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Integration of Agricultural Research, Education and Extension

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In modern times, science advances most and best when organised. Organisation of research is itself a scientific method of major importance. There is now an increased appreciation in India, as in other countries, that progress in agriculture can be achieved only when there is recognition of the fact that efforts may collapse if all the three legs of the tripod-research, education and extension — are not all functioning. The Joint Indo-American team, in their report on agricultural research and education in India observe that everywhere in India, in its wide contact, the team has found approval of these sentiments and of the necessity for this co-ordination.

An attempt has been made in this paper to reflect the views of the Joint Indo-American team and such authorities as Dean Mumford, who had been associated with the Land Grant College Movement of the United States of America, one of the greatest national organisation of agricultural research and development, the report of the Indian Delegation to the Chinese Republic etc. The salient features of their observations are set out in brief.

Research: The farmer in India is most wedded to tradition. Although in recent years a perceptible change in his attitude is noticed, the impact of agricultural research on his farming methods cannot be said to be as powerful as it is in the other progressive countries. Lack of education and economic backwardness, rather than prejudices against improved technique, may be the factors responsible for this state of affairs. With the launching of the Community Project, National Extension Service and other schemes, the skepticism with which scientific research on agricultural problems was looked upon has gradually changed to one of confidence. This awakening among the farmers demands a wise and understanding attitude on the part of the investigators also. Inadequate or unfounded information cannot be allowed to pass through the expanded channels for agricultural extension. The Indo-American team has made the following recommendations for organising agricultural research in India.

1. Strengthening research under way and initiation of research in many potentially productive problem fields today which are essentially neglected,
2. Employment of personnel on a permanent basis and to furnish such supporting or operating funds as are necessary to carry out a research project,
3. Employment of project co-ordinators to review the results of schemes in which a number of States are participants. Employment of technical experts as Joint Directors of Agriculture at State level,
4. Conduct of field demonstrations to evaluate new research findings,
5. Establishment of adequate sub-stations or field locations representative of the different cropping, soil and enviromental conditions of the State,
6. Joint planning by the Centre and the State etc.

The first recommendation poses the questions — What are the potentially productive problems ? Is the Director, or the Scientist or the farmer or the Government to decide which are really worthwhile problems. To quote Mumford "each of these classes of individuals must have a part in answering this question. The Director must exercise his broader vision of the needs of agriculture on the advice and council of his staff. The Scientist alone will be the best authority under the circumstances. But the farmer certainly cannot be ignored. After all the problems are his concern. Co-operation of all these will issue a safe answer and a wise programme of research.

Although the farmer demanded quick solutions many of his problems required long and painstaking research. The research worker's function to quote Dr. E. W. Allen "is not as some thoughtless persons have claimed 'to grow two blades of grass grow where but one grew before'. The duty is much broader and more important". The oft repeated but now somewhat obsolete slogan of "science for science's sake" has no standing in agricultural research stations. Public sentiment is likewise primarily concerned with their service to agriculture. It is true that often a solution of the farmers' problems leads to most advanced studies in science and the investigations most likely to accomplish permanent solutions are those which are founded and buttressed upon the most fundamental and advanced research. Julian Huxely is quoted as saying "you will

find it impossible to draw any sharp line between pure and applied science. I am more than ever convinced that any such line is merely arbitrary and often you cannot draw it at all. But of course research can be at very different degrees from practice and it will be useful to be able to classify the different kinds of research".

While the importance of basic research is generally recognised on all hands, the treatment it receives from administrators is well brought out by the definition of a College President viz., "basic research is the work for which it is difficult to obtain funds. Applied research is the kind for which it is relatively easy to obtain funds". Dr. Cullinan has listed out eight landmarks in the progress of horticultural research in the past 50 years, which have formed the basis for outstanding progress in the field of horticulture, such as the concept of C : N ratio, photo-period controls, polyploidy by treatment with chemicals, discovery of hormones, concept of leaf analysis to measure utilisation of plant nutrients, tracer technique in plant nutrition etc. It is well known that a host of applications have followed these discoveries. Dr. Cullinan has further suggested several problems deserving expanded studies on anti-biotics for control of virus diseases, a national programme of leaf analysis for determining nutrition levels, form of nitrogen application, studies on rest period and chilling requirements as related to blossoming, use of radio-active chemicals as traces in absorption, translocation and utilisation of various elements in plants, use of herbicides etc.

Organisation of Research : The Joint Indo-American team is of the opinion that although agricultural research in India includes some excellent work in well equipped laboratories with well trained and able scientists, the total programme is inadequate to meet the needs and demands for agricultural materials and practices on Indian farms. The larger number of schemes sanctioned for short periods are handicaps in the planning of research and particularly in employment of competent staff. In regard to co-ordination the team observes : "aside from a limited measure of co-ordination of schemes supported by the Indian Council of Agricultural research, there is no real integration of research efforts conducted by the Centre and the States and other institutions in India". The work of the Central Institutes under the Ministry of Agriculture independent of the Indian Council of Agricultural Research, the independent action of commodity committees have also been pointed out. The team recommends that the Indian Council of Agricultural Research should be suitably strengthened with resposibilities for leadership and services.

Many of the problems relating to agriculture are of nationwide significance and of even international concern. Some of the problems do not admit of solution by the State. The United States of America took up a nation-wide attempt to correlate and co-ordinate the work of several States and the work of U. S. Department of Agriculture. As a result even as early as 1940, there were more than 1350 co-operative projects between the department of Agriculture and the States. Joint Committees with members from the United States Department of Agriculturre and the Experimental Stations were organised. This committee encouraged co-operation, recommended proceedure, in common with other agencies and a substantial contribution to co-ordination of research in the United States. There has been a substantial elimination of duplication by the several States and the Department of Agriculture. The Indian delegation to the Chinese Republic has also referred to a 'National Committee for co-ordination of agricultural research' established in that country. In regard to the Centre—State relationship the Indo-American team has recommended employment of Project Co-ordinators, who would review the work of the different States on similar problems with a view to co-ordinating the work.

Commenting upon technical personnel the team says "it has been advised that it has not been possible to co-ordinate the efforts of scientific research institutions because of 'personality conflicts' between heads of institutions reliance solely on seniority aggravate problems of co-ordination and co-operation because such senior individuals are strong willed, inflexible and unwilling to modify their views on questions which can best be compromised".

The transfer of Specialists trained in certain descipline to high level positions in another scientific field for which they are not specially qualified but to which they are entitled on the basis of seniority has also been mentioned with specific examples. The poor salary scales offered to scintific workers as campared with those in the administrative services has, according to the team, resulted in the loss of many potentially productive, well trained young scientists. The poor strength of staff employed in research stations has also been commented upon. Among other drawbacks are the absence of sufficient number of professional or scientific societies and lack of opportunities for scientists to participate in the conferences both of national and international character.

Research and education : The success of the Land Grant College Movement in the United States of America is claimed to be due to an intelligent co-ordination of the educational triad viz.,

research, education and extension. The Agricultural Colleges are based on the needs of the rural people. They are to create knowledge in the broad field of agriculture. The very rapid increase in the enrolment of colleges of agriculture in recent years and the widespread public approval of their educational programme is evidence of their essential values in our educational systems. The colleges are closely associated with the research stations. Without research stations, the educational programme would soon perish from a dearth of ideas. The techincal training in the college is effective because it is solidly based on work at the agricultural research stations. These stations though primarily intended for solving problems of agriculture are now recognised as essential for good college training. Agricultural teaching is not merely the accumulated knowledge of all the best mothods of agriculture of all ages, but also the knowledge of all sciences related to agriculture.

That a college of agriculture has three main features viz., teaching, research and extension was realised very early in the United States of America. Good teaching could not be separated from research. Results of research obtained purely for farmers should be fully utilised for teaching students who were to become farmers or guide them. The college teacher is a more efficient teacher if he is at the same time conducting investigations. The teacher how takes no interest in research or is overburdened with teaching that he can do no research or is overburdened with teaching that he can do no research, can hardly be an inspiration or a modelfor his students. The close association between the research stations and the college has had a remarkable influence on the general progress of agriculture that one would agree with Dr. Allen's observations viz., " during the life of the Agricultural Colleges, there has been more progress in matters relating to farming than in all the centuries that went before ".

The agricultural colleges in India have been conceived and developed with the primary purpose of preparing young men to enter Government service. Little opportunity was provided for specialisation at under-graduate level. The intent was to develop multi-purpose men who could fit reasonably well into any one of the several types of jobs. The curriculum was therefore uniformly inelastic. This system which has proved satisfactory to the present time, may require some rethinking in the near future. It is claimed that the beginning of specialisation is the beginning of success in the colleges of agriculture, greatly accelerated by the establishment of the agriculture, research stations.

Research, education and extension: The work of the research worker did not end with establishing a truth but in developing a truth but in developing a technique for the use of the knowledge so discovered. Success in extension service cannot be achieved without co-ordination between the agricultural college and the agricultural research stations. In addition to research staff agricultural research institutions should also have extension specialists in different subjects who should be members of the resident departments and by reason of this connection will be fully conversant with the latest developments and discoveries of the station.

The role played by the Agricultural Demonstrator and Extension Officer is of greatest importance. He is the representative in the local farm community of all that the department stands for. He is the representative in the local farm community of all that the department stands for. He is really a teacher in a great adult education movement. His primary function is putting knowledge to work. The future of the extension service is dependent on a strong dynamic college and efficiency organised and directed research centres.

For effective results in extension great emphasis is laid on the publication of results of research. It is something to discover a new truth. It is another to present the truth in such a manner that discoveries will have the widest possible use. The authors of scientific publications are generally criticised on the grounds that they report their results in the languages of science and that they are generally too conservative in suggesting applications. There should be an effort to report results with such clarity and simplicity that the intelligent reader should be able to gain a fairly definite idea of at least what the investigator has really discovered. It is often said that research workers devote more attention to a discussion of how the results were obtained than to stating as clearly as possible just what has been discovered.

To foster development of an efficient extension service, organisation of rural youth clubs on the model of the 4-H clubs, organisation of conferences between scientific workers and cultivators, are suggested. It has also been recommended that various types of action and development programmes such as quarantine and other restrictions and related activities should not be functions of those in-charge of research or education. Such activities involving regulatory measures affect desirable relationship that should be maintained between cultivators and extension officers.

Finally, it would be a great mistake to measure the achievements of the Agrienltural colleges and Research Centres solely by economic results or monetary returns. One of the most significant results is the enlargement of the intellectual horizons of the people. "The farmer's success is dependent quite as much upon a keen intelligence as upon the traditional rural virtues recognised for generations as essential *for successful* rural life".

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