EDUCATION AND TRAINING FOR AGRICULTURAL DEVELOPMENT

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1. The role and importance of agriculture, even in many of the highly industrialized countries of the world, is almost universally recognized. In most of the developing countries, its place and importance in the life, progress and future prosperity of their peoples is unique. The vast majority of these people live in rural areas deriving their livelihood from the cultivation of crops and the keeping of livestock. Yet others are engaged in the closely related activities of forestry and fishing. The growing towns and industries are dependent upon agricultural production for their food supplies and the raw materials which form the basis of many manufacturing processes and local trade and commerce. Foreign exchange earnings from international trade derive very largely from the exports of agricultural products by the developing countries to the advanced industrial countries of the world. Even the development of local industrial enterprises hinges largely upon an expansion of local and nearby markets and this again depends in the main upon increasing the purchasing capacity of rural people. The improvement of nutrition standards, the spread of better educational and social services are all closely linked to a steady rise in rural and urban family incomes. And these are, to a large extent, dependent upon a steady and sustained growth in agricultural productivity.

2. We do not always realize how complex and interdependent are these many factors. As visitors to a new country we may be impressed by the modern airport, splendid buildings, roads, shops and facilities of the capital city. We may not at first appreciate the enormously difficult problems faced by the government and people in grappling with the problems of development as a whole; problems of unemployed and under-employed young people for whom the rate of expansion of employment opportunities is totally inadequate; problems of creating the essential infrastructure of a modern agricultural economy in the rural areas; problems of limited finance and trained manpower for rapid and effective development. We learn to appreciate, when we begin to study some of these problems, how complex they

are; that, important as it is, education alone cannot solve them. It must operate in conjunction with many other factors in a "team approach" to development. We begin to realize also that there can be "no satisfactory growth of modern towns and cities alongside poverty stricken rural communities based upon the hazards and miserable returns of subsistence agriculture" (1). We appreciate the essential connection between agricultural prosperity and the expansion of industry and commerce; the interdependence of rural and urban development. These facts of life have important practical implications for each one of us. We are forced to appreciate the fact that success within the sector or rural development, within which we work, is largely dependent upon successful implementation of other and complementary sectors of the whole development complex. We cannot, therefore, hope to succeed unless we can become, conceptually and in a practical manner, good and useful members of a team. It is the team or integrated approach which offers the prospect of real and sustained progress.

3. Agricultural development is itself a very complex process, more especially in parts of the world where the predominant pattern is one of peasant subsistence agriculture and the transition to a modern farming economy involves many social, economic and technical problems. There is little point in encouraging thousands of small farms to expand and intensify their agricultural production if roads and communications are non-existent and there are no markets to absorb such increased production at prices which offer them a reasonable cash return. Thus the creation of a modern agricultural economy involves a whole range of essential "inputs" if the transition from subsistence is to be achieved without social disruption and recurring crises. From the agricultural viewpoint alone, it is necessary to establish an organizational and institutional structure appropriate to initiate and sustain the complex processes of agricultural development. A basic need may well be the establishment of systems of land tenure which provide the farmer with the necessary incentive to invest in the improvement of his land. He has other essential needs: available credit, a marketing system for his production, farm requisites and supplies, the development of a co-operative system through which the smaller producers can derive the benefits of larger scale enterprises. Agricultural services, which include research, education and training, field advisory and other technical services, are all essential to progress and modernization. The creation and development of all these elements is a lengthy, expensive and slow business. Priorities have to be established and each

country will pursue the development of this structure in accordance with its policy, available resources, circumstances and needs. However, in a world in which nations are becoming increasingly dependent upon each other, there is a need for national agricultural policies to harmonize with regional and international ones. It is to begin to meet such needs, both in the short and longer term, that FAO has undertaken the preparation of its Indicative World Plan for Agricultural Development.

4. Perhaps the most important single result of the experience of the first UN Development Decade - the 1960s - is the realization of the central importance of the human factor in the whole process of change and development. In the field of agricultural development this has special significance because in many of the countries with which we are specially concerned the "human factor" involves millions of farm families eking out a bare livelihood at subsistence level. Many of these rural people are illiterate; they are under-nourished; their resources are minimal. And yet it is upon them, their capacity to respond to such opportunities of education and training and of technical advice and help as may be offered to them, that much of the world's future progress depends. Agricultural change and development cannot be imposed from above; the desire for such change and the endeavour for its achievement have to be generated within the rural family and community.

AGENTS OF AGRICULTURAL CHANGE: THE EXTENSION SERVICES

5. In the complex process of agricultural change and development the central factor is the farmer - the producer. He is the person who is called upon to accept and put into practice new concepts of the management and use of his resources, to adopt new techniques of crop and animal production, to work harder and more effectively, and to adapt himself and his enterprise to the conditions and requirements of a modern agricultural economy. The farmer, however, neither lives nor works as an isolated individual. He is the head of a farm family in which the womenfolk have a crucial role to play. In many rural areas the farm family is but an element in a close-knit rural community.

6. Agricultural research involves the application of science and technology to all aspects of agricultural production. Through

patient and systematic work in the laboratory and the experiment station new high yielding varieties of crops and more productive livestock are evolved, serious pests and diseases are brought under control, advances in engineering are brought to the service of agriculture, many ways and means of increasing the productivity and profitability of farming are studied and tested. As well tried results become available the problem still remains of getting improvements accepted by the farmer and the farming community at large. It is for this purpose that agricultural extension services have been developed in most countries. The extension worker, at farm or village level, forms the most important link in the chain of communication between the research worker and the farmer. It will be apparent, therefore, that the extension staff of the agricultural services have an extraordinarily important role to play in the whole process of agricultural improvement. In areas of peasant subsistence agriculture they are faced with immense difficulties in their task of initiating change and introducing new ideas and practices in a conservative and tradition-bound society. In order to achieve anything they must first win the confidence of the farmer and be able to demonstrate convincingly that the adoption of new practices is worthwhile. It will be clear that to undertake these responsible duties the extension worker requires good training and strong support. He needs to have sufficient education and training to understand the reasons underlying the improvements he advocates and to explain and demonstrate them to the farmer. He should also be capable of understanding the peculiar problems of the farmer and communicating these back to the research worker. The duties of the extension worker therefore imply considerable skill and responsibility and call for human qualities of a high order. The agricultural advisory or extension services of many of the advanced countries play an extremely important part in the steady improvement of farming efficiency. How can such services be strengthened to give similar service to farming improvement in the developing countries?

7. This, like many other problems, will require time and much effort to solve. In the first place, there is an urgent need for the training of considerable numbers of young people - both men and women - for this kind of work. It seems paradoxical that the man who deals directly with the farmer is the poorest educated and the lowest paid in the whole of the agricultural services. If he is to play an effective part in agricultural development in the future it is necessary to recruit young people of good educational standard, train them well and offer them career prospects through which they can take pride in their

profession and through periodic in-service training progressively increase their skill and usefulness. Secondly, it is necessary to establish an extension service, adequately supervised, in which the individual worker has a manageable farm population with which to deal. A target now being set in a number of developing countries is one extension worker per thousand farm families. In areas of intensive development the proportion will need to be considerably higher - perhaps one to 200 or 250 farm families. Finally, the extension worker cannot work in isolation and without the help of other supporting services. His work must essentially be a part of the "package" which includes such things as the provision of credit, seeds and fertilizers, and other essential services to which reference has already been made. It is, of course, essential that those who train for work amongst farmers should be people who will be happy to live and work in rural areas and who will develop a sympathetic understanding of rural people. They need also to have a love of farming and to develop practical skills in the management of crops and livestock. Without assets such as these it is difficult to see how they can be successful in bringing about change in agriculture.

FUNCTIONAL LITERACY RELATED TO AGRICULTURAL DEVELOPMENT

8. In many of the developing countries where agriculture is the basis of life there are still large portions of the population which are illiterate. Even for the young it may be many years before universal primary education becomes feasible. Thus a high proportion of farmers and their families are illiterate and yet the need for agricultural development is imperative. Can the efforts of adult literacy campaigns and other forms of literacy work amongst such people, which have been undertaken for many years, be reoriented and strengthened to serve the needs of farming improvement and rural development? Can literacy work itself be invested with a new sense of purpose if it is more specifically and in a thoroughly practical manner, geared to serving the immediate problems and needs of the farmer and his family?

9. There seems little doubt that functional literacy, operating as one of the integral factors of agricultural improvement, should serve an extremely important need. Modern agriculture, even in its simplest aspects, requires the imparting of some technical knowledge for which the printed word serves a most

useful purpose. The planting of new varieties of seed and the associated use of fertilizers or sprays for disease and pest control may well require simple printed instructions to supplement advice of extension workers. Simple records become essential when sales and purchases, and possibly credit, are involved in an increasingly sophisticated agriculture. The local co-operative will issue receipts for produce delivered. It becomes necessary to be able to understand weights and measures if the farmer is not to run the risk of being continually cheated. Thus there is, in situations like these, not only a need for widespread literacy work but a demand by the community faced as it is by new situations and new needs.

10. Here, then, is a great opportunity for linking in a very practical manner the needs for economic and social development in rural communities with the work of adult literacy. There are already, in several developing countries, large scale projects undertaken with the support of the UN Development Programme in what is described as Work Oriented Literacy Projects. In order to succeed they require very substantial support for much of the work is undertaken on a voluntary basis. They need a constant flow of appropriate simple literature, well illustrated, in the appropriate language or dialect. Agricultural education institutions as well as agricultural extension services and farmer training centres have, because of their practical understanding of the problems of farming improvement, essential contributions to make in all work of this character. It may be that voluntary service in such adult literacy work in rural areas is one way in which the enthusiasm and energy of educated young people may be put to good and positive use. Certainly such work can also be strengthened and supported by the radio and television services which are now being developed. The application of functional literacy to agricultural development is of quite recent origin. There is a need for careful evaluation of the experiments now under way in various countries. As with other aspects discussed in this paper a very great deal will depend on the effective integration of this work with the other components of agricultural development. There is no longer room for isolated and uncoordinated efforts where needs are great and resources limited.

THE PLACE OF INSTITUTIONALISED FARMER TRAINING

11. In traditional societies, agricultural systems and practices represent the accumulated experience, knowledge and skills gained in the cultivation of crops and the keeping of livestock over many generations within the environmental conditions in

which each community lived. Agricultural lore and skills were passed from father to son and mother to daughter as they grew up and worked together in home and field, as season succeeded season. The influences of western education and other factors of change have tended to weaken these processes through which the family and society ensured the continuation of the systems of farming essential to their survival. At the same time the urgent need for agricultural improvement has created a situation where education and training are increasingly called upon to serve farming development. In many situations the pace of change is such that the meagre resources of the extension services require to be supplemented by institutional training in order to cope with urgent needs. This is the context within which many of the farmer training institutions of the past two decades have grown up. In some cases, notably in the Far East, they tend to be linked to farmers' associations. Elsewhere, they have been established by ministries of agriculture and in some cases by non-governmental organizations. What is their function and where do they fit in to the broader pattern of agricultural and rural development?

12. In earlier days a good deal of farmer training was devoted to offering one or two-year courses of a thoroughly practical nature to young men who had passed through primary school and who, it was hoped, would make farming their career. Many "farm schools" were established with this objective in view. In general the results have been disappointing in so far as the great majority of those who passed through these schools sought employment outside agriculture. This is hardly surprising when one considers the poor and uncertain returns in the areas of subsistence agriculture where most of these schools were situated. Education and training, of any kind, offered the main hope of escape from the drudgery and pathetically small cash returns of peasant subsistence farming. Gradually the idea began to take hold of devoting at least a part of this training effort to people who were already in farming, to adult farmers and farm women. Instead of these lengthy, and hence expensive, courses for relatively few young men, the new Farmer Training Centres catered for a series of short residential courses for quite large groups of farmers and others. In the countries of East and Central Africa these Farmer Training Centres or District Farm Institutes have become, over the past 10 years or so, an important feature of agricultural development work.

13. Farmer Training Centres, with residential capacity of between 30 and 40 and up to 100, have mostly been set up in areas

or districts where a rapid move towards more intensive farming and the introduction of high value cash crops and livestock enterprises bring an immediate need for more intensive and specific training. The introduction of farm planning in Kenya, together with the expansion of small-holder tea, coffee and pyrethrum production are examples of the kind of situation in which this short course residential farmer training became both necessary and useful. Large numbers of small farmers began to invest money in the fencing, lay-out and improvement of their holdings once they had acquired title following the processes of land consolidation and registration. Having grown up as subsistence cultivators they were now becoming cash farmers and were in need of instruction not only upon the technical aspects of new crops on high value livestock but even more importantly the elements of farm management. Thus both the need for short course instruction as well as a demand from farmers themselves arose as a direct consequence of the government policy for the intensification and development of African farming in Kenya in the 1950s and early 60s. In neighbouring countries development of farmer training institutions has proceeded along somewhat different lines according to their policies, needs and circumstances. The fact that an expansion of such institutions, with the ultimate goal of one training centre to serve each district, is envisaged in the development plans of several of these countries provides sufficient evidence as to their potential importance in agricultural and rural development.

14. Commencing as farmer training institutions, it was not long before courses for farmers' wives were offered and, in fact, proved very popular. It is seldom possible for farmers and their wives to leave their homes for a week's course at the same time and they therefore attend separately. Special courses given by trained women instructors are now given to farmers' wives not only in improved agriculture but in such subjects as nutrition, home improvement, hygiene and the like. Many courses are now arranged for local leaders, for young people responsible for organizing Young Farmers' Clubs in Uganda and the 4-K Clubs of Kenya and similar organizations elsewhere. These institutions are also increasingly being used for in-service training courses for local field staff in many of the services concerned with rural development. Thus there is a marked tendency to expand the functions of these farmer training institutions so that they can cater for a wide range of short course training needs connected with agricultural, home and rural community development. The terms District Development Centres and District Training Centres sometimes employed describe

rather well the broader role which many of these institutions are beginning to assume.

15. What special advantages do these institutions offer in comparison with the less formal types of extension work? In the first place it must be emphasized that they are not a substitute for extension services; they are essentially an integral part of these whereby intensive short course training supplements the activities of district extension services. Both are complementary in the sense that they have but a single objective: the improvement of farming and the farm family within the broader context of rural and national development. These training centres, when adequately staffed with good facilities can achieve very important results in their residential short courses. Through good teaching, supported by the use of many educational aids as well as practical demonstrations, the principles and practices of modern farming, home improvement, better nutrition, organization of young people's clubs can be most effectively introduced and taught to respective groups. Often it is an entirely novel experience for forty or fifty practising farmers to find themselves together for a whole week in pleasant surroundings with good accommodation and catering, attending a well arranged course which has direct and practical relevance to their own problems. They can, at any point, ask questions or join in discussion. They can stimulate each other. Often a study tour visiting farms similar to their own but in a different area acts as a powerful incentive for them to try new methods or improve existing ones when they return home. Women are at least as keen as men and the fact that both men and women from the same home attend courses can generate a great enthusiasm for the improvement of home and farm. At these courses farmers are often taught by more experienced agriculturalists than the village extension worker. They may well visit experiment stations where specialists working on specific crops and animal production problems explain what they are doing and what practical implications for improved farming they hope to achieve. Thus there can be the opportunity for the exchange of ideas and experience between the farmer, the extension specialist and the research worker. Finally, there are the regular in-service training courses now being given to field staff enabling them to meet, to discuss their problems and to bring themselves up to date. Thus though a 40-bed training centre offering a series of one-week or 10-day or shorter courses may only have a through-put of 800 to 1000 persons each year, the total effect and the total number of people influenced may be many times these figures. The development of these training centres for short

course work has already indicated their important potential contribution to agricultural and rural development. What now requires to be done is to exploit this new approach through better staff selection and training, improvement of teaching methods and materials, and more adequate support for these institutions which cater for the most important category of all - the farmer, farm family and rural community.

EDUCATION AND TRAINING OF AGRICULTURAL TECHNICIANS

16. Within the broad structure of agricultural education and training it is common to recognize three principal levels: higher agricultural education; intermediate agricultural education and training; and vocational training for farming and related occupations. Interpretation of these levels differs widely and up to the present there is no universally accepted system of classification. Intermediate agricultural education and training usually embraces a wide range of education and technical training separated at the upper levels from university level education and professional training and tending to merge at the lower level with various kinds of vocational training. The main purpose and objectives of intermediate agricultural education and training are quite clear. These centre around the training of skilled agricultural technicians for a wide range of technical jobs within farming itself, in the agricultural services essential to a modern agricultural industry, in research, teaching and in agricultural commerce and industry. Without the efficient services of large numbers of skilled technicians modern agriculture cannot exist. It is the shortage of skilled technicians, properly trained and supported which is probably the most serious barrier to agricultural progress in many countries today. It is commonly stated that research has already provided the answers to many of the technical problems of agricultural development; the major limiting factor is the ability to apply these results in improved farming systems and practices. This is precisely where the skilled technician comes in. He is concerned with practical application; his is the task of translating the findings of research into systems and practices which are sound and economically viable. His work is essentially complementary to that of the agricultural and veterinary scientist. Farm machinery may be invented and developed by the professional engineer but it does not require the services of so skilled and costly a person for its operation, repair and maintenance. This is the work of the technician, and there will be several or many technicians to every qualified engineer. Within the agricultural services, university trained agricultural scientists, teachers,

specialists of many kinds and senior administrators are needed for a wide range of professional duties. It is, however, the technician from the intermediate agricultural training institutions who is required to undertake much of the skilled practical work at farm, workshop and field level. The majority of agricultural extension staff are essentially technicians who themselves must be able to perform and demonstrate effectively the various skills of modern farming. They will work as laboratory and field assistants at agricultural research institutions, they will perform large numbers of inoculations of cattle and poultry under the supervision of a professional veterinarian. They will service and maintain irrigation schemes under the supervision of an engineer.

17. It follows from what has been said that the kinds of education and technical training required to produce these skilled technicians must differ greatly from that given in the universities. It must have a very marked practical orientation. Indeed, a significant proportion of such training needs to be undertaken within the agricultural industry itself. In many countries today intermediate agricultural education is not properly geared to these objectives. It tends to be the pale shadows of university education with great emphasis upon theoretical learning and distinct weakness as regards essential training in managerial and practical skills. It is often far too closely geared to the narrow requirements of the civil services and far too remote from the actual needs, present and future, of a developing farming industry. Not infrequently, the patterns of intermediate agricultural education and training of developing countries are still largely copies of those of the advanced countries from which they were originally drawn, with curricula, textbooks and examination systems designed and developed for totally different environmental, economic and social conditions. These, then, are some of the problems requiring urgent attention if the education and training of agricultural technicians is to make an effective and practical contribution to the development and modernization of agriculture.

HIGHER AGRICULTURAL EDUCATION

18. The university as the top of the whole educational structure occupies a position of great importance and responsibility. In many countries it enjoys a position of prestige and its teachers often have an important influence upon public opinion and affairs far beyond the confines of the university. It is thus appropriate that agriculture and the agricultural

sciences should be adequately represented and play an important role in the life, thought, research and teaching of the university. In developing countries where agriculture is the basis of life and nearly all development it is appropriate that agriculture should be one of the central foundations of the university's work. This principle was first put into practical effect in America where, commencing with the Morrill Act of 1862, Land Grant Colleges were established in rural areas of all states for the development of studies in agriculture, mechanical sciences and home economics. Many of these colleges have become renowned universities and the basis of their work has expanded into many scientific and technological fields. However the fact remains that the purpose of their establishment was to serve the improvement of rural life through the application of science and technology to agricultural development through the medium of the university. The agricultural universities of India provide a modern example of the application of similar principles and the new University of Mauritius is being built around its Faculty of Agriculture. These examples are quoted because they illustrate the importance, within the context of economic and social development, placed upon agriculture within the university. There are many other examples where faculties of agriculture and related disciplines are very strongly developed within the university system and make essential contributions, through their research and teaching, to agricultural development.

19. It is through higher agricultural education that the professional cadres required for agricultural research, teaching, administration, industry and many specialized duties are educated and trained. The curriculum of such education is essentially based upon the sciences, both basic and applied. The university is much more concerned in the development of intellectual capacity than in teaching practical skills although the latter may often be a pre-requisite of university entrance requirements. The university student should gain an enormous amount from life and work in the university community in addition to whatever technical and professional training he receives. His subsequent duties will involve the exercise of leadership and other qualities which are largely developed outside the lecture theatre and laboratory. It is therefore necessary to achieve an appropriate "balance" in higher agricultural education between educative processes and influences and the more formal aspects of professional and technical training.

20. Many problems face those concerned in the planning and development of higher agricultural education. The breadth of scientific disciplines related to agriculture and the constant expansion of knowledge within these disciplines pose many difficult problems in the designing and adaptation of first degree structures and curricula. For rather similar reasons higher agricultural education and related disciplines are expensive both in terms of capital investment in teaching and research facilities and in recurrent costs. Staff: student ratios are inevitably high if really satisfactory teaching of students is to achieved. An active programme of research is the life blood of good university teaching and in agriculture this implies extremely close ties and working relationships between higher agricultural education and agricultural research. It is equally necessary that those engaged in teaching and research at this level should be constantly aware of the situation and needs of the farmer and this, again, indicates the need for close ties with the field extension services. It is certain that in a rapidly changing agricultural situation an increasing demand will arise for the provision of regular specialized in-service training courses in many fields and an effective reponse to this need poses both a challenge and an opportunity to universities. Finally, it is necessary to stress that agricultural education and training, at all levels, can only be effective if developed as a fully integrated structure with the various elements complementing and supporting each other. In this regard, the university with its special position and the relative privileges it enjoys has an enormous contribution to make in terms of leadership, inspiration and support to all levels of agricultural education and training.

THE CONTRIBUTION OF EDUCATED AND TRAINED RURAL WOMEN TO AGRICULTURAL DEVELOPMENT

21. Considering the profound influence of the woman in the home, the enormously important role women have played in the production of tropical food crops, and their potential contribution to rural development, it is remarkable what limited attention has been given so far, in many countries, to the education and training of girls and women as a direct contribution to rural development. It would in no way be overstating the case to say that this aspect is one of the key elements in the balanced and effective mobilization of human resources for agricultural and rural development. Past neglect in this sector needs to be made good as rapidly as possible. Girls' education, especially in the basic sciences, needs to be made as good as

that offered to boys. Opportunities must be created for the education and training of girls and women in the various fields of food and agriculture, at all levels, to enable them to give effective service in these and related aspects of rural development. It is a matter for some satisfaction that in the countries of East Africa, girls are now undertaking courses both at intermediate and university levels in agriculture, in home economics and in other related disciplines. Already all the District Farm Institutes of Uganda - fifteen of them - are staffed by male Principals and women Vice-Principals, the latter all having equivalent technical qualifications. No doubt some other examples might be quoted. But these are just beginnings; the full potential has yet to be developed through education and training and the creation of appropriate employment opportunities. In the same manner in which far more attention needs to be given to the individual farmer in enabling him to emerge from a subsistence economy, so must equal attention be devoted to farm and rural women since neither the family nor the community as a whole can advance in a satisfactory way, unless women can be enabled to make their full and appropriate contribution to the process of social and economic change.

CONCLUSION

22. This paper is concerned with the contribution of education and training to agricultural development. It has special reference to the many developing countries where agriculture is the central fact of life. Experience of the past few decades suggests that in the approach to agricultural development, especially in countries of predominantly peasant subsistence agriculture, far too little attention has been given to the importance of the farmer, the farm family and the rural community, as key factors in the whole process of change and improvement. The desire for change and the will to achieve progress cannot be imposed from above; they have to be generated from within. It follows that education and technical training are fundamental elements in the process of mobilizing the human resources of agricultural and rural development. The different levels of agricultural education and training together with the related activities in extension and functional literacy are briefly considered in the context of agricultural development. It is emphasized that together they may be regarded as one of the "inputs" of rural development. There are other equally important factors and inputs and it is impossible to achieve steady and sustained progress without their support. More attention therefore is being paid to what is sometimes described as the "integrated" or

"package" approach to farming improvement and rural development. These considerations inevitably lead to the conclusion of the vital importance of team work and a team approach to these problems. Not only must the team involve those agencies, government or private, responsible for the various rural services; it must surely involve the people themselves - local leaders, farmers and rural women. This need lends special importance to education and training devoted to the farmer and farm family in order that they may develop the capacity to help themselves and to create farming systems, a rural society and rural economy of which they may be proud and which makes its full contribution to national development and prosperity. No longer can we treat agriculture and the rural community as the poor relations of progress and development; in many countries they must be given the most dynamic treatment and high priority if the future of their society is to be assured.

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