Cropping Systems Research in Thailand ---- A Critique

Ch. Krishnamoorthy

In 1970, when cropping systems research was initiated in Thailand, approach of a pioneer was desirable and justified because the objectives were to (a) explored the area (b) define the scope (c) decide upon the direction to pursue. At that time it was necessary for the individual scientists to follow what, in their judgement, was the most appropriate. Since then, during the last 9 years, we have collected a mass of data and experience and the time is appropriate to systematize, formalize and, if necessary, institutionalize future research on cropping systems. We should now think in terms of cooperation, coordination among the agencies active in the area of cropping systems and the subject matter of research so that we may save time, energy and finances and, more importantly, transform research highlights of cropping systems into implementable practices for farmers adoption and ultimately into crop production development.

1. Organization and Structure

1.1 Cooperation: Multidisciplinary Research

As we move from varietal improvement to crop improvement programmes, we become increasingly concerned with regional adaptability of biological material and cultural practices. The interest, however, is limited to a particular crop. The optimization of individual crop production is necessary but not sufficient to develop cropping systems. In cropping systems the question is one of optimizing the system as a whole with respect to the most limiting resources physical, biological and socio-economic. In addition to resource utilization, improvement and management, other consideration prevail.

One can thus see the need for several disciplines working together with a focus on the systems. To my knowledge, there is little evidence of multi-disciplinary research in the country. At best, the project is sub-divided and contracted to several

branches departments. When the data and results come in, it is almost impossible to knit them together and tell the complete story. The project report reads more like the contributions of the various agencies than an integrated research report.

In order to improve the effectiveness and efficiency of cropping systems it is necessary to invest the coordinator with higher authority and responsibility. The cooperating scientists will be seconded from the various disciplines to the project. They together with the coordinator form the team which plans, executes and reports research. Implicit in this structure is that the cooperating scientists enjoy technical support and back stop from their discipline branches, even though they work in the project and are responsible to the coordinator for day to day work.

How this could be brought about within the existing heirarchial systems and rules and regulations, and what organizational changes are needed should engage our immediate attention.

1.2 Coordination Among Agencies

As far as I am aware, cropping systems research is actively pursued in the Universities of Kasetsart, Khon Kaen and Chieng Mai and in the Department of Agriculture. Within the Department of Agriculture, the Rice Division, Field Crops Division and Technical Division together with several Experiment Stations are participating. However, there is hardly any visible coordination, formal or informal, among the concerned agencies. True, there have been meetings and workshops, including the present one, for presenting papers and to a limited extent, for exchanging ideas. But coordination does not readily follow such meetings and workshops.

One may visualize voluntary coordination among the agencies. Alternatively, one may wait for a coordination committee to be set up from the top. Of these two, personally I prefer the first alternative which does not preclude the constitution of a formal coordination committee at a later date by an appropriate authority. Notice that this committee will be effective only as long as every one of the agencies recognizes the need for coordination.

The major functions of the coordination committee will cover (a) identification of research priorities in terms of national policy and goals, (b) agree upon the research which the agencies will undertake, keeping in view the available facilities, personnel and their specialized knowledge (c) remove bottlenecks and (d) review annually the programme of work.

1.3 Changes: from within or without?

When it is recognized that certain indicated changes are needed, the question at the operational level is how they should be brought about. A movement of importance (religious, social, economic or scientific) always originates with an idea of an individual, is chastised by discussion, accepted by a few dedicated followers who then "influence" others and is finally labelled.

I believe that within heirarchial systems there is sufficient freedom for individual thinking and group action. There is an urgent need to channelize this freedom to creative activities. For example, instead of emphasizing the restrictive and restraining nature of existing rules and regulations, one may seek the possibilities of utilizing constructively the authority and freedom that already exists at the various levels and then ask for more, if needed. While there might not be a positive encouragement for scientists of the various agencies to meet and discuss, such meetings of minds are not forbidden.

1.4 Accountability and Credit

In the present system there is no mechanism to allocate responsibility and apportion credit; there is no provision for rewards and incentives for outstanding performance. Why, then, should one work hard and devotedly? Rules and regulations do not provide us with an answer. On the other hand, it is social ethic and group attitude of the scientists that provide us with a clue. In the ultimate analysis, research is a self imposed activity and the burden will be lightened if there is recognition at least by one's peers and immediate superiors. In certain Branches there is

a practice of awarding annually the best researcher and best experiment station and this could be extended to several areas of research.

2. Subject Matter Areas

Because of my limited knowledge, I shall confine myself to cropping systems based on field crops and principally to the Northeast region of Thailand. We, in the Field Crops Division, have reviewed the past research done in the Division (and in a few cases outside it) on cassava, kenaf, corn and sorghum, and cotton based cropping systems and discussed them at various Divisional meetings. More important conclusions are summarized below.

2.1 Land forms and cropping systems:

Intercropping is most appropriate to uplands where most of cassava and kenaf are grown. There is not enough stored moisture to support a crop sequence.

There is need to distinguish three categories in Upper (Paddy) Terraces. Those adjoining uplands may be treated as extension of upland and those adjoining lowlands as wet paddies. At the intermediate levels of Upper Terraces flexible systems are needed depending on the season. In our opinion the Upper Terraces have a high potential for crop production but there is very little research information.

2.2 Crop Geometry:

The crop geometry of the base crop was accepted and intercrop was fitted in. While this worked well in the case of cassava and cotton based systems, it failed in corn and sorghum or kenaf based systems. We have therefore initiated studies to determine the widest row widths of corn and kenaf at which yields are not significantly reduced. Both systematic and conventional designs have been used.

Studies in Thailand (and in India) have shown that we should not have more than two rows of intercrop, say, of legumes in between rows of the base crop. Even then, there is a distinct advantage in pairing the two rows. Studies are underway to arrive at the best geometry (uniform and paired rows) when it beocmes necessary to accommodate more than two rows of are intercrop.

2.3 Population density:

We find that the population density of an intercrop should be higher than that of a sole crop. This is because development and yield components of the intercrop are reduced. For example mungbean does not branch heavily and peanut pods per plant are fewer. We are examining this question with mungbean and peanut in cassava and kenaf based intercrop systems.

2.4 Choice of intercrop:

Choice of watermelon, pumpkin, corn for cobs and stringbean and soybean for green pods is open to criticism because of limited market and inelastic demand. In any case, even if such sequences are otherwise acceptable they can not be offered as a general solution because of the wide disparity between the area under field crops and the above mentioned crops.

Among the legumes, performance of peanut was more stable than that of mungbean or soybean in the Northeast. Cowpea was another stable crop.

2.5 Varietal improvement:

Except for soybean, there was practically no attempt to develop varieties of food legumes suited to intercropping short stature, erect and capable of standing overcrowding within the row. In the case of corn and sorghum, was it necessary to have such tall varieties?

2.6 Differential planting of component crops:

There was no unequivocal evidence in favour of differential planting, except in corn based intercrop systems. Even so, the practice will not acceptable to farmers because it involves sowing the same land twice.

2.7 Analysis of data:

No detailed economic analysis of data was done. Even the gross returns were not statistically analysed but only mean returns recorded.

2.8 Conclusions:

Reasonably good L.E.R. was obtained with cassava based systems. The problem was to increase the yield of the legume component. Paired row technique is indicated to increase simultaneously plant density and minimize intraspecific competition.

Because of relatively narrow spacing and tallness of kenaf it is necessary to pair both kenaf and legume rows. The same applies to corn or sorghum based systems.

The two major cotton based systems are (a) relaying with corn and (b) intercrop systems with legumes. Cotton-legume intercrop systems which are flexible enough to permit planting of both the crops at their optimum dates have been developed. Depending on the season and site conditions, the systems may be intercropping, relay cropping or sequence cropping.

3. Summary and Conclusions

The period of exploratory research is over. Much more systematic and basic study of cropping systems is now needed. This will become possible when we develop cooperative and coordinated projects. How to bring them about in the existing milieu deserves our immediate attention.

We are at best at the stage of identifying biologically efficient systems. We have long ways to go regarding soil fertility maintenance through cropping systems. We are yet to consider the socio-economic implications of our experimentally best systems. We are still far from recommendations to farmers which involves not only knowledge of what is to be done but also how it should be accomplished on farmers' fields under farmers conditions and with their own resources.

****