# INTERIM REPORT

## OF THE

# NATIONAL COMMISSION ON AGRICULTURE

## ON

## SOME ASPECTS OF AGRICULTURAL RESEARCH, EXTENSION & TRAINING


GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE
NEW DELHI
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## SUMMARY OF RECOMMENDATIONS

### Agricultural Research

1. The ICAR should, with the help of its scientific panels, undertake to draw up long term plans of fundamental and applied research, identify gaps in our information and assign them for execution to appropriate scientists, universities and research institutes. (Paragraph 3.2)

2. The University Research Councils should be strengthened by the addition of competent experts of State Departments of Agriculture. Reciprocally, the Development Councils set up by the departments should have scientists of the universities represented on them. (Paragraph 3.6)

3. The ICAR should evolve a system whereby continued international cooperation and collaboration between agricultural scientists of India and abroad becomes possible on a regular basis. (Paragraph 3.8)

### Fundamental Research

4. High calibre scientists should be drawn into the field of agricultural research both in the universities and central institutes to carry out fundamental research. (Paragraph 4.5)

5. The institutions including agricultural universities which are primarily meant for basic research should take part in applied research also. For the agricultural universities to be able to conduct applied research, regional research stations may be placed at their disposal at the rate of at least one per agro-climatic region. (Paragraph 4.6)

### Funding of Research

6. For every Plan period, the Centre and States should inform the agricultural universities the minimum level of funding that they can expect for research from Plan funds annually. The minimum should be at a level of 80 per cent of the possible actuals. The universities should then plan the recruitment of research personnel on a fairly long term basis. (Paragraph 5.10)

7. The ICAR should create 50 Professorial Chairs, distributed 40 in the agricultural universities and 10 in the other universities. Some of these may be designated as Chairs of Excellence and created on a higher scale of pay in order to attract outstanding scientists. On an average, each university may have 2 Chairs and universities in areas of backward agriculture may get necessary weightage. (Paragraph 5.11)

**Concept of a Division including teaching, research and extension**

8. Immediate steps should be taken by the agricultural universities to reorganise their existing set-up in such a manner that an integrated approach pertaining to teaching, research and extension permeates in every discipline. For this purpose, each teaching department should be converted into a Division which should represent within it all the elements of teaching, research and extension pertaining to that particular discipline. (Paragraph 6.4)

**Responsibilities of State Departments vs Agricultural Universities**

9. Adaptive research should be the responsibility of State Departments. For this purpose, experimental farms which are usually meant for demonstration work and for raising seed etc., should be placed exclusively under the control of such Government Departments. These departments must have in their cadre qualified scientists competent to do adaptive research and such scientists should have the benefit of administrative and extension experience also. (Paragraph 7.5)

10. In order to have effective programmes of adaptive research, the Government Departments should form Adaptive Research Councils analogous to the Research Councils which exist in agricultural universities. (Paragraph 7.6)

11. In the area of extension relating to field trials, the responsibility for the extension programme should be with the research workers' group which seeks to establish the applied or the adaptive research in the field. The field workers should give them all support in establishing a link with farmers to enable the trials to be carried out satisfactorily. (Paragraph 7.18)

12. The involvement of the scientists in the university with extension on the farmers' field in the nature of demonstrations and intensive programmes should be limited. Every scientist in the university having a good research base should have direct contact with the field so as to get first hand knowledge of farmers' problems which he would have otherwise overlooked. This should be assured by placing highly trained extension subject-matter specialists in the respective Divisions at the headquarters and at each of the regional research stations. (Paragraph 7.19)

13. The state departments shall be made fully responsible for the entire field of extension functions in the states, except for a limited involvement of research scientists to the extent outlined in the earlier recommendation. The subject-matter extension specialists located in the various Divisions in the university and in the research farms, must be available to the extension workers to solve their special field problems. A suitable liaison machinery should be worked out in each state so that expert opinion can be obtained quickly by the field workers when necessary. (Paragraph 7.20)

**Reinforcement of State Departments**

14. The Programme, Subject-Matter and Extension Specialists at the State level must be specialists of the highest level possible in their fields of specialisation and they shall maintain contacts with the specialists in the University Divisions. At district, and tehsil or taluk level, there should be a team of specialists in appropriate fields and in appropriate grades. The team leader and the specialist at the tehsil level should preferably be holders of M.Sc. degree and those at the district level preferably holders of Ph.D. degree. To provide support to Village Level Workers, five to six graduate Agricultural Extension Officers (AEO) should be provided in each block. In animal husbandry, there should be graduate Field Extension Officer at least at taluk level. In the districts where special programme is being undertaken in animal husbandry or fishery, additional suitably qualified Extension Officers should be posted. (Paragraph 8.9)

15. In order to maintain technical competence in State Departments, provision should be made for exchange of staff at appropriate levels between the universities and departments on deputation basis. (Paragraph 8.10)

16. The structure of state departments should be so reorganised and streamlined as to provide for uniform pattern of staff in all the districts, but for this sake, the quality of staff should not be sacrificed. If duly qualified personnel are not available in sufficient number, priority may be given to areas of special programmes. (Paragraph 8.11)

**Training**

17. As far as training of departmental personnel and farmers is concerned, a Joint Training Board may be constituted at the state level with members drawn from State Departments and the agricultural university to formulate a comprehensive training programme. An officer of the rank of at least a Joint Director should be appointed in every state to look after the training programmes and he should be the convenor of the Joint Training Board. (Paragraph 9.9)

18. The responsibility of periodical training of top and middle level administrators and experts of Government Departments should be that of agricultural university. The duration of such training may be long enough for an effective transfer of knowledge. State departments themselves should arrange for the training of their lower-level experts and administrators either through their own institutions or with the help of agricultural university according to needs. State departments should also be responsible for routine training of field workers and farmers for new introductions and programmes, while the agricultural universities should be responsible either for imparting training to farmers in general scientific agriculture or familiarising them in the latest developments in various disciplines. The frequency and duration of such training programmes should be determined according to need. (Paragraph 9.10)

19. Farmers' training centres should be set up at the rate of one at least in each district where long duration as well as short duration courses should be organised to provide training facilities in various subjects to farmers' sons and daughters and also to adult farmers, both men and women. A Joint Training Board should be appointed for each of these centres with the head of the institution as convenor for drawing up detailed programmes of training annually. (Paragraph 9.11)

20. The State Departments should organise adequate training programmes in the district training centres for their junior

staff members at the field level. The agricultural universities should organise refresher courses of long duration for departmental personnel. (Paragraph 9.12)

21. The departmental personnel at high level should be trained in agricultural administration and management in the existing management institutions as an interim measure. (Paragraph 9.13)

**Formation of Apex Body**

22. An Apex Body should be constituted for each State under the chairmanship of the Minister of Agriculture and having the Vice Chancellor of the University and the Directors of Agriculture, Animal Husbandry and Fisheries and Agricultural Production Commissioners/Development Commissioners as members. This Body should have the overall responsibility of ensuring that the two organisations work in harmony and in the best interest of an all round development of agriculture in the State. (Paragraph 10.2)

# INTERIM REPORT ON SOME ASPECTS OF AGRICULTURAL* RESEARCH, EXTENSION AND TRAINING

## SECTION I

### Introduction

1.1. One of the terms of reference given to the National Commission on Agriculture relates to "achievements, deficiencies and potential of the development of agricultural research and steps needed for promotion of agricultural research and its application to field conditions in the context of a fast developing technology and need for scientific demonstrations on farmers' fields, for gearing up extension meachinery and for the establishment of a two-way channel between farmers and scientists". This subject has also been included in the list of items on which the Commission has been specifically asked to make interim recommendations. The Commission has selected for immediate study from this wide topic some aspects having a bearing on the creation of a sound research base in every agricultural university and research institute; allocation of research and extension responsibilities; integration of research, teaching and extension; coordination and cooperation amongst agricultural universities, central institutes and state departments and funding of research. The Commission is convinced that these aspects need clear understanding and immediate attention so that science and technology will be more purposefully and gainfully employed in the future development of agriculture than at present. Our interim recommendations relate to these aspects only. Other aspects of the term of reference will be dealt with in the final report.

1.2. Members of the Commission visited various central and state research institutes, agricultural universities and agricultural colleges. They held discussions in some states with scientists at different levels and also with officers of the state departments. Based on these discussions, questionnaires relating to agricultural research and extension were issued to various State Governments, Central Institutes, agricultural universities, Indian Council of

*Agriculture here includes horticulture, animal husbandry, forestry, fishery etc. In this context 'State Departments' whenever used in the report will mean all such departments which pertain to these disciplines.

Agricultural Research (ICAR) and some individuals. Appendices I and II contain copies of these questionnaires and Appendix III gives a list of the individuals, organisations and institutions, who replied to them. The replies, in addition to the discussions referred to above, have been duly considered in arriving at conclusions and formulating recommendations on the issues mentioned earlier.

## SECTION II

### Review of present position

2.1 The development in any field of human endeavour is made possible only through proper application of science and technology. Systematic research is the foundation of science and technology. In the sphere of agriculture and allied disciplines the ultimate goal is production. It is therefore imperative that results of research automatically and regularly keep on flowing upto the point of production, that is, the farmer. Extension service makes this flow possible. The backbone of research as well as extension is indeed education. An integrated approach to education, research and extension is therefore essential for an all-round agricultural development.

2.2 A chain of processes is involved starting from research and ending in production and it is necessary to assume some kind of demarcation before the agencies involved in various processes are specified and made responsible for different aspects. For instance, taking an overall view of agricultural research, one must recognise that it cannot be compartmentalised artificially into one kind of research or the other. However, the demarcation of research into categories may be rewarding in the sense that it may avoid confusion and save a good deal of overlapping in efforts. Keeping this limitation in mind, three categories of research* have been distinguished, *viz.* (i) Basic or Fundamental Research, (ii) Applied Research, and (iii) Adaptive Research.

2.3 Basic or fundamental research has either an intellectual, exploratory or gap-filling function or all of them in one. It is carried out solely to increase our stock of knowledge. Such topics as genetic factors determining yield potential; effect of radiation on biological meterials; physiology of nutrient absorption; structure of humic acids; sex attractants for control of pests,

*Basic research has been further divided into 'pure' and 'objective' basic research, and applied research into applied 'project' and applied 'operational' research, and has also been termed as 'mission-oriented' research. 'Pure' basic research is to some extent 'speculative' research and is more or less an intellectual pursuit. (Reference : A Science Policy for Canada: Report of the Committee on the Management and Control of Research and Development, Office of the Minister of Science, HMSO 1961).

etc. constitute subjects of fundamental research. Physiological and biochemical requirements of cultivable fish; genetic studies and antigenic analysis of bacteria and viruses are also examples of basic research in the fields of fishery and veterinary science respectively.

2.4 Applied research is directed to attain a practical goal, which may often be defined precisely, by the application of known basic principles. Sometimes applied research may throw up problems for fundamental research. Examples are : determination of the yield potential of a variety; efficiency of fertiliser use; effective form of nitrogenous fertilisers in different agro-climatic regions; soil test-crop response relation; finding out the best type of food for fish as per physiological and biochemical requirements; studies on keeping quality of rinderpest vaccines under different conditions and duration of immunity in vaccinated animals etc.

2.5 Adaptive research also called "on farm testing" or "field verification trials" starts from the proven results of applied research and carries them forward to a wider field of application, by evaluating, adjusting or orienting the results of research to a specific locality or situation. Exploitation of the productivity potential of a variety; economics of local agronomic practices; specification of a suitable variety of long-staple cotton for a particular climatic zone; choice of a drought-resistant or disease-resistant variety; determining variety of fish suitable for a specified water temperature; trials for efficiency of tissue culture strain of rinderpest virus etc. are examples of adaptive research. In essence, adaptive research is to refine and develop a precise package of practices for a given set of conditions in a local situation.

*Historical*

2.6 The establishment of the Imperial Bacteriological Laboratory at Poona in 1889 [later shifted to Mukteswar-Izatnagar, and named Imperial (now Indian) Veterinary Research Institute], the Imperial (now Indian) Agricultural Research Institute at Pusa, Bihar in 1905 (later shifted to New Delhi) and agricultural teaching and research institutions at Poona, Coimbatore, Kanpur, Nagpur and the formation of the Indian Central Cotton Committee about the beginning of this century reflected some of the earlier attempts to initiate agricultural research and development in India. Agriculture became a provincial subject after the constitutional changes in 1919 and thereafter it was felt necessary to

coordinate research activities of the States and the Centre. For this purpose, the Royal Commission on Agriculture (1928) recommended formation of a central organisation called the Imperial (now Indian) Council of Agricultural Research and this body was set up in 1929. It was the Central Government that took initiative for promoting research by establishing a number of research institutes and commodity committees.

2.7 Soon after publication of the Report of the Royal Commission on Agriculture, there followed a great depression in the Indian agrarian economy, but even so the state departments and colleges and institutions under them quickened the pace of their research activities. In fact, some very good research work in agriculture could be traced to the thirties in some of the colleges. The influence of agricultural research was directly felt by such agro-based industries as cotton and jute textiles; sugar; lac; vegetable oils; tobacco manufactures; and plantation crops of coffee, tea and rubber. But the pace of research was not sufficient to discharge the increasing responsibilities developed on these institutions in later years. It was partly because of insufficient appreciation of the usefulness of agricultural research and partly because of lack of finance and the State Departments not being geared adequately to the task. A somewhat greater official attention was directed to agricultural research during the forties. As a consequence, a number of central and state institutions came into being in the post-independence era.

2.8 The work of the Indian Council of Agricultural Research was reviewed by the two joint Indo-American Teams in 1954 and 1959 which made several important recommendations in the field of agricultural research and education. A complete reorganisation of the ICAR and an overhauling of agricultural education were recommended by the Agricultural Research Review Team in 1963. The Radhakrishnan Commission on University Education had also earlier dealt with some aspects of agricultural education at the university level. It appreciated the great experiment of democratising adult education through the establishment of Land Grant College system in the United States. The establishment of experimental farms within the Land Grant Colleges is a forerunner of the concept of agricultural extension, which brought the research laboratory, the class room and the experimental field into one single whole. In fact, the agricultural programme of Land Grant Colleges is built on three legs : (i) the college, (ii) the research institute, and (iii) the extension service. In view of the success achieved by the Land

Grant system of agricultural education, the Radhakrishnan Commission recommended that every basic elementary school and every rural university should have its own small experimental farm as early as possible so that the spirit of research and experiment shall pervade all rural life.

2.9 Agricultural Universities began to be set up in India in 1960. They derived benefit from the recommendations of the Joint Indo-American Teams which outlined a model approach to an integration of teaching, research and extension education. The Agricultural Universities accepted this principle, but some of them could not implement it in its entirety.

2.10 The ICAR was reorganised in 1966 and given the responsibility for organising and supporting agricultural research in various universities and institutions in the country. To enable the ICAR to perform this function, it has also been provided with research funds in the shape of a cess on various commodities. This cess income under the Agricultural Produce Act 1940 and late Commodity Committee Cess Act is at present at the level of Rs. 2.50 crores per annum. The ICAR has divided the work of planning and coordinating research in different disciplines into three main divisions, each under a Deputy Director General. Education is the responsibility of a separate Deputy Director General. For each discipline, which has to be studied in depth, a Panel is formed comprising of eminent scientists available in the country. The functions of such Panels are to suggest programmes of research, priorities for research schemes and ways and means of improving work under schemes in their respective disciplines. The Panels are required to advise on problems on which research work has to be intensified or undertaken, results which require to be tested through pilot projects or those which could be passed on to extension workers. A list of functions of the Scientific Panels is given in Appendix IV. The ICAR finances such schemes as are approved by its Panels for short periods ranging from 3 to 5 years.

2.11 The ICAR as the co-ordinator of agricultural research and also being entrusted with the responsibility for agricultural education in the country, has a crucial role to play in the realm of research and education. The Commission is separately examining in depth the effectiveness of the present re-organisation of the ICAR and what further steps are to be taken to make the ICAR play its cardinal role in research and education. The Commission hopes to give a separate Interim Report on the ICAR.

*Present Status*

2.12 We have examined schemes relating to 'fundamental' research which are financed by the ICAR and we find that most of these schemes financed out of the cess funds fall into category of applied research and that the number of schemes relating to fundamental research is comparatively small. During the last five years out of 64 schemes sanctioned by the Council involving a sum of Rs. 96.7 lakhs, only 18 schemes costing about Rs. 36 lakhs (37.5%) appear to have been concerned with fundamental research. Further, most of the schemes relating to fundamental research are sponsored by the older universities having good faculties for basic sciences. This is to some extent understandable. Agricultural Universities have tried to concentrate more on applied research in order to find out quick solutions to farmers' problems. In old agricultural colleges also, the departments of basic sciences were not generally strong. These institutions had, therefore, to take advantage of the fundamental research carried out elsewhere within and outside the country. Some of the central institutes have been engaged in fundamental research and the results of their efforts are available to agricultural universities and other institutions, but this is not adequate. It is true that the colleges of Basic Sciences exist in some of the agricultural universities, but these are in many cases at a fairly low level and they have not laid adequate emphasis on the study of basic sciences. There has also been resistance in some cases for admitting students or scholars coming from the mainstream of sciences which are basic to agriculture. It is, however, necessary that agricultural universities and other universities should encourage fundamental research in sciences basic to agriculture.

2.13 Insofar as agricultural universities are concerned, it is observed that the understanding between them and the state departments *vis-a-vis* agricultural research has not taken any definite shape. In fact, there are several patterns, at one end being the universities which are entrusted with all the three responsibilities, *viz.* teaching, research and extension (not merely the educational part) and at the other, the universities denied of facilities for research by state departments compelling them to fall back on their own resources. In between these two, there are two intermediate patterns one in which only teaching and negligible amount of research are the responsibility of the university; and the other where the process of transfer of agricultural research from the state to the university is smooth but slow, the intention being a complete transfer in stages. Different agricultural universities

are in varying stages of development belonging to one or the other of these four types.

2.14 For example, some States like Punjab, Haryana and Madhya Pradesh have transferred all the research stations to the control of the universities on the understanding that the university will be the sole scientific consultant of the department of agriculture. On the other hand, the most recent agricultural university to be established, namely, the Tamil Nadu Agricultural University at Coimbatore, has been given responsibility for supervising research work only in two districts. With the varied patterns of research administration and execution prevalent in different States, there is a growing tendency for mutual recrimination between university and state departments. Such a lack of cooperation and clear definition of responsibilities and duties is leading to a situation which can be potentially very harmful to agricultural research, education and extension. Already, the National Demonstration Programme of the Indian Council of Agricultural Research with which the Farmers' Training Programme has been linked, is not achieving the anticipated results owing to lack of adequate cooperation between the research staff under the control of the university and the extension staff under the control of the State Department of Agriculture. Ironically, the coordination between research, education, extension and development was far better before the establishment of agricultural universities. The Commission, however, considers the establishment of agricultural universities in different States as a most welcome and desirable innovation. Because of the lack of understanding, the two organisations instead of being complementary and supplementary to each other have unfortunately involved themselves into unhealthy rivalries. This fissiparous tendency is detrimental to the scientific development of agriculture and must be nipped in the bud. There is enough scope for both the organisations to purposefully serve the cause of agriculture in their own spheres of activities by collaborative and cooperative efforts, instead of working at cross-purposes. It is, therefore, necessary to have a clear-cut delineation of responsibilities between the two organisations, and evolve suitable arrangements for coordination both at the policy-making and implementation levels.

2.15 Further, the existing structure of agricultural universities is, by and large, such that a free and sustained communication among the teaching, research and extension wings is conspicuously absent. There are separate Directorates of Research and Extension. Teaching departments do not possess direct

responsibility of research and extension in their respective jurisdiction. The varied patterns of agricultural universities, which have thus emerged under different situations of stresses and strains, are not conducive to their proper development.

2.16 Insofar as extension is concerned, the pattern of work performed at present by the agricultural university *vis-a-vis* the Departments in different states varies considerably. One of the universities has gone ahead and located subject-matter specialists in each district in the state concerned. Soil testing and seed testing laboratories are also operated by it. Some universities have specialists only at their headquarters in Extension Directorates at present, but even these have an ambitious proposal of stationing specialists and taking over extension function at tehsil level. Some of the universities have taken over responsibility of extension programme in a few blocks around their campuses and some of their regional research stations. In the case of a few other universities even though research and education programmes have not been fully organised in a satisfactory manner, extension programmes have been initiated. Thus, there is no dividing line of responsibility between the State Departments and universities in the field of extension.

2.17 With regard to state departments two additional factors have to be reckoned with. Firstly, with the coming of agricultural universities, these departments have been depleted of their technical personnel to a considerable extent. Secondly, the technical staff with the departments do not have necessary opportunity to keep themselves abreast of the latest developments in the field of science and technology.

2.18 The training of farmers is now recognised to be an essential step in the transfer of technology to the field. Commensurate with the immensity of the task, attempts made so far by governments through establishment of a few farmers' training centres in each state are too inadequate. Nor can this sphere be the sole responsibility of agricultural universities. Unless joint efforts at appropriate levels are made, the task of training farmers will remain unfulfilled.

*Scope*

2.19 From the foregoing discussions the following important points emerge, which require immediate attention :—

(i) Creation of strong base for fundamental research in universities and appropriate funding for this purpose.

(ii) Reorganisation of Agricultural Universities on the basis of the principle of integrating teaching, research and extension education.

(iii) Demarcation of the functions and responsibilities of Agricultural Universities and State Departments *vis-a-vis* teaching, research and extension.

(iv) Suggestion for the staffing pattern of technical personnel keeping in view the responsibilities and functions mentioned in (i), (ii) and (iii) above.

(v) Training of technical and administrative personnel of the Departments.

(vi) Training of farmers.

These points are critically examined in this report and suitable recommendations made.

## SECTION III

### Agricultural Research

3.1 The work of the Scientific Panels/Sub-panels of the ICAR is limited at present to advising it in the selection of projects submitted to it for funding. Such projects are mostly time-bound. ICAR does not ordinarily take up any programme exceeding five years at a stretch. This system does not leave scope for it to take a comprehensive view of the researches in different disciplines and to formulate forward-looking long-term research programmes for the country. The Scientific Panels of the ICAR should, therefore, undertake this responsibility and devote sufficient time to think over problems of fundamental nature and fulfil the role of formulators of a forward-looking research programme for different agricultural disciplines. They should take note of the work already planned in this connection in various universities and institutes in the country. They should then plan for filling up the gap and allocate, on a priority basis, research responsibilities to the universities and institutes and individual scientists according to the available expertise.

3.2 The Commission therefore recommends that the ICAR should, with the help of its scientific panels, undertake to draw up long-term plans of fundamental and applied research, identify gaps in information and assign them for execution to appropriate scientists, universities and institutes.

3.3 What often passes as fundamental research in agriculture is but a variation of a similar study done elsewhere having little or no relevance to our conditions. Sometimes, research workers having no connection whatsoever with the field of specialisation conduct work in sheer oblivion of the actual problem. Conditions such as these necessitate re-orientation of curricula in teaching institutes in so far as agricultural education is concerned. In fact, a conspicuous lack has been noticed of a strong research base which ensures trained personnel of proper calibre in adequate numbers in agriculture for the purpose of manning research institutes and guiding fundamental research in agriculture. The need for creation of centres of fundamental

research in agriculture therefore becomes imperative. It is actually with this objective in view that the concept of agricultural universities was mooted.

3.4 In this context, the establishment of agricultural universities beginning in 1960, the re-organisation of the ICAR in 1966 and the implementation of All-India Coordinated Projects constitute some of the landmarks in the field of agricultural research as well as education and extension. In fact, the performance of some of the agricultural universities having an integrated approach to teaching, research and extension education has tended to change the outlook of the government as well as the attitude of scientists.

3.5 Some of the agricultural universities have gradually transformed themselves into centres of excellent research and education within the means available to them and have in the process helped modernisation of agriculture. These universities have established Research Councils which have the responsibility of advising on research projects (applied research) and fundamental research programmes. Such Councils normally include experts from different scientific disciplines. They have the authority to constitute sub-groups with coopted members to analyse in detail the requirements of their disciplines and then take an overall view. The State Governments which have to take full responsibility for the development of agriculture must have a say in the formulation of such research programmes.

3.6 The Commission recommends that the University Research Councils should be strengthened by the addition of competent experts of state departments of Agriculture. Reciprocally, the Development Councils set up by the Departments should have scientists of the universities represented on them.

*International Collaboration in research*

3.7 We wish to draw attention to another aspect of research which is of prime importance in the present context. This is international collaboration in agricultural research. India has been considerably benefited by researches conducted at the international research institutes, particularly in the evolution of high yielding varieties of wheat and rice. Indian scientists have also contributed

significantly to the advances in agricultural research. There is need for continued international cooperation and collaboration. This could be effectively organised through the Central Research Institutes and the agricultural universities.

3.8 We recommend that the ICAR should evolve a system whereby continued international cooperation and collaboration between agricultural scientists of India and abroad becomes possible on a regular basis.

## SECTION IV

### Fundamental Research

4.1 The academic climate of universities is always most congenial to the pursuit of knowledge for its own sake and hence universities are the best places for fundamental research. However, the agricultural universities have generally not been able to undertake fundamental research so far. In the interest of agriculture, it is essential that they should pay immediate attention to this aspect. One of the possible reasons for lack of attention to fundamental research may be that it takes time for fruition, if at all, and therefore for quick recognition scientists naturally take to applied or adaptive research. It is also felt that fundamental research, though needed, is not the responsibility of agricultural universities, which are required to attend to mission-oriented research having in view practical utility only. The lack of high calibre research personnel competent to conduct fundamental research may be another reason. This lack generally arises because our present system of research is project-based and therefore time-bound. In such jobs of temporary tenure, very few competent persons are attracted and those who are attracted have to shift from place to place after the closure of projects.

4.2 The situation as regards fundamental research is similar in the central research institutes, some of which, though well equipped with men and materials, have not formed themselves into excellent centres of fundamental research.

4.3 There is urgent need to encourage development of specialised centres of fundamental research in different parts of the country, which would be capable of tackling problems that are basic in nature. The best places where such centres could be developed are naturally universities in general and the agricultural universities in particular. Central institutions of the ICAR are also places where such centres could be developed. One of the ways to encourage universities to develop such centres would be the setting up of professorial Chairs by the ICAR. This matter is further dealt with in Section V of this report.

4.4 It is equally desirable that institutes for fundamental research are also the places for applied research, because there is an essential need for a healthy symbiosis between the two. Agriculture represents such a science where laboratory trials must be tested at field level in all kinds of climatic combinations. Facilities for applied research are often demanding and may not be available in all places of fundamental research. A university, for the purpose of its applied research programmes, will require the help of farms which are adequately equipped for such work. State regional research stations are ordinarily located in different agro-climatic regions and some are also well equipped. Therefore, these appear to be ideal for this purpose of applied research. Some of these research stations should be placed at the disposal of the universities in such a manner that they have at least one such station for each type of climatic region. Where more than one research station in each agro-climatic region have already been transferred to the university in any State, this need not imply re-transfer of any of the research stations to the state departments. If any climatic region does not have a station, it is desirable that this gap is removed by opening a new station. The universities should then be able to build them up with their research staff and facilities. Required number of extension personnel should also be located at such stations.

4.5 The Commission recommends that high calibre scientists should be drawn into the field of agricultural research both in the universities and central institutes to carry out programmes of fundamental research.

4.6 We further recommend that the institutions (including agricultural universities) which are primarily meant for fundamental research should take part in applied research also. In order to enable the agricultural universities to conduct applied research, regional research stations of State Governments may be placed at their disposal in such a manner that each agro-climatic region is served by one research farm. If it becomes necessary to set up new farms for this purpose, it should be done.

## SECTION V

### Funding of Research

5.1 The important sources of finance for research schemes in agriculture are the ICAR, State Plans, normal Budgets of States (or committed expenditure) and centrally sponsored schemes financed by the Government of India. Limited funds are also available from PL 480 and other agencies like the USAID, Ford Foundation, Rockefeller Foundation. In regard to basic and fundamental research, replies received in response to the questionnaire issued by the Commission reveal that very limited funds are exclusively provided for undertaking basic research by the Agricultural Universities and State Research Institutions.

5.2 The present arrangement for funding of research in the universities is not satisfactory. The provisions made in the State and Central Plans for agricultural research and the funds sanctioned by the ICAR are all tied to projects which are temporary. The ICAR, from its cess funds, annually approves projects on an individual basis for a period of 3 or 5 years and such projects as are accepted from a university get funds allotted either on a 100% basis or some times on a part basis. Only in some universities like Andhra Pradesh, there is sanction for basic research staff who can do continuous fundamental research. On the whole, it will not be an exaggeration to say that both fundamental research, which is a long term process, and long term applied research have been neglected so far in the funding arrangements. It is necessary that the Research Council set up by the agricultural university assisted by the experts of the state government should identify the priority projects and programmes that are required for the development of agriculture, animal husbandry and allied fields in the state. As all these projects and programmes are for the development of the agricultural sector, the State shall make necessary allocations in its budget to support them fully. In the case of financial constraints, the Research Council should be required to earmark those programmes for which funds are essential. Such programmes, which go beyond the Plan period, shall be transferred at the end of the Plan period, to the committed expenditure of

the state agricultural budget and the university shall be guaranteed the necessary funding for the continuity of the necessary schemes. Additional schemes approved during a Plan period should normally be treated as part of the Plan.

5.3 One of the duties cast upon the ICAR is to promote agricultural research in the country. This duty was in their original franchise as the Imperial Council of Agricultural Research, and, in the 1966 reorganisation, this duty has again been emphasised. To enable the ICAR to do this, a cess has been levied on various agricultural commodities and the entire income is being passed on to the ICAR. It is necessary that the gaps in fundamental research and long term applied research should be quickly identified within a year. Such of those gaps which relate to problems of an all-India nature and are of priority interest must be supported by funds by the ICAR at the university or institution which is identified as the most competent to carry out the research. More than one university or institution can be allotted one problem if this is so advised by the appropriate standing committees of the ICAR.

5.4 Plan schemes of the Centre and the States are time-bound. At the same time, considering the importance of research, it is desirable to expect that Plan allocations in the Centre and in the States for research through the universities will be continuously growing even though the package of schemes for the funds may vary from time to time. There is need for employing research workers in the universities and institutions on long term contracts which shall not be less than 10 years' duration in a scale at the lower and middle levels and of 6 years' duration at higher levels. To enable the university to hire efficient research staff on this basis, they must have some assurance of continuity of research funding. Thus for every Plan period the Centre and the States shall inform the university of the minimum level of funding that the university can expect for research from Plan funds annually during the Plan period. Funds will, of course, be made available on accepted programmes, but the sum total of such programmes shall not be less than the minimum accepted. Given the will, there is no doubt that a guarantee of a minimum at the level of 80% of possible actuals can be given by both the states and the centre. It should then be possible for the universities to plan the recruitment of their research personnel on a fairly long-term basis so that at least 80% of such personnel have long-term contracts. The 20% of the temporary posts that are unavoidable in any organised system, will take care of the fluctuations in the research programmes.

5.5 Fundamental and long-term applied research programmes necessary for the state recommended by the State Agricultural Experts and approved by the Research Council of the University should be funded by the state government in its budget.

5.6 We have already noted that most of the schemes relating to fundamental research sponsored by the ICAR are carried out in the older universities having good faculties of basic sciences. It has been pointed out to us that failure to give the agricultural universities more fundamental research schemes is not due to an unwillingness on the part of the ICAR, but due to lack of the necessary scientific leadership in the universities to support useful research. This is to some extent understandable. The agricultural universities are all new. The practice of funding research through short-term schemes also puts a premium on applied science of the immediate kind. Lack of permanence or a long-term contract for the research scientist also prevents the development of a strong research centre in the university. Besides, in the old agricultural colleges also, the departments of basic sciences were not generally strong. Even in the agricultural universities which have basic science streams, the level of expertise is low. Special steps will, therefore, have to be taken to enable the agricultural universities to equip themselves for fundamental research not only in agriculture and allied sciences, but also in basic sciences. The Central Institutes of the ICAR should also develop strong centres of fundamental research; but this should not lead to the neglect of agricultural universities. There has to be a balanced growth.

5.7 Centres of fundamental research must now be developed in the agricultural universities. These will have to be held by scientists of the foremost calibre selected from out of the best in the country, whether they come from the agricultural universities or from the main stream of sciences basic to agriculture, animal husbandry and fisheries. These scientists shall be provided with a team which can help them in continuous fundamental research and they shall be suitably funded so that the vagaries of budgeting do not upset important research work from time to time. This can be done in our opinion by the creation of a large number of Professorial Chairs in the agricultural universities generally and a few for basic sciences in the general universities for undertaking fundamental research in these sciences.

5.8 A strong centre of research can only be built around a scientist who has the qualities of leadership and therefore the

creation of these Chairs and the subjects chosen should depend on the identification of a suitable field of research which the university is in a position to promote and the presence of an outstanding scientist, who can built up a tradition of research in the particular research field. By creating these Professorial Chairs and providing for sufficient research grants many of our talented scientists competent to carry out fundamental research can be attracted to join the agricultural universities. While a good number of these Chairs may carry a scale of pay of Professors available in the universities, a few may be created on a higher scale and designated as Chairs of Excellence to be offered to outstanding scientists who have earned recognition in the field of fundamental research in agriculture or any discipline allied to it. These chairs may also be availed of to enable outstanding Indian scientists serving abroad to return and work in the country. It will also be useful to provide for Research Fellows, generally three to four in number, to work with each Professor in the designated subject. Adequate provision will also be necessary by way of Travelling Allowance, equipment and contingencies of recurring nature, besides non-recurring expenditure on additional facilities by way of laboratory, equipment, etc. The recurring cost is expected to be of the order of Rs. 80,000 per annum per Chair and non-recurring expenditure of the order of Rs. 50,000 per Chair. The total cost is expected to be roughly Rs. 4,50,000 per Chair over a period of five years.

5.9 Great care is necessary in the selection of the Professors for manning these Chairs. The selection should be made on an All-India basis by a Central Committee comprising two representatives of the university where the Chair is located, two representatives of the ICAR and a Chairman to be nominated by the President, ICAR. The appointment will be made by the university subject to the concurrence of the ICAR.

5.10 It is recommended that for every Plan period, the Centre and the States should inform agricultural universities of the minimum level of funding that they can expect for research from Plan funds annually. This minimum should be at a level of 80% of the possible actuals. The universities should then plan their recruitment of research personnel on a fairly long-term basis.

5.11 We recommend creation by the ICAR of 50 Professorial Chairs distributed 40 in the agricultural universities and

10 in the other universities. Some of these may be designated as Chairs of Excellence and created on a higher scale of pay in order to attract outstanding scientists. On an average each university may be allotted two Chairs and universities in areas of backward agriculture may be given a weightage in the allocation of extra chairs.

## SECTION VI

### The Concept of a Division including Teaching, Research and Extension aspects in a discipline in the agricultural universities

6.1 The present position of research in agricultural universities is such that all teachers are not necessarily doing research. To enable a teacher to do his teaching well, he should positively be involved in research and likewise a research worker must participate as often as practicable in teaching work in order to freshen his mind and broaden his outlook. University teachers and research workers have a responsibility to ensure that results of research are transferred to the fields for the purpose of adoption and for this, it is imperative that they should have adequate knowledge of extension. Contact with extension activities will additionally enable them to always keep abreast of requirements of farmers. Similarly, it is imperative for extension workers to keep abreast of latest advancements in teaching and research. Research, however, excellent it might be, becomes infructuous unless it is allowed to go through the whole chain of processes through teaching and extension production. Unless there is a sound mechanism of seeing the results of research to their logical end, there is always a danger that some excellent pieces of research may altogether be forgotten. In order to achieve the object of ensuring that a teacher is involved, to some extent or the other, in research and extension and a research worker in teaching and extension and an extension worker in teaching and research, it is essential that every discipline in a university should have a blend of teaching, research and extension activities. This is really the concept of integration of teaching, research and extension. The present setup in agricutural universities is not really tuned to this type of integration. At present, every discipline has a Department with a Professor as its head. There are separate Directorates of Research and Extension. The link between teaching and the other two activities is throuh the heads of teaching departments and Directors of Research and Extension. The undesirable gap that exists in the existing setup can only be bridged if personal factors of the different heads do not come in the way. This is not always guaranteed.

6.2 This defect can be remedied if every discipline is made to have teaching, research and extension under one single head.

This is the concept of a Division for every discipline in an agricultural university and to this extent it is desirable that the present setup should be modified and reorganised. In the revised setup there will still be provision for separate Directorates of Research as well as Extension as at present, but their main function will be coordination.

6.3 Thus every teacher will be afforded an opportunity to do research and extension work in addition to teaching. Similarly every research worker will be enabled to spend a part of his time in teaching and extension work. Extension workers will also have opportunity to be involved in teaching and research. The proportions of time to be spent on each type of activity by a worker will, of course, depend upon a variety of considerations including aptitude, work load etc. Keeping these factors in view, the Head of each Division will determine the extent of participation of a teacher or a research worker or an extension worker in the three fields.

6.4 The Commission recommends that immediate steps should be taken by agricultural universities to reorganise their existing setup in such a manner that an integrated approach pertaining to teaching, research and extension permeates in every discipline. For this purpose, each teaching department should be converted into a division which should represent within it all the three elements of teaching, research and extension pertaining to that particular discipline.

## SECTION VII

### Responsibilities of State Departments versus Agricultural Universities

*Adaptive Research*

7.1 Adaptive research is usually to be done on an extensive scale, and in most cases consists in making suitable adjustments and modifications of certain tested findings in order to suit specific situations. Extension being the next step to adaptive research, economic considerations often become deciding factors in the choice of one technology in preference to another. In some of our researches, this economic aspect is lost sight of and consequently such researches become infructuous. In view of the diverse needs of adaptive research, the state departments—possessing as they do, adequate resources and wide jurisdiction throughout the agroclimatic regions of their states—are most competent for carrying out adaptive research. While making this observation the Commission would like to re-emphasise that agricultural universities shall be fully responsible for basic and applied research in agriculture, animal husbandry and related sciences and the universities must be given adequate facilities and funds for discharging their obligations as the scientific consultant and adviser to the departments of agriculture, animal husbandry, etc. The state departments should confine themselves only to adaptive research such as varietal testing, fertiliser recommendation based on soil analysis, water duties etc. and must not use this freedom to develop parallel research organisations in competition with the universities. As mentioned earlier, adaptive research needs imagination and experience of a varied nature. The structure of state departments and quality of their personnel should therefore be such that they should be capable of discharging well their responsibilities. In fact, their expertise should not in any way be inferior to that of the universities. Unless strengthening of staff of state departments is made in this way, the objective of adaptive research, i.e., the process of leading research to its production goal cannot be achieved.

7.2 Adaptive research to be carried out by state departments has to be based on applied research work done in the universities

and central institutions. It is, therefore, necessary that those in charge of adaptive research programmes in the departments keep themselves continuously in touch with the developments in the corresponding disciplines in the universities. It will also be of help if the senior scientists of the universities are able to advise the departments on their annual programmes of work in adaptive research. For this purpose, there must be adaptive Research Council in government departments similar to the Research Council obtaining in agricultural universities and in these Councils the senior university experts should also find a place. The advice of these experts should be given full consideration in planning adaptive research programmes of the government departments.

7.3 In the past, when the state departments were in full charge of research and education, a research worker was generally not involved in administrative or extension work. But now if the adaptive research is to be meaningful, research workers too must have a full knowledge of extension problems of the field and of administration which is necessary for any extension programme. Thus a system must be evolved in the state departments whereby research personnel also have the experience of administration and extension work so that they have the necessary field experience to back up their research.

7.4 State experimental farms which usually are meant for demonstration work and for raising seeds etc. should be exclusively under the control of the state departments, which can utilise them for their adaptive research and extension work. But agricultural universities should not be precluded from using them, if required.

7.5 The Commission recommends that adaptive research should be the responsibility of state departments. For this purpose, experimental farms which are usually meant for demonstration work and for raising seed etc., should be placed exclusively under the control of government departments. Agricultural universities should also be given facilities to use them for their experiments as and when needed. The departments must have in their cadres qualified scientists competent to carry out adaptive research. They should also have the benefit of administrative and extension experience to enable them to discharge their responsibilities efficiently.

7.6 In order to have effective programmes of adaptive research, we recommend that the state departments should form

Adaptive Research Council analogous to the Research Council existing in the agricultural universities. On the Adaptive Research Council, the departments as well as the agricultural universities should be represented by their senior scientists.

*Extension*

7.7 In some states, ideological conflicts have arisen between the state departments and agricultural universities in respect of research and extension activities. In the field of research our recommendation is that adaptive research should be the responsibility of state departments. There are agricultural universities which have assumed full responsibility for extension work. By doing so, they get highly involved in this kind of work and, sooner or later, time must come when the burden might prove too much to enable them to do justice to their legitimate basic responsibilities of research and education. Moreover, there is a danger that the state departments may be eventually depleted of their technical content by this pressure. Hence, a solution of this problem is called for.

7.8 Extension is defined in various ways. Without going into these definitions it may suffice to state that it is not just carrying the improved practices as they are to farmers for adoption. But it is mainly activisation of farmers' intelligence to such an extent that they understand the principle behind each recommendation so as to enable them to make adjustments necessary for adoption under their conditions. It should be noted that it is not possible to reach all the farmers at once. It is also not expected that every farmer will adopt new innovations. There will be some progressive farmers who will adopt the recommendations early and some at later stages. Some very progressive farmers may even innovate new practices themselves with or without the assistance of the departments or universities. Such innovators, however, are very few and similarly there may be a few farmers who will never adopt new innovation at any time.

7.9 The process of extension education is a lengthy one. It has its beginning with the drawing up of programmes of research designed to improve agricultural production based on scientific principles and it ends with the adoption of improvements on as large an area as possible. This process is a continuous one, although there are definite stages one leading to another. The first stage is when extension education programme gets initiated as the field day organised on research and experimental farms. At this stage, field workers and farmers get an opportunity of

observing research in progress and of making comments with regard to possible application of the results. When the recommendations are ready for testing on field scale, trials are conducted to find out to which areas the recommendations may be finally applied. Field trials may be on experimental farms or on farmers' fields in different areas recommended for trials. The field workers have to help research workers in selecting the areas and farmers for conducting field trials. The research workers are those in charge of adaptive research as well as applied research. They should be entrusted with these trials, but the field workers would also be fully involved in the process. In the course of this work, comments from field workers and intelligent farmers would prove most valuable.

7.10 The analysis of results of field trials would naturally indicate the suitability or otherwise of recommendations for different areas. Based on the results of the various trials, demonstration programmes, in which field workers must be involved, are required to be drawn up. The demonstrations aimed at convincing primarily the field workers and some farmers may be a few in number in the first year. The strategy of agricultural development can be drawn up every year for each area on the basis of these demonstrations. Up to this stage research workers and also such extension specialists, who have direct link with research stations and institutes, have to play a leading role. The Commission has already made recomendations about the division of responsibility between the agricultural universities and state departments for applied and adaptive research. Depending on whether the field trials flow from applied research or adaptive research, the research worker in charge of the programme of research will be in charge of the field trials. The field workers must give the necessary help as liaison between the research workers and the farmers.

7.11 The real work of extension starts after this stage of field trials. At this stage, an adequate number of field workers will have to take the lead in expanding the demonstration programmes and organising farmers groups and discussion forums. They may also utilise various means of communication, like radio and television, in bringing the new knowledge to the farmer. They have to sell this programme till its adoption by a large mass of farmers. The problems of supply and service would naturally arise at this stage of development. The field workers would be required to take necessary steps to arrange for supply and service through appropriate agencies without unnecessarily getting

involved in actual selling. It has been observed that there is a lot of confusion in the organisation of this aspect, which, by and large, is the major component of extension. Though the bulk of the work will be done by the field workers, the continuous link with research workers and technologists is necessary to solve various problems of growth. The main controversy is whether the university or the department should have control over the extension programme.

7.12 There are different views about it. One view is that unless the extension functions as a whole are performed by the agricultural universities, the integration of extension with research and education would not be complete. Those who have this view feel that the state departments should engage themselves only in supply, service and regulatory functions as obtaining in the U.S.A.

7.13 In the concept of the American Land Grant University, it is laid down that the university shall deal with research, education and extension in an integrated manner. Owing to occasional statements that our agricultural universities are patterned after the Land Grant Universities of America, a lot of confusion has been introduced as to the role of our agricultural universities in the field of extension. The Ministry of Agriculture has been emphasising that the work of the agricultural university is research, teaching and extension education. On the other hand, the replies that the Commission has received from the universities show clearly that they are not content with a restricted field of extension education alone. They believe that they will be able to control field extension even at block level through their scientists. It will be useful in this context to refer to the difference in conditions obtaining in India and the United States. In the latter, the farmers are relatively few in number, they are literate and the problem of communication or of reaching remote villages does not exist, whereas India presents an altogether opposite situation in all these respects. Even in the United States, they do not depend on universities for extension, for which separate county agents exist. In India, the setting up of an extension agency preceded the establishment of agricultural universities.

7.14 The other view is that universities should not get involved too much in field extension work but should confine themselves to knowledge input or extension education in the early stages. It is also stated that limited participation in the field of extension by the specialists is necessary to keep them

acquainted with field problems which crop up in the process of modernisation of agriculture. If specialists are not involved even to this extent, then there is every likelihood that research programmes may drift away from field problems and finally extension may itself suffer for want of new recommendations coming forth as fast as needed.

7.15 The state departments have continued to shoulder the responsibility of agricultural development in all the states in spite of the fact that agricultural universities have developed extension programmes on different patterns in different states. A strong feeling that is prevailing at the present juncture is that the state departments should continue to be fully responsible for state extension programmes. Although state departments will not perform all the supply and service functions themselves in future, they will be required to continue to play an important role in seeing that these functions of service and supply are organised properly through various private, cooperative or corporate bodies. The third important function that is still to be developed fully is of regulatory nature. When the regulatory functions fully develop, there will be need of a separate wing in every state department to look after this aspect. In support of this view the example of countries like U. K. and Japan where extension functions are performed independently of research and education has been cited.

7.16 The Indian Council of Agricultural Research and the Union Ministry of Agriculture have been emphasising that the agricultural universities should deal with extension education and not the entire field of extension. The universities have to teach and carry out research on this subject and therefore the teachers must be directly involved in field experiments in extension. It is to enable them to do so that in some universities the entire extension work in a few blocks near the university is allotted to the university. From the replies to questionnaire it appears that there is no difference of opinion that extension education should be dealt with by the universities.

7.17 It is agreed on all sides that the agricultural scientist should not stay in his ivory tower and carry out his research work without any contact with the farmer and without any direct knowledge of the field problems. There should be a two-way traffic between the research scientist in the laboratory and the farmer in the field so that, on the one hand, the research scientist is able to show his wares directly to the farmer and the farmer

on his side is able to indicate to the scientist the field problems that his researches have missed. In order to enable the university scientist to gain this experience, it was decided to involve them directly in the national demonstrations. Wherever the university involves itself in national demonstrations, it has to provide a strong group of research scientists qualified in several disciplines so that all field problems can be tackled simultaneously. Such groups are being located in districts where there is no research base and the group has no feed-back from the laboratory. It is not possible for the university to take the responsibility for a district where it has no suitable research station providing proper facilities to the scientist group. These research stations have to be multi-disciplined to support the experts who service the national demonstrations. Such centres can only be a few in a state. Further, it is an accepted proposition that research and education in the university shall go together. If the research personnel are posted in outside stations where they have no opportunities of teaching students regularly, this objective is not achieved. There has, therefore, to be a suitable balance between educational and research posts in the university. This limits the number of research workers who can be supported by the university subject to the emphasis that research and education shall both form a necessary part of the work of every scientist in the university. As the objective is to give every genuine research worker direct contact with the field, such a limitation of the intensive programmes or demonstration programmes to the personnel who are usefully engaged in research and education is considered reasonable.

7.18 We recommend that in the area of extension relating to field trials, the responsibility for the extension programme should be with the group of research workers who are concerned with the applied or the adaptive research in the field. The field workers should give them all support in establishing a link with the farmers to enable the trials to be carried out satisfactorily.

7.19 The Commission recommends that the involvement of the scientist in the university with extension on the farmers' field in the nature of demonstrations and intensive programmes should be limited. Every scientist in the university having a good research base should have direct contact with the field so that he can have first hand knowledge of farmers' problems which he would have otherwise overlooked. This should be assured by placing highly trained subject-matter extension specialists in the respective divisions at the headquarters and at each of the regional research stations.

7.20 We further recommend that the State Departments shall be made fully responsible for the entire field of extension functions in the states excepting the limited extension functions to be performed by the research scientists in the university as recommended in the above paragraph. The subject-matter extension specialists located in the various divisions in the university and in the research farms, must be available to the extension workers to solve their special field problems. A suitable liaison machinery should be worked out in each state so that expert opinion can be obtained quickly by the field workers when necessary.

## SECTION VIII

### Reinforcement of State Departments

8.1 Because of the various uncertainties in the division of labour between the agricultural universities and the state departments, there is a setback in the organisation of the personnel in the departments and in having a clear conception as to the level of scientific expertise the personnel must have. Any continuing uncertainty about the functions of the universities and departments will only extend the area of confusion and prevent proper organisation of an effective departmental structure in agriculture. In the hope that our recommendations for the division of labour in the fields of research and extension between the university and the departments will be accepted, we proceed to examine, in some detail, the structure of the extension organisation required in the state departments.

8.2 The need for giving technical support to the agricultural programmes at the district level was recognised by the Agricultural Administration Committee (Nalagarh Committee—1958) which recommended that extension specialists should be appointed at the district level. They also supported the idea of having subdivisional agricultural officers in charge of each revenue subdivision of a district. Even though, at present, District Agricultural Officers have been appointed in most of the districts, no specialist staff belonging to the agricultural department are available at the taluk or sub-division level. It is necessary that the group of extension specialists in various disciplines recommended by the Nalagarh Committee should be appointed in every district in the country. At present, agricultural universities contribute to this group in various districts of different States. The pattern is not uniform. In Haryana, the agricultural university is expected to contribute the group in all the districts. If our recommendation that extension should be the full responsibility of the state department is accepted, the expert group will have to be provided by the departments. Any group which is located by an agricultural university should, in our view, confine to extension work in accordance with our previous recommendations in the matter. It is not desirable that these expert groups be divorced from a research base in the university. Modern agriculture is based on science and technology and hence it is much

more relevant today that the recommendation of the Nalagarh Committee to locate the specialist group at a level lower than that of a district is now accepted. It is desirable that this group is now located at the taluk or equivalent revenue administrative level in the state. The number of experts in the group and type of experts may be related to the particular problems of taluk and the important programmes in agriculture in the area. The team leader and specialists at the tehsil level should preferably be M.Sc.s and those at the district level preferably Ph.D.s.

8.3 The situation foreseen by the Nalagarh Committee in agriculture has now arisen in animal husbandry in various parts of the country. The country is planning for an aggressive animal husbandry programme particularly in milk production, poultry rearing, sheep rearing, pig rearing and so on. These are all expected to be commercial projects and not by-product industries as of old. All these programmes require strong support of scientific experts to extension organisation in the field. It is now necessary to introduce an extension specialist group of animal husbandry experts in those districts where intensive programmes of animal husbandry development are being undertaken. The scientist will obviously have to be selected to suit the particular programme that is being attempted.

8.4 The Village Level Worker (VLW) is the lowest field worker in agriculture. There is a view that the VLW is not sufficiently trained to be effective in modern scientific agriculture. It has been suggested by those having this view that the lowest level of extension worker must be an agriculture or animal husbandry graduate. On the other hand, there is a contrary view that the VLW is a good extension worker and given prompt and effective guidance can still carry out his functions satisfactorily. By suitable inservice training and giving them opportunities to get higher qualifications, VLWs can be made still more effective. What is wanted is a better support from the next higher level. The next higher level of extension specialist is the Agricultural Extension Officer (AEO). Each Community Development Block has an AEO. In Intensive Agricultural District Progamme (IADP) districts, 4 AEOs were recommended for close supervision and guidance. In Intensive Agricultural Area Programme (IAAP) districts, 2 AEOs have been recommended. It has been suggested that if the AEO is located at a circle headquarters within a taluk, he would be in the best position to contact the villagers and also help VLWs in the circle. Having considered all these suggestions, the Commission is of the view that the best arrangement will be to keep the VLW, but support him with

a larger number of AEOs. A circle usually has a population in the range of 10,000 to 12,000. Considering that the population in a block varies widely from area to area and that the requirements of different areas also vary, it is desirable to work towards coverage by AEOs of population of roughly 10,000 to 12,000 per AEO or 5 to 6 AEOs per block, as may be applicable. In states, where there are circles under a taluk, the circle may be such an area. Corresponding areas may have to be found in the states where the circle system does not work. The AEO must be a graduate. In animal husbandry, there must be one graduate Field Extension Officer at least at taluk level. In the districts where a special animal husbandry programme is being undertaken, there should be additional Extension Officers competent in the particular animal husbandry science involved in the programme. Similarly, where a fishery programme is in force, Fishery Extension Officers should be made available.

8.5 We have suggested a certain coverage of the field by AEOs and specialist groups. What we are recommending will be the objective towards which we expect the states to move. As far as possible, the coverage which is being recommended may be observed in the areas where special intensive programmes are in operation, *viz.*, Multi-cropping Programme, Adopted Village Programme, Small Farmers' Development Agency, Marginal Farmers and Agricultural Labour Schemes and special Dry Farming Schemes. At the same time, the quality of the personnel shall not be downgraded because it is not possible to get so many persons with the necessary qualifications at one time. It will be better to wait for persons with proper qualifications rather than fill posts with people, who are not sufficiently qualified.

8.6 If our recommendations are accepted, the personnel in the state departments at various levels will have basic qualifications equivalent to the various levels of personnel in the research and education wings of the agricultural universities. For the future of our agriculture, it is necessary that the personnel in our government departments maintain their technical efficiency and the personnel in the agricultural university maintain their touch with the field and the farmer. Both these can be achieved on a permanent basis if a provision is made for a certain percentage of posts in the state departments and in the agricultural universities on an equivalent basis to be filled by deputation from the universities or the departments respectively. A three-year tenure will be reasonable. Such an arrangement will also

develop a sense of *camaraderie* between the state departments and the agricultural universities, which will ultimately benefit the development of economy.

8.7 The VLW and the AEO are at present under the administrative control of the Community Development Block and Panchayati Raj authorities. For technical supervision, they are under the control of the Department of Agriculture. The Commission has had complaints that this makes it difficult for the state department sometimes to discharge their responsibility. It has been suggested that the VLWs and the AEOs should be squarely placed under the Department of Agriculture. We shall deal with this basic problem in a future report. For the present report, it is sufficient to point out that the expert scientific groups we have recommended at the district and the lower level should be fully under the control of state departments according to expertise. Where under our recommendation more than one AEO is posted to a Block, we are of the opinion that one AEO should be left in the control of Block authorities but the others should be squarely placed under the Department of Agriculture. Similarly, experts in animal husbandry shall be under the control of the Animal Husbandry Department. In Maharashtra, there is already a division of staff between the agriculture and panchayati raj authorities from the lowest level upwards. In their case, even the problem of VLWs does not present any difficulty. In other states, any change in the status of VLW may need further examination.

8.8 It has been observed that the state departments have developed in haphazard manner due to historical reasons. There are no specialists at all in some states at the district or even at state level. In some states specialists at district level are provided by agricultural universities in some districts and by government departments in some other districts. The pattern of staffing is not the same in all the districts. It is only in one or two states where the staffing pattern is more or less the same in all the districts.

8.9 The Commission recommends that the programme, subject-matter and extension specialists at the state level must be specialists of the highest level possible in their fields of specialisation and they should maintain contacts with the specialists in the university divisions. At district, and tehsil or taluk level, there should be a team of specialists in appropriate fields and in appropriate grades. The team leader and the specialists at tehsil level

should preferably be holders of M.Sc. degree and those at the district level preferably holders of Ph.D. degree. To provide support to VLWs, there should be five to six AEOs who are graduates in agriculture for every block, one of them being under the control of Block authorities and the rest under the Department of Agriculture. In animal husbandry, there should be one graduate Field Extension Officer at least at taluk level. In the districts where a special programme is being undertaken in animal husbandry or fishery, additional suitably qualified Extension Officers should be posted. The existing VLWs may be encouraged to take higher training to qualify themselves as Agricultural Extension Officers.

8.10 The Commission further recommends that in order to maintain technical competence in state departments, provision should be made for exchange of staff at appropriate level between the universities and departments on deputation basis.

8.11 The Commission also recommends that the structure of state departments, should be so reorganised and streamlined as to provide for uniform pattern of staff in all the districts. Even so, the quality of staff should not be downgraded for lack of sufficient candidates with the necessary qualifications we have laid down. It is better to wait for duly qualified personnel and adopt priorities in filling the crucial sectors. Priority may be assigned to areas where special intensive programmes are in operation, *viz.*, Multi-cropping Programme, Adopted Village Programme, Small Farmers' Development Agency, Marginal Farmers and Agricultural Labour Schemes and Special Dry Farming Schemes.

## SECTION IX

### Training

9.1 It is on the fields of millions of farmers in the country that the crop production has to be increased. This is possible only when large number of farmers adopt better methods of farming. They have to be convinced that the improved methods give better returns and it is in their own interest to adopt them. They have to be trained sufficiently so that they will be able to practise the methods on the fields. It has to be ensured that the necessary inputs and other pre-requisites become available to them in time and where needed. The training of millions of farmers is a gigantic task. Even to train the trainers is a sufficiently big task. A few farmers' training centres or schools established in each State eannot be adequate for the purpose. Nor is it sufficient even if the agricultural universities attempt to train a large number of farmers on their campus. All facilities and methods of communication will have to be utilised if the objective of training at least one member of each of the farming families is to be achieved. In short, the training facilities to be provided in agriculture will have to be of the following categories :—

(i) Training of top level administrators and experts of the state departments in scientific disciplines.

(ii) Training of the middle level workers in the departments with special reference to development programmes to be taken up in near future.

(iii) Training of village level and tehsil level workers in programmes to be taken up and also in extension methods and subject-matter areas concerned.

(iv) Training of farmers in subject-matter on long term duration basis.

(v) Training of farmers in development programmes on seasonal basis.

(vi) Training of farmers on mass-scale in understanding modern agriculture and implications of agricultural development.

9.2 Training programmes have to be organised by the state departments if it is a departmental concern and by the agricultural university if it is to be the concern of the educational institutions. Whoever may organise training programme, it is essential that experts of both the state departments and the agricultural university take part in teaching and demonstrations. This is necessary because the objective of all this training is ultimately better production and in this there should be close understanding between field workers and university. For each training institute or a training programme, there must be a Joint Training Board with representatives from both the departments and the university, who should decide the curriculum and arrange for the teachers. This Joint Training Board should also help in evaluating the results of training wherever necessary. We are in favour of such a uniform pattern for all training programmes. The responsibility for the training may be as follows :

(a) Training of top level as well as middle-level administrators and experts of the state departments should be arranged periodically by the agricultural university and shall be of a sufficiently long period, say, about three months, to enable an effective transfer of knowledge.

(b) Training of lower level administrators and experts of the state departments can be arranged by them either through departmental institutions or through the agricultural university, as is convenient and suitable for the type of training envisaged. The period of training may vary according to the intricacies and needs of the programme to be handled.

(c) Training in the routine for new introductions and programmes for field workers and selected farmers and mass training programmes for adoption of practices for new introductions and programmes shall be arranged by the state departments in their institutions or at the village level.

(d) Training of farmers in developments in particular branches of agriculture and animal husbandry shall be in the agricultural university. The period of training and frequency may be as determined by the university. There shall be general courses of training for the farmer who is anxious to acquire knowledge and a better appreciation of scientific agriculture.

9.3 The agricultural universities have to play a very important role in training high level staff of the state departments and in organising long duration refresher courses for all the staff of development departments. These courses should be organised and offered continuously. They should be run in such a manner that at least once in three years all the staff members get an opportunity of updating their knowledge. In addition to the long duration courses, the Government Departments may have to organise 8-10 days' short duration training programmes every year. The specialists of the departments should be in charge of these courses. The facilities of the university should be fully utilised in running these courses. Further, long duration refresher courses could be organised for junior staff of the department.

9.4 University courses of training can be either at the headquarters of the agricultural university or at a regional college or regional farm, as is convenient. Wherever accommodation for the candidates is lacking, suitable hostel facilities will have to be developed. These facilities should be suitably charged on plan resources.

9.5 For the training of farmers' sons and daughters, and for lower level administrators and experts, institutes will have to be started at the rate of at least one in each district, at which various courses will have to be offered in different subjects for different periods. It is better to develop existing centres and equip them for meeting needs of short term as well as long term courses in various fields. The younger generation will have to be encouraged to take long duration courses. These courses may be split up according to the subjects and organised in such a manner that the boys and girls can take them according to their convenience, instead of being required to stay for one or two years at a stretch. Such centres should also organise short term courses of 8-15 days' duration for farmers, both men as well as women. These centres should be organised under the aegis of state departments. The training centres at district level may, no doubt, be too remote for all the farmers to reach them. It may be necessary to start more training centres at a level lower than the district, using the facilities like seed farms, research stations, experimental farms, school farms, etc. Graduate farmers are being encouraged to go back to the land. Wherever they organise their own cultivation on modern lines or start advisory and supply services, it will be desirable to involve them also in the training programmes for farmers by suitable incentives and proper organisation.

9.6 In addition to the institutional training programmes, *ad hoc* training programmes will also have to be organised to train farmers as and when needed. Mass scale training courses should be conducted by the departments concerned before every season. Such programmes should be organised as far as possible on seed farms, school farms, research stations etc. It has been observed that the holding of weekly meetings of farmers on all government as well as university farms has proved beneficial in that the farmers from surrounding areas are shown the work that is going on and special discussions on specific subjects are arranged according to the needs of the season.

9.7 Lastly, the departmental personnel will require training in administration and management. At present there are no such opportunities. In addition to providing opportunities for taking training in specialised subject-matter areas, it is necessary to provide facilities for giving training at a fairly high level in agricultural administrations as well as in management. As an interim measure, the management training centres established all over the country or the Administrative Staff College at Hyderabad could be utilised for this purpose. If large scale training facilities are to be provided, one centre may not be sufficient and it may be necessary to establish a special centre for giving training in administration to high level personnel in the state departments. It may be necessary to organise a specialised management institution with bias towards agriculture, animal husbandry and rural sciences. The Commission will be examining this question later.

9.8 To organise training programmes to meet the above mentioned needs is a herculean task. The training programmes will have to be systematically planned and operated—a task that has to be handled with utmost diligence. For this purpose an officer at least of the rank of Joint Director should be appointed in each State on a wholetime basis. In some states, there is provision for such a post and a Joint Director is in charge of all the training programmes.

9.9 Looking to the present day needs as far as training of departmental personnel and farmers is concerned, the Commission recommends that a Joint Training Board may be constituted at the state level with members drawn from state departments and the agricultural university to formulate a comprehensive training programme for the state as a whole. An officer of the rank

of at least a Joint Director should be appointed to look after the training programmes and he should be the convenor of the Joint Training Board.

9.10 We recommend that the responsibility of periodical training of top and middle level administrators and experts of government departments should be that of the agricultural university. The duration of such training should be at least three months for an effective transfer of knowledge. State departments themselves should arrange for the training of their lower-level experts and administrators either through their own institutions or with the help of agricultural university according to needs. State departments should also be responsible for routine training of field workers and farmers for new introductions and programmes, while the agricultural university should be responsible for either imparting training to farmers in general scientific agriculture or familiarising them in the latest developments in various disciplines. The frequency and duration of such training programmes should be determined according to need.

9.11 We recommend that farmers' training centres should be set up at the rate of one at least in each district where long duration as well as short duration courses should be organised to provide training facilities in various subjects to farmers' sons and daughters and also to adult farmers both men and women. A Joint Training Board should be appointed for each of these centres with the head of the institution as convenor for drawing up detailed programmes of training annually.

9.12 We further recommend that the state departments should organise adequate training programmes in the district training centres for their junior staff members at the field level. The agricultural universities should organise refresher courses of long duration for departmental personnel.

9.13 We also recommend that the departmental personnel at high level should be trained in agricultural administration and management in the existing management institutions as an interim measure.

## SECTION X

### Formation of Apex Body

10.1 In our recommendations on research, extension and training we have strongly emphasised the need for delineating responsibilities between the agricultural university and the state department, but at the same time pointed out the areas of common purposes and combined efforts between them. For instance, in the field of research the university is to pass on the results of applied research for adoption by the state department which, in turn, must pose fresh problems for applied as well as fundamental research for the university. In order to ensure an effective interaction in these important aspects of research, it has been recommended that each of the Research Councils of the university and the state department does draw upon the top expertise of the other. In the field of extension the university should primarily confine itself to the knowledge input but every research scientist in the university should have contact with the field so that he gets a first hand knowledge of the farmers' problems which he would have otherwise missed. The liaison between the research staff of the university and the extension workers of the department should be such that expert opinion is transmitted quickly to the field. It has also been recommended that for the development of mutual confidence the technical competence of the specialists in the department and the university is of equally high calibre. A further recommendation has been made to provide for exchange of scientists between the two organisations on deputation basis. This would enable a better appreciation of each other's difficulties and points of view. In the matter of training of departmental personnel a Joint Training Board has been recommended at the state level, in which members drawn from the state departments and the university are to formulate training programme for the state as a whole. The responsibilities for the training at different levels are to be shared by the state department and the university according to the nature of training to be imparted and the standard of the trainees. The blending together of the university with the state department at all possible levels has been prompted by the desire to see that the optimum benefit is derived from research, training and

extension programmes. It is, however, felt that it would still be desirable that all these joint efforts of the two organisations are periodically judged and advised by an Apex Body.

10.2 We recommend that an Apex Body be constituted for each state under the chairmanship of the Minister of Agriculture having the Vice-Chancellor of the university and the Directors of Agriculture, Animal Husbandry, and Fisheries and Agricultural Production Commissioner/Development Commissioner as members. This Body should have the overall responsibility of ensuring that the two organisations work in harmony and in the best interests of an all round development of agriculture in the state.

## SECTION XI

### Acknowledgements

11.1 The Commission takes this opportunity to thank t individuals, institutions, Agricultural Universities, ICAR a Government Departments for their valuable suggestions whi they gave either by correspondence or in personal discussions.

11.2 Dr. R.K. Misra, Specialist, Sarvashri Sada Nar Joint Director, M.L. Manrai, Assistant Director, S.P. Math Research Investigator, N.L. Arora, Technical Assistant of t Research Division assisted the Commission in various sta of the preparation of this Report.

B. Sivaraman
*Vice Chairman*

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NEW DELHI,
25th November, 1971.

J. S. SARMA
*Member Secretary*

## APPENDIX I

*Questionnaire on Agricultural Research*

TERMS OF REFERENCE C-I

1. What is the present arrangement in your State for basic and fundamental research in agriculture, animal husbandry and fisheries? Give a chart showing the existing organisation. Are you satisfied with the provision and facilities for basic and fundamental research in your State? If not, what are the improvements you will suggest?

2. What are the Central Institutes in your State doing basic and fundamental research in agriculture, animal husbandry and fisheries? Is there any machinery for coordination of the work done at these Institutes and the work in the State laboratories? If not, can you suggest a suitable machinery to avoid overlapping of work and unnecessary duplication.

3. There is a view that in any important commodity or discipline, where rapid progress is to be achieved, it is desirable to have a Central Institute for the commodity or discipline. There is a contrary view that for basic and fundamental research, the state laboratories should be fully supported for whatever national programme that is accepted as necessary. Coordination can be achieved by a suitable Coordination Committee of experts at the national level. Which of these views do you subscribe to or have you any other solution to the problem?

4. It is suggested that research workers or groups in Central Institutes should have the facility of regional centres under their control to test out their findings under different regional and climatic conditions. There is a contrary view that multiplication of sub-centres of Central Institutes should be stopped and any testing work can be carried out by either:

(*i*) requesting the State laboratory in the area to test out and report the result, or

(*ii*) provide temporary facilities of laboratory and farm space in the State Unit to the Central workers to test out the results in this area for a season or seasons.

What are your views on this problem?

5. What is the system of funding of basic and fundamental research followed in your State?

6. It is stated that the bulk of research funds comes through plan programmes and I.C.A.R. schemes. Very little funds are actually available for a steady and long-term basic and fundamental research in any discipline. Will this be a correct statement of the position in your State? If so, what remedy will you suggest for a good base for basic and fundamental research in agriculture, animal husbandry and fisheries in your State? Give a statement showing the funds received from different sources during the last five years for different research schemes.

7. There is a complaint that a greater part of the research staff in a university or laboratory, either State or Central, is temporary and is linked up with schemes and programmes which are time-bound and very temporary; as a result, it is difficult to carry out any long-term programmes of basic and fundamental research with experienced staff. Is this criticism valid? If so, what remedies will you suggest.

8. It is suggested that every research centre and university may be guaranteed a basic annual grant for research and development so that they can maintain a permanency of useful research staff. Do you agree? If so, what adjustments you will suggest in the present methods of scheme and programme funding from the plan sector and from the I.C.A.R. and foreign foundations?

9. It is suggested that for coordinated basic and fundamental research it will be useful if there is horizontal and vertical mobility of scientific personnel between universities, institutes and the Government departments. Is this an achievable objective? What are the difficulties? Have you any solution to offer?

10. Coordinated research projects have been sponsored and funded by the Central Government for various commodities and disciplines. What are the projects that are working in your State or university? Have you any additions or deletions to suggest to the list?

11. Do you use the additional funds received under the Coordinated Project to appoint additional staff, or are these funds used to substitute the facilities already available? Thus, are the staff existing prior to the sanction of the Coordinated Project scheme retained? If so, what are their functions and responsibilities?

12. It is felt that there is likelihood of overlapping and duplication of effort between the coordinated research programmes and the basic and fundamental work carried on in the universities and Central Institutes. It is suggested that a clear division of functions between the two is desirable. Do you agree? Can you suggest a suitable division of functions? Some suggestions before the Commission are as follows:—

(*i*) Based on the present state of basic and fundamental research in the commodity, the Coordinated Research Programme should aim at a rapid collection of material and laying out a programme of quick testing and selection to meet the needs of the agricultural economy at that point of time.

(*ii*) The Coordinated Research Programme should check in the field the hazards in the growth of the selected varieties and try to find remedies, if possible, or else refer back the problem of selection to basic and fundamental research, meanwhile taking the selection off the list for immediate trials.

(*iii*) The Central Research Institute should keep to basic and fundamental problems of Research and Development in the commodity and study of all the related problems thereto. Long-term objectives should be laid down and pursued systematically.

(*iv*) The Central Research Institute should not normally interest itself in the immediate selection and trials of varieties in the Coordinated Programmes. A contrary view may be taken that the expertise available at the Central Institute should not be lost to the Coordinated Programme in this vital sector and subject to availability of suitable workers, who can be spared from the basic and fundamental work, this may also be attempted.

(*v*) The State Research Units and the Universities should undertake both types of Research and Development, *viz.*, Participation in the Coordinated Programme. The University being involved in Extension, cannot keep away from the Coordinated Programme. State Agricultural Research had always an applied bent.

13. There is also the opposite view that no such clear-cut distinction can be drawn between the research done under the Coordinated Research Programmes and the basic and fundamental work carried out in the Universities and Central Institutes; both were one and the same. The distinction is only in the functions of the Central Institute and the University.

14. It has been proposed that the Project Coordinator in a Coordinated research project should have laboratory facilities, staff and a farm to do research improvements in support of the programme. It is suggested that there must be a Central Institute to support the Project Coordinator at his headquarters. Some of the arguments for and against are as follows:—

(*i*) No doubt, sufficient basic and fundamental research is necessary in the important commodities to support any programme of agricultural growth. Is a Central Institute the only answer to the problem? Cannot the basic and fundamental research be done by the State Agricultural Universities and college laboratories and the Research Stations of the existing Central Institutes like the I.A.R.I.?

(*ii*) A contrary view is held that without a Central Institute a coordinated basic and fundamental research programme may not develop in the country. It is for this reason that in any important commodity there is to be a Central Institute. The argument against this is obviously that important work of this nature is better done at several centres by several intellectuals any of whom may achieve a breakthrough. Coordination in programming and in analysing the results can answer the problem of Coordinated National Research.

(*iii*) What is the role of a Project Coordinator in the commodity? Has he any functions of research and trial which he has to carry out himself? Is not his role that of an analyser of the problem and a distributor of the work to the existing centres of research and trial with a coordination of work and collation of results rather than a role of research worker himself with a research farm and laboratory under his direct supervision?

(*iv*) If it is necessary for the Project Coordinator to have a farm and laboratory to support him directly in his work, will it be a solution to place him in the position of a Visiting Professor of Research in the laboratory and farm where the Centre is located. (The Centre may be located at a place where both these facilities are available in a Central Institute or a University or a State Unit).

(*v*) Irrespective of the need for research and trial by the Coordinator in the programme, in view of the fact that an eminent scientist in the commodity is generally selected for this post, is it desirable to allow him to keep his hand in the research by allowing him the facility of a laboratory and farm as mentioned in (*iv*) above? Will this seriously interfere with his work of coordination or create a suspicion in the minds of his co-workers that he may be more on the look out for individual credit than for a development of team work.

What are your views on the subject? Have you any other views?

15. Initially there was a proposal to have a Memorandum of understanding between the I.C.A.R. and the State Governments under which the respective roles and responsibilities of the I.C.A.R. and the State Governments have been laid down? Is this being entered into? If not, what are the difficulties? Is there a need for such Memorandum of Understanding? If so, what should be the provisions of such Memorandum?

16. Certain problems have been brought to our notice as requiring urgent handling in (Basic and Fundamental) Research and Coordination. They are as follows:—

(*i*) Though there has been an attempt to diversify germplasm in the breeding for high-yielding varieties, this needs to be purposefully planned for all the commodities now. The germplasm bank should be available to all research workers in the country without much difficulty.

(*ii*) Breeding for high-yielding varieties under the meteorological and climatic conditions prevailing in a region is a long-term problem. There are many regions with many differences in the pattern of rainfall, drought, sun shine, etc. This work should be systematically organised.

(*iii*) Breeding for the type of fertiliser response required in the local economy is another important problem. In a land of small farmers it may be desirable to breed a variety which responds in a large way at intermediate levels of application of fertilisers.

(*iv*) Breeding for pest and disease resistance should be related to the region in which the material is to be used and the types of pests and diseases which are endemic or generally of an epidemic nature in the zone. Breeding for all purpose resistance appears to be luxury.

(*v*) Breeding for the types of drought the plant has to face in the different regions under rainfall conditions is another long-term problem. Drought resistance has been found in the high-yielding varieties as a factor not bred for, but available. Purposeful breeding for various types of drought is necessary.

(*vi*) Research on soil use and water control has just started and requires a long-term steady pursuit.

(*vii*) Dr. Borlaug has mentioned that in wheat and maize a programme of international trials has been organised. Similar programme will probably be organised in other commodities. The need for a strong coordinating body, therefore, arises to effectively use this facility.

(*viii*) Research in a commodity should not confine itself to that commodity but also deal with commodities which will be a useful multi-cropping routine for the farmer along with the commodity. There is need to prevent over-cultivation of a single crop like rice in an area.

(*ix*) We do not appear to have brought in agricultural economists and farm management specialists in our approach to research and development. There is need immediately to bring in these disciplines in a strong way in your basic and fundamental research programme. In particular, the breeder must take note of the economics of the crop and the best season in which the farmer will be willing to spare land for the crop. As example, it was noted:—

(*a*) Pulses, as long as they are not heavy yielding will have to compete for particular periods when other crops may not be remunerative.

(*b*) Cotton occupies the land for too long periods and rural economics need shorter term cottons.

(*c*) Oilseeds like pulses will also have to compete for particular seasons. Breeding will have to be for a convenient season.

(*x*) In Oilseeds, except in Caster, breeding is still by the selective method. The strong aids of chemicals and irradiation techniques of mutation need early and comprehensive introduction.

Do you agree about the importance of these items for urgent action. Have you any alternatives, additions or modifications to suggest?

17. Certain problems of Coordinated Research Programmes have been brought to our notice. They are as follows:—

(*a*) Coordinated research has been paying too much attention to All India varieties. As has been agreed to recently, it is necessary to select varieties for the regional peculiarities.

(*b*) Regional meteorological and climatic conditions must receive attention in selection of the right type of crop to recommend to the area. The Coordinated Programme sets two broad objectives to be really effective in helping the breeders in meeting the demands. For example, rice is divided into three crops—early, medium and late. What a region requires will be rice crop of a particular maturity where even a five days lengthening may not fit the season or the multi-cropping programme. The Sorghum Project pin-points the need for extreme accuracy in laying down the requirements of the season or the terrain.

(*c*) The same non-sensitive varieties are now used for the Rabi and the Kharif Programmes. It is agreed that breeding specially for a Rabi Programme is desirable. Daylight conditions are different and water availability in rabi is much less than in the kharif.

(*d*) Entomology and mycology support to the Coordinated Programmes is usually weak. These disciplines need urgent strengthening.

(*e*) The Coordination Programmes do not have the support of a good agricultural economist or farm management specialist. Hence economics does not appear to have come to the advisory system. This is a basic defect and needs immediate correction.

(*f*) Field experience of the high-yielding varieties is not travelling up to the Coordinators fast enough. The Hybrid Jowar experience is significant. There is at present no effective way for the Coordination Programme to really assess the field experience of a released crop. Methods to overcome this may be:—

(*i*) Utilise the National Demonstrations to gather the field experience.

(*ii*) Utilise the Coordination Organisation of the State Agricultural Department and the State Agricultural University to check on the field experience and bring up the defects quickly.

(*iii*) Have a purposeful and fully supervised pre-release cultivation on Government and University controlled farms to identify possible trouble spots.

(*iv*) Carry out field evaluation studies through selected agro-economic research centres so that not only scientific problems but problems of economics and sociology are also attended to.

Do you agree about the importance of these items for urgent action? Have you any alternatives, additions or modifications to suggest?

18. At present there are a number of research, experimental or demonstration farms scattered all over the State. How many such farms are there in your State? What are their functions and what role do you envisage for them in the future research set-up? What is the present level of expenditure on them? Are there any Government farms for demonstrations or trials?

## APPENDIX II

*Questionnaire on Agricultural Extension*

TERMS OF REFERENCE C-1

1. Agricultural extension is still the responsibility of the Community Development Block staff in the States. The Technical Adviser available to the farmer is still largely the Village Level Worker and the Agricultural Extension officer. Is this a correct statement of the present position in your State?

2. Has the IADP Group of District Specialists been inducted in other districts such as Intensive Agricultural Area Programme districts in your State and, if so, in which districts. Has the Group been able to give a higher level of technical advice to the farmer in any large measure in the district of their operation? What is their method of contact with the farmer and his problems?

3. Has the agricultural university or agricultural colleges in your State any group of specialists allotted to any particular district or area? What is their method of contact with the farmer and his problems? Have they been able to give a high level of technical guidance in any large measure in their area of operation?

4. Has the National Demonstrations Scheme been introduced in your State and, if so, in which districts? Normally, how many field days are held in each National Demonstration Farm in each year. Is there any difficulty in the placement of the requisite staff under the Scheme? If so, give details. Do the Expert Group of the Scheme attend these field days or how many of them do they attend? What is the average number of farmers they were able to attract in any one field day in a farm? Are there general discussions of mutual problems on each field day between the experts and the farmers?

5. Is there a suitable system of coordination in your State by which the officers of the Department of Agriculture can get ready and quick advice on complicated technical problems from the agricultural colleges or university faculty? If not, what is the type of coordination you will recommend?

6. Is there any system in the agricultural colleges or university by which the research and teaching staff is directly involved in extension work in the the villages? What is the extent of the involvement, if any?

7. It is said that modern agriculture requires a much higher level of technical advice and guidance than what the Community Development staff-V.L.Ws and A.E.Os can give. What is your view?

8. What is the level of technical expertise of the Block level experts in your State? Is it possible by suitable inservice training to enable them to take an active part in the new agricultural programmes effectively?

9. It is said that for a proper transfer of technical know-how in new agriculture, the top level experts should be directly engaged in the field programmes in a practical way. What is your view?

10. What is the number of top level experts at the Doctoral level and above available in the agricultural colleges and university in your State? What part of their time can they spare for direct field contact with the farmers in an extension programme?

11. Taking a pragmatic view of availability of manpower and the time taken for training top level scientists, it has been suggested that technical support to the agricultural programme can be divided into three levels of technical competence. They are :—

(i) Top level scientific personnel should concentrate on demonstrations and field days for direct contact with farmers and the number should be adjusted to their capacity to earmark time for this in their overall programme of research, extension and teaching. Otherwise, they should be available for technical consultancy by the Department of Agriculture and the Extension Organisations direct involvement in large scale field programmes shall be limited.

(ii) The experts of the Department of Agriculture should utilise their expertise in the field in large scale field programmes and for technical advice of a high order avail of the technical guidance of the top level scientists in the colleges and university.

(iii) The Extension Organisation should be responsible for large scale field programmes of a simple kind and should be sufficiently trained to have the competence to understand the programme and put it across.

Do you agree with this division of labour? Or have you any alternative solution?

12. Keeping in view the various experiments so far made in the involvement of the top level scientists in extension and the experience of the Department of Agriculture and the Extension Organisation in the field, can you suggest a suitable framework for the top level scientists organisation to be in charge of the field liaison and identify their points of contact with the faculty in the university or college for coordinated work. Can you suggest, similarly, a suitable structure in the Department of Agriculture and the Extension Organisation to cover the field of extension in high level technical guidance in new agriculture.

13. There is a school of thought that the Community Development Organisation is not able to discharge its function of agricultural extension because of the duality of control of the agricultural experts (including the V.L.W's) in the Block. It is suggested that as the new agriculture requires a continuous link between top level expertise and the field programmes, the agricultural workers, in the Blocks should be placed squarely under the agricultural hierarchy for best results. What is your view?

14. It has been pointed out that the agricultural hierarchy will find it impossible to supervise if the entire field programme is placed on them. It is pointed out that it was out of the past experience of the intensive cultivation programme where the agriculture hierarchy found themselves unable to control the vast programme, that the division of labour between Community Development and Agriculture Department was evolved. It is suggested that there is a validity still in this division of labour for best efforts. Do you agree?

15. Taking a pragmatic view of the situation and the limitations of control that the agriculture hierarchy can exercise in a lage field programme, it has been suggested that for best effort the work can be divided into two sectors:—

(i) In the intensive programmes, like the multicropping programme, adopted village programme, SFDA and MFDA, the field staff dealing with agriculture may be placed directly under the agriculture hierarchy and the agriculture hierarchy given full responsibility for obtaining results. It has been suggested that in these programmes quick and effective fulfilment of targets is essential for both success of the programme and getting the economic results necessary for growth.

(ii) In the rest of the areas the present Block pattern of extension may continue to function with technical supervision and guidance from the agriculture hierarchy. Do you agree? Have you any other suggestion?

16. For the areas under the Special Employment Schemes or the adopted village schemes, a certain number of VLWs and AEOs can be earmarked and they can be placed directly under the District Agricultural Officer; so that there is unity of purpose in both the implementation and the technical side. The proposal for earmarking need not mean an addition to the cadre. In Intensive Cultivation areas there are already 15 to 20 VLWs and 4 AEOs at the Block. It should be possible to divert a part of the staff to the special programmes, leaving only the normal staff for ordinary extension work. Do you agree with this? What is your view?

17. It is pointed out that the actual contact with the farmer is maintained by the Village Level Workers and the Agricultural Extension Officers, who are the lowest levels of expertise in the agricultural hierarchy. The types of programme now envisaged require support of this level of expertise to three distinct programmes. They are:—

(i) Supporting the top level technical scientists of the university and the colleges in their demonstration and field contact programmes;

(ii) Supporting the agriculture hierarchy in the intensive programmes of multicropping, adopted village, etc; where intensive and quick growth in large areas is required; and

(iii) Support to the general extension programme through the Block. It is suggested that the level of understanding in the Village level Worker and the Agricultural Extension Officer may be different for these different programmes and for best effect it is desirable to support these programmes with that level of expertise which will give best results. Do you agree?

18. Arising out of the last question, it is suggested that the level of expertise required may be as follows:—

(i) For support of the top level scientists the Village Level Workers must be at least an Agricultural Graduate and the Agricultural Extension Officer a Post-Graduate in one discipline.

(ii) To support the intensive programme, selected Village Level Workers who have reasonable educational background and have shown extensive capabilities may be given intensive training in the particular programmes which they are to support and placed in position. Agricultural Extension Officers must be at least graduates and should be similarly trained.

(iii) For the general extension, present levels of expertise of VLWs and AEOs may continue; but whenever there are dropouts and retirements, replacements must be of much higher level of technical competence.

Do you agree with this assessment or have you alternative suggestions?

19. An alternative view is that higher level technical advice is necessary at the village level and that this would call for the appointment of graduates as Village Level Workers and M.Sc. (Agriculture) as Agricultural Extension Officers. As the application of new technology would raise new problems such higher level technical competence is necessary for the extension staff. Do you agree with this view? If so, what will be the implications and how is the cost to be found?

20. It has been suggested that VLWs and Block staff should not be entrusted with supply functions i.e. provision of inputs, etc. and in many States the VLWs and Block staff have already been divested of this function. What is your view regarding this?

21. Another suggestion made is that the agricultural extension services should be strengthened by providing one agricultural graduate per village and Specialist services at the Block level as an essential link between the research scientists and the farmers. It is further suggested that such agricultural graduates need not be Government employees but should be self-employed and take to distribution of agricultural inputs, custom service, self-cultivation, and advisory services for the farmers. What is your view on this ?

22. Yet another suggestion is that there should be a technically strong unit at tehsil (Taluka) level supported by field laboratory facilities for carrying on analytical work needed to solve field problems and an agricultural graduate at circle level (5 to 6 per tehsil) for contact with the farmers assisted by 2 to 3 field assistants. What is your view on this?

23. It is also suggested that full responsibility with regard to formulation as well as implementation of agricultural development programmes should be that of Agriculture Departments in all areas and that the needed authority should be delegated to the organisations to discharge this responsibility. What is your view?

## APPENDIX III

*List of Correspondents who replied the Questionnaires*

| Name | Designation | Address |
|---|---|---|
| 1. Shri T.P. Singh | Secretary to Government of India. | Ministry of Agriculture, Krishi Bhavan, New Delhi-1. |
| | STATE GOVERNMENTS | |
| 2. Shri A.K. Sharma | Joint Director of Agriculture (I.P.) | Directorate of Agriculture, Government of Assam, Shillong, Assam. |
| 3. Shri M.D. Rapthap | Secretary Agriculture. | Department of Agriculture, Government of Meghalaya, Shillong, Assam. |
| 4. Dr. K. Sengupta | Director of Agriculture. | Directorate of Agriculture, Government of West Bengal, Writer's Building, Calcutta-1, West Bengal. |
| 5. Shri Saran Singh | Agricultural Production Commissioner. | Government of Bihar, Patna, Bihar. |
| 6. Shri J.L. Dalal | Director of Agriculture. | Directorate of Agriculture, Government of Haryana, Chandigarh. |
| 7. Dr. R.V. Ramakrishna | Joint Director of Agriculture. | Directorate of Agriculture, Government of Madhya Pradesh, Bhopal, Madhya Pradesh. |
| 8. Shri G.A. Patel | Director of Agriculture. | Directorate of Agriculture, Government of Gujarat, Krishi Bhavan, Ahmedabad, Gujarat. |
| 9. Shri S.R. Chopde | Joint Director of Agriculture. | Department of Agriculture, Government of Maharashtra, Poona-1, Maharashtra. |

| Name | Designation | Address |
|---|---|---|
| 10. Shri T. Kipgen | Development Commissioner. | Secretariat, Government of Goa, Daman and Diu, Panjim. |
| 11. Shri M.R. Pai | Secretary Agriculture. | Food and Agriculture Department Government of Andhra Pradesh, Hyderabad, Andhra Pradesh. |
| 12. Dr. Md. Quadiruddin Khan | Director of Agriculture. | Directorate of Agriculture, Government of Andhra Pradesh Hyderabad, Andhra Pradesh. |
| 13. Dr. H.L. Kulkarny | Director of Agriculture. | Directorate of Agriculture Government of Mysore, Mysore Government Secretariat, Vidhan Soudha, Bangalore, Mysore. |
| 14. Shri A.J. Chacko | Director of Agriculture. | Directorate of Agriculture, Government of Kerala, Trivandrum-1, Kerala. |
| AGRICULTURAL UNIVERSITIES | | |
| 15. Dr. B. Samantrai | Vice-Chancellor | Orissa University of Agriculture and Technology, Bhubaneswar, Orissa. |
| 16. Dr. M.S. Randhawa | Vice-Chancellor | Punjab Agricultural University, 216, Sector 9-C, Chandigarh. |
| 17. Shri A.L. Fletcher | Vice-Chancellor | Haryana Agricultural University, Hissar, Haryana. |
| 18. Shri G.S. Mahajani | Vice-Chancellor | University of Udaipur, Udaipur, Rajasthan. |
| 19. Dr. L.S. Negi | Vice-Chancellor | Jawaharlal Nehru Krishi Vishwa Vidyalaya, P.B. No. 80, Krishi Nagar, Jabalpur-4, Madhya Pradesh. |

| | Name | Designation | Address |
|---|---|---|---|
| 20. | Shri L.N. Bongirwar | Vice-Chancellor | Punjabrao Krishi Vidyapeeth, Murtijapur Road, Akola, Maharashtra. |
| 21. | Shri H.G. Patil | Vice-Chancellor | Mahatma Phule Krishi Vidyapeeth, Rahuri, District Ahmednagar, Maharashtra. |
| 22. | Shri O. Pulla Reddi | Vice-Chancellor | Andhra Pradesh Agricultural University, Dilkusha, Hyderabad, Andhra Pradesh. |
| 23. | Dr. K.C. Naik | Vice-Chancellor | University of Agricultural Sciences, Post Bag No. 391, XI Main, 16 Cross Malleswaram, Bangalore-3, Mysore. |
| | | INSTITUTES | |
| 24. | Dr. S.B. Bandyopadhyay | Director | Jute Technological Research Laboratories, 12 Regent Park, Calcutta-40, West Bengal. |
| 25. | Dr. V.G. Jhingran | Director | Central Inland Fisheries, Research Institute, Barrackpore, West Bengal. |
| 26. | Dr. T. Ghosh | Director | Jute Agricultural Research, Institute, Nilganj, P.O. Barrackpore, West Bengal. |
| 27. | Dr. S.Y. Padmanabhan | Director | Central Rice Research Institute, Cuttack-6, Orissa. |
| 28. | Dr. M.L. Magoon | Director | Indian Grassland & Fodder Research Institute, Jhansi, Uttar Pradesh. |
| 29. | Dr. D. Sundaresan | Director | National Dairy Research Institute, Karnal, Haryana. |
| 30. | Dr. D.R. Bhumbla | Director | Central Soil Salinity Research Institute, Karnal, Haryana. |

| Name | Designation | Address |
|---|---|---|
| 31. Dr. Hari Kishore | Director | Central Potato Research Institute, Simla-1, Himachal Pradesh. |
| 32. Dr. R.M. Acharya | Director | Central Sheep and Wool Research Institute, Avikanagar, Malpura, Rajasthan. |
| 33. Dr. V. Sundram | Director | Cotton Technological Research Laboratory, Adenwala Road, Matunga, Bombay-19 DD, Maharashtra. |
| 34. Dr. G.S. Randhawa | Director | Institute of Horticultural Research, Hessaraghatta, 255, Upper Palace Orchards, Bangalore-6, Mysore. |
| 35. Dr. D.M. Gopinath | Director | Central Tobacco Research Institute, Rajamudry-1, Tamil Nadu. |
| 36. Dr. S.S. Shah | Director | Sugarcane Breeding Institute, Coimbatore-7, Tamil Nadu. |
| 37. Dr. S.Z. Qasim | Director | Central Marine Fisheries Research Institute, Gopala Prabhu Road, Ernakulam, Cochin-11, Kerala. |
| 38. Dr. P.C. Mandal | Director | Central Tuber Crops Research Institute, Trivandrum, Kerala. |
| 39. Dr. V.M. Pillai | Director | Central Institute of Fisheries Technology, P.B. No. 1039, Chittoor Road, Ernakulam, Cochin-11, Kerala. |
| 40. Dr. Dharampal Singh | Director | U.P. Institute of Agricultural Sciences, Kanpur-2, U.P. |
| 41. Dr. R.M. Patel | Director | Institute of Agriculture, Anand, Western Railway, District Kaira, Gujarat. |

## APPENDIX IV

*Main Functions of the Scientific Panels of the ICAR*

To offer suggestions on the following:—

(*a*) Co-ordinated Programmes of Research in their respective disciplines and the institutions or centres where they may be taken up.

(*b*) Model Co-ordinated Schemes/Projects of Research.

(*c*) Priorities for the Research Schemes/Projects recommended.

(*d*) Ways and means for improving the work under the Schemes/Projects of Research pertaining to their respective disciplines.

To advise on the following:—

(*a*) Problems on which research work needs to be:

  (*i*) intensified or

  (*ii*) undertaken.

(*b*) Results which require to be:

  (*i*) tested through pilot projects/schemes or pilot plants or

  (*ii*) passed on to extension workers for adoption by the farmers, the trade and the industry.

(*c*) Closure of schemes which are not working satisfactorily or have reached a stage where further work is not necessary.

(*d*) Such problems as may be placed before them.

(*e*) All such other matters as may be referred to them by the Director General/the Standing Committee/the Advisory Board and the Governing Body.



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