid, although others, as the employers of Mr. Ellerton, charge nothing. I am persuaded however, that this last indulgence is a mistaken liberality, and in many parts of the district, would be attended with ruinous consequences. In every part the farmers undertake to cultivate much more than they intend to perform, and in many, were they not charged with interest, they would cultivate none. As it is, in some parts of the district, as near Nathpoor, they are so extraordinarily dishonest, that it seems scarcely possible to induce them to cultivate a half of what they undertake, and for which they receive advances. I am persuaded, that a greater price given for the weed, and more strictness in making advances and recovering balances, would be found more advantageous for both parties.

In Gondwara, where the land is higher, and the soil stiffer, there are 10 factories. I have been favoured with the produce of 4 of these, for a space of 8 years from 1800 to 1807, while they belonged to Mr. Smith, and this is as follows,

1800. Bundles of plants, 41,764 indigo, 131 Fy. M. 20 sers. 1801. Do. 48,834 do. 162 Fy. M. 1802. Do. 26,083, do. 109 Fy. M. 17 sers 4 chhat. 1803. Do. 74,525 do. 278 Fy. M. 12 sers. 1804. Do. 93,945 do. 381 Fy. M. 1805. Do. 138,798 do. 536 Fy. M. 28 sers 8 chhat. 1806. Do. 92,770 do. 310 Fy. M. 1807. Do. 166,106 do. 754 Fy. M.—Total, 682,825 bundles, 2,662 Fy. M. 37 sers 12 chhats.

From this it will appear, that nearly 257 bundles of weed produced 1 *man* of dye, whereas with Mr. Ellerton 350 bundles were required, in a great measure probably owing to the country being lower, and more of the weed being spoiled; but in part also I am persuaded, owing to the soil. Mr. Smith looked upon any attempt to ascertain the quantity of ground actually cultivated as totally impossible, the frauds being so numerous and irregular, as to preclude calculation. The land however, is probably not more productive than in the south-