

MULTIDISCIPLINARY APPROACH TO DEVELOPMENT RESEARCH -
THE MALAYSIAN EXPERIENCE

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Introduction

The concept of multidisciplinary research has recently been the focus of attention at conferences and seminars pertaining to agricultural development and in particular to agricultural research. This focus of attention is the result of the realization that, for too long, researchers tend to be "loners" in undertaking research projects. It is also being increasingly realized that problem-solving research in agricultural development is not the exclusive domain of any one particular discipline.

The need for multidisciplinary research stems from the very nature of the problems confronting agricultural development activities. Most, if not all, of these problems are multi-dimensional and as such any attempt to find answers to these problems through research based on a single discipline is not likely to yield an adequate solution. Any research result which does not offer an adequate solution to the problems faced by the farming community is not likely to be adopted by it. Even if this research result or the technology generated is adopted by the farmers, they are likely to face a host of other problems which could have been avoided if these problems have been identified and researched through a multidisciplinary approach.

MARDI's Approach to Multidisciplinary Research

MARDI has been given the broad responsibility of conducting scientific, technical, economic and sociological research with respect to the production, utilization and processing of all crops, (except rubber) livestock and fresh water fisheries.

To carry out this broad responsibility, MARDI's organizational structure has been geared to the conduct of multidisciplinary research. This is effected by organizing the Institute into commodity branches or departments (rather than on disciplinary-oriented branches) with each commodity branch having a complement of research staff from various disciplines. However, it must be noted that the Institute

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is not exclusively structured along commodity branches, but, to a small extent, along disciplinary branches. These disciplinary oriented branches however, only exist in support of, and complement, the research undertaken by the commodity branches.

It is not my intention to bore you with a lengthy discussion of MARDI's organizational structure. But it is hoped that the above brief note on the Institute's operational structure will facilitate a better understanding of our multidisciplinary approach to the Cropping Systems research, or the Development Research as we call it, which is the subject matter of this group meeting.

Approach to Development Research in MARDI

Before sharing with you our experience in multidisciplinary approach to development research, a brief explanation on the background to this area of research is in order. As was reported at the previous Cropping Systems Working Group meeting in October 1978, there has been a major change in the cropping systems research programme in Malaysia since early 1978. This involved the placement of the cropping systems research activities under the Institute's development research programme. As such, in Malaysia, there is now no cropping systems research programme per se.

This change was necessitated by the fact that research activities undertaken on the development of cropping patterns involving rice followed by other upland crops have been minimal except for one site at Kuala Brang. The major activities being undertaken pertain to the improvement of the existing rice-rice pattern. Emphasis on the improvement of the rice-rice pattern was felt essential in view of the fact that about 65 percent of the country's rice areas is provided with drainage and irrigation facilities. Thus development research is geared to the effective implementation of the double cropping of rice and the productivity improvement of both crops.

The development research programme undertaken has consistently emphasized the notion of a multidisciplinary approach. This research programme is carried out from the various outreach stations of the Institute with each station being staffed by researchers of different disciplines. These researchers work as a team to produce results or technologies which are not only technically feasible and economically viable but also socially acceptable to the farmers in the farming localities under their jurisdiction.

The research team at each outreach station generally comprises of a breeder, agronomist, soil scientist, crop protection scientist, water management scientist, economist, statisticians and an agricultural engineer. This multidisciplinary team is headed by a team leader whose function is to coordinate the activities of the various disciplines and is responsible for the effective implementation of the development research activities at his station. The development research activities undertaken at the outreach stations are not independent of the central research stations particularly the Central Padi Research Station and the Central Field Crop Research Station but are supported and guided by these central stations through direct and constant communication. Whereas the technologies produced by the central research stations mainly result from research undertaken at the station itself, development research pertains to location-specific research and involves the testing of these technologies on the farmers' land and the adaptation of the technologies to suit the particular farming environments of each farming locality. The central research stations, like the outreach stations, are also staffed by a multidisciplinary team of researchers. The constant communication between the central research station multidisciplinary team and that of the outreach station provides an important linkage between the two teams and in providing feedbacks from the outreach stations to the central stations and vice versa.

The development research activities undertaken can be categorized into component technology research and the technology verification trials.

The component technology research implements studies pertaining to varietal testing, fertility studies, cultural and pest management and water management studies. These studies are carried out on land rented from farmers. However, the actual work is carried out by hired laborers under close supervision of the researchers.

The technology verification trials involve the testing of the component technologies on the farmers' land. In these trials, the inputs are provided by the Institute while the actual operations are carried out by the farmers themselves under the watchful eyes of the researchers to ensure that the various cultural operations carried out by these participating farmers are in accordance with the directions prescribed. In these trials, agro-economic data are collected and analyzed in order to be able to determine whether the technologies tested are ready to be made available to the extension agencies for eventual dissemination to the farmers.

Though the economists and the agricultural engineers are not specifically mentioned in the component technology research team, they do have a role to play. However their studies are not necessarily confined to the farms where the component technology research and verification trials are carried out. The economic and agricultural engineering studies are carried out on areas where the development research activities are to be implemented. The economic studies are carried out with the object of providing information to the other members of the multidisciplinary research team with respect to the resource availability and utilization and the constraints to higher productivity faced by the farmers in the surveyed area. These data provide the development research team with a thorough understanding of the agro-economic environments of the area where this research is to be carried out and thus facilitate in the planning of the research activities to be undertaken so that the research implemented bears direct relevance to the needs of the farmers in the particular area.

The agricultural engineering research involves the study on the mechanization problems and needs of the area and the conduct of mechanization trials. These trials yield information on the possible areas to be mechanized and the type of machinery to be used based on the agro-economic environments of each area.

Insofar as development research on cropping patterns involving rice and other upland crops are concerned, as noted earlier, little work has been done except at the Kuala Brang site. Here, the work involves experiments with various cropping patterns with rice as the base crop. The cropping patterns being tested include rice and such upland crops as groundnut sorghum, soyabean and maize. What needs to be emphasized here is that this rice and non-rice cropping pattern studies are also carried out on a multidisciplinary basis as in the rice and rice pattern studies.

Prospects for Multidisciplinary Approach to Cropping Systems Research

The above discussion has hopefully given some idea of MARDI's multidisciplinary approach to its development research activities. Though the the discussion pertains to the Institute's development research and not to the cropping systems research per se, I feel that the multidisciplinary approach discussed is equally applicable to to the cropping systems research in the other participating countries. After all, the difference between our development research activities and the cropping system research lies not so much in the style or approach but rather in the contents (of the types of crops involved).

In cropping systems research, as in the case of development research, the very nature of the research activities to be undertaken require multidisciplinary research inputs, as the former research area also involves the various elements of component or package technology. For example, cropping systems research activities would need to include, one way or another, varietal improvement studies; agronomic studies; soil fertility studies; crop protection studies; socio-economic studies and technology verification studies. For an effective planning and implementation of these studies, the research contribution from the various relevant disciplines is an absolute essential. This is to ensure that the package of technology or the cropping patterns developed and recommended are technically sound, economically viable and socially acceptable to the farmers and thus would be readily adopted by them.

Any attempt at research based on one or two disciplines is likely to result in an incomplete technological package which does not offer a complete solution to the problems being researched.

A multidisciplinary approach to the cropping systems research enables the researchers to have a thorough understanding of the real (and not the assumed) "package of problems" faced by any particular farming area. These researchers are thus able to implement relevant research activities with the object of providing a more complete solution to the problems or constraints faced through technological package generation.

Some Problems in Multidisciplinary Research

Though multidisciplinary research is an effective approach in solving the various constraints encountered in bringing about an increase in agricultural productivity, the implementation of this approach invariably presents various operational problems. This section of the paper will only discuss some of the major problems likely to be encountered.

One major problem likely to be encountered is the ability to establish multidisciplinary research teams with a full complement of the relevant disciplines. This is brought about the shortage of research scientists faced by many countries. Even in the case of MARDI, with some 400 research scientists, not every development research team is equipped with a full multidisciplinary team.

Coordinating the activities of researchers from various disciplines to achieve common objectives is no meager task and is more easily said than done. There is likely to be a tendency on the part of the researchers to carry out their respective projects more in pursuit of their professional interest and research publications rather on pursuit of the objectives of the multidisciplinary research. This is understandable so long as the reward system is biased towards the list of publications attached to a particular researcher. Insofar as the researchers are concerned, their research contributions in a team approach is less visible and professionally satisfying than their contributions to their own disciplines through their own publications.

Thus, for any multidisciplinary research team, the team leader needs to provide strong and effective leadership. He has the immense task of putting together work programmes and get the cooperation of the other team members in achieving the objectives of the multidisciplinary research team, and at the same time allows some degree of flexibility to enable members of his team to pursue their professional interest.