

PN-AAS-221

INSTITUTIONALISING FARMING SYSTEMS  
RESEARCH IN ZAMBIA

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S.A. KEAN AND W.M. CHIBASA

## SUMMARY

Farming systems research represents a new direction for agricultural research and several countries in Eastern and Southern Africa are presently including such accomponent within their research programmes. Zambia is one such country and as part of the recent restructuring of the Research Branch of the Department of Agriculture a major element of the new structure is the inclusion of a team to undertake farming systems research namely, the Adaptive Research Planning Team. The establishment of the Adaptive Research Planning Team to do this work followed demonstrations by C.I.M.M.Y.T. of methods that could be used to plant adaptive and applied research. This paper outlines how, once accepted, the farming systems research approach was incorporated into the overall Research Branch structure.

## AGRICULTURAL RESEARCH IN ZAMBIA

Most agricultural research in Zambia, particularly crop research, is conducted by the Research Branch of the Department of Agriculture. Until the present season, 1981/92, this research was carried out almost exclusively on the network of research stations and sub-stations across the country. The research was originally conducted by scientists working on a disciplinary basis (e.g. breeding, agronomy, plant protection etc but recently these researchers have been reorganised into multidisciplinary Commodity Research Teams e.g. Cereals, tubers, oilseeds etc.

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S.A. Kean - Farm Management Research Officer is Coordinator of the Adaptive Research Planning Team, Department of Agriculture, Mulungushi House, Lusaka, Zambia.

W.M. Chibasa - Assistant Director of Agriculture (Research), Department of Agriculture, Mulungushi House, Lusaka, Zambia

In the course of several evaluations of the Research Branch, it became apparent that there were several features of the nature and structure of the research programme which were inhibiting the production of relevant recommendations which could be rapidly adopted by the majority of Zambia's traditional and small scale commercial farmers, who form approximately 85% of the total rural population. There were four main problem areas which stood out.

1. Ineffective research programme formulation

The Research Branch had no effective means of identifying the problems of specific groups of farmers, neither was it able to formulate research programmes to meet their specific needs. Research workers had minimal contact with small scale farmers and they tended to pursue their own specialised interests. The procedure of Research Tours, Experimental Committee meetings and Research Committee meetings rarely prevented the tendency of the research programme to centralise around the arbitrary decisions of the Commodity Coordinators, based at Mount Makulu the Central Research Station, thereby inhibiting the policy of paying more attention to local problems. The recommendations which were produced were for a province as a whole, only barely recognising that within the province there might be several different types of farmers, each facing different circumstances and problems and thus requiring different sets of recommendations. The end result was research programmes which produced technology for which there was only limited demand, usually amongst the medium and large scale commercial farmers.

Single crop or activity approach

The research programme tended to look at each crop or activity e.g. weeding, in isolation from other crops or activities. In particular, livestock research, which still forms only a small component of the research programme, was not related to crop research. In short, there was no farm systems approach looking at the farm in totality; its crops; livestock and off farm enterprises, as well as the interactions between them.

3. Neglect of economic and social factors

The research undertaken was carried out almost exclusively by natural scientists who worked with only the natural factors affecting farmers e.g. soil, climate, pests, diseases etc. No attention was given to the social and economic factors e.g. farmers' priorities, their resources, producer and input prices, markets etc. which affect the decisions farmers make in managing their farms. When evaluating trials the natural scientists would almost always do so in terms of output per unit area, although in most of Zambia, labour is the limiting resource and thus it would be sensible to consider also. output per unit of labour.

4. Insufficient on-farm trials

The majority of research trials to date have been undertaken on research stations, normally using techniques involving intensive levels of management, mechanised land preparation, high fertiliser levels and other agronomic factors at optimum levels e.g. keeping crops clean weeding throughout trials. However, agronomic conditions on research stations with such intensive management practices are often quite different from those conditions facted by farmers in their fields. The location of research stations are also sometimes not representative of the area where the majority of farmers are found. Through on-farm trials it is possible to formulate and evaluate technologies under farmer conditions and to do this at many locations, not just at the research station.

BACKGROUND TO THE ADAPTIVE RESEARCH PLANNING TEAM

Having recognised these weaknesses within the agricultural research programme, the Ministry of Agriculture and Water Development responded favourably to a request by C.I.M.M.Y.T.'s East African Economics Programme to demonstrate a set of procedures which could improve the research programme formulation. C.I.M.M.Y.T. undertook two demonstrations; the first showed how to identify different recommendation domains, in which farmers are grouped according to their resource constraints

and development opportunities. The second demonstration was of diagnostic survey techniques which could be used to pinpoint the important points of leverage in a farming system, around which adaptive and applied research programmes are formulated. An important feature of these techniques is that they aim to describe and understand farming systems and do not entail detailed quantitative data collection and thus they are relatively quick and cheap.

Following these demonstrations, the Steering Committee monitoring them gave its approval for the procedures to be incorporated into the Research Branch and the Adaptive Research Planning Team is the end result.

#### DIFFERENT OPTIONS FOR INCORPORATING FARMING SYSTEMS RESEARCH INTO THE RESEARCH BRANCH.

Several options were considered for incorporating diagnostic farm survey work and on-farm trials into the structure of the Research Branch.

The first would have been to undertake a very major reorganisation and establish regional research stations or institutes which contained all the different disciplines and would have been capable of focussing on all agricultural enterprises and problems in a particular ecological zone. However, this was never a real possibility, because it was at variance with the already agreed policy of establishing multidisciplinary Commodity Research Teams, which would be responsible for working on different crops, livestock and other activities for the country as a whole (for the complete list of the Commodity Research Teams see figure 1). Thus, although these Commodity Research Teams (C.R.T.s) are based in the most appropriate provinces, they have a mandate to serve all provinces and the different ecological conditions found within Zambia.

The second option was to include several social scientists in each of the C.R.T.s, thereby making them truly multidisciplinary. However, the main problem with this was that the social scientists would still not have a complete farming systems perspective if they were expected

to focus only on problems related to the particular Commodity Research Team in which they were working. Additionally, such an approach would have entailed each C.R.T. carrying out its own surveys and then on-farm trials on the different farming systems, thus resulting in massive duplication of effort, as well as confusion to farmers as different C.R.T.s could have been working side by side in an area.

The third option recognised that the Commodity Research Teams have a national focus, but that farming systems research has an area focus and thus two separate but complementary approaches would be required. In addition, it was recognised that adaptive on-farm research requires different organisation and management from applied research on research stations, which would be better handled by a different team than by the Commodity Research Teams. Thus to cater for these different needs and to complement the Commodity Research Teams, it was decided to establish the Adaptive Research Planning Team.

#### OBJECTIVE AND FUNCTIONS OF THE ADAPTIVE RESEARCH PLANNING TEAM

The Adaptive Research Planning Team (A.R.P.T.) brings together social and natural scientists, who examine the different farming systems in order to plan and undertake adaptive research programmes. The overall objective is to produce recommendations which are relevant to the needs of the majority of Zambia's farmers, especially the traditional and small scale commercial producers.

The main functions of the A.R.P.T. are as follows to:-

- i) Collect information on the different farming systems in Zambia which will be used to formulate relevant adaptive and applied research programmes.
- ii) Undertake adaptive research especially on farmers' fields.
- iii) Through the programme of on-farm trials, improve the link between research and extension staff.

- iv) Make information available to relevant institutions e.g. those dealing with extension, input supply, credit, marketing etc. to assist them in preparing projects, which will remove particular institutional and infrastructural problems facing farmers in different recommendation domains.

#### ORGANISATION OF THE ADAPTIVE RESEARCH PLANNING TEAM

The Adaptive Research Planning Team will eventually have a Farm Systems Agriculturalist and a Farm Systems Economist in each of the nine provinces of Zambia. They will both be based at the Regional Research Station in each province. There will also, initially be one Rural Sociologist working in the team for the country as a whole, but this number is very likely to be increased. In addition, there is a coordinator responsible for the programme and for liaising with other departments and organisations, especially those which can use the data collected in their project planning.

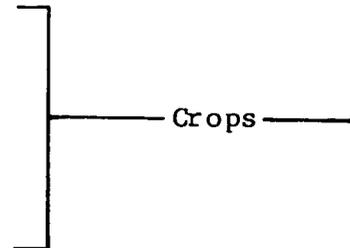
#### ROLE OF THE ADAPTIVE RESEARCH PLANNING TEAM IN THE NEW RESEARCH BRANCH STRUCTURE

The new Research Branch structure combines both the national commodity focus on the Commodity Research Teams and the area focus of the Adaptive Research Planning Team. This is illustrated in figure 1.

The Commodity Research Teams are based at different regional research stations and are conducting applied research in order to find potentially useful technical improvements, or to solve technical problems in the different agroecological areas of Zambia. The C.R.T.s are largely involved with plant introduction i.e. selection and breeding, conventional agronomy trials and tests of new chemicals e.g. herbicides and pesticides. That is, they are working at present solely within technical or natural parameters e.g. climate, biology, soils but it is expected that, as more social and economic data are collected by A.R.P.T., these too will help to shape the content of the applied research programme. From the diagnostic surveys undertaken by A.R.P.T. certain specific problems will inevitably arise, to

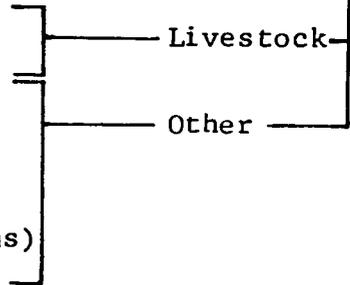
NEW STRUCTURE  
DEPARTMENT OF AGRICULTURE

Cereals  
 Oilseeds  
 Fibres  
 Tubers  
 Vegetables  
 Trees and Plantations  
 Grain Legumes  
 Tobacco



Crops

Beef  
 Dairy  
 Food Conservation + Storage  
 Farm Machinery and Tillage  
 Plant Protection  
 Weed Control  
 Soil Productivity  
 Intercropping (Cropping Systems)  
 Irrigation



Livestock

Other

COMMODITY  
 RESEARCH  
 TEAMS (CRT)  
 (National Focus)

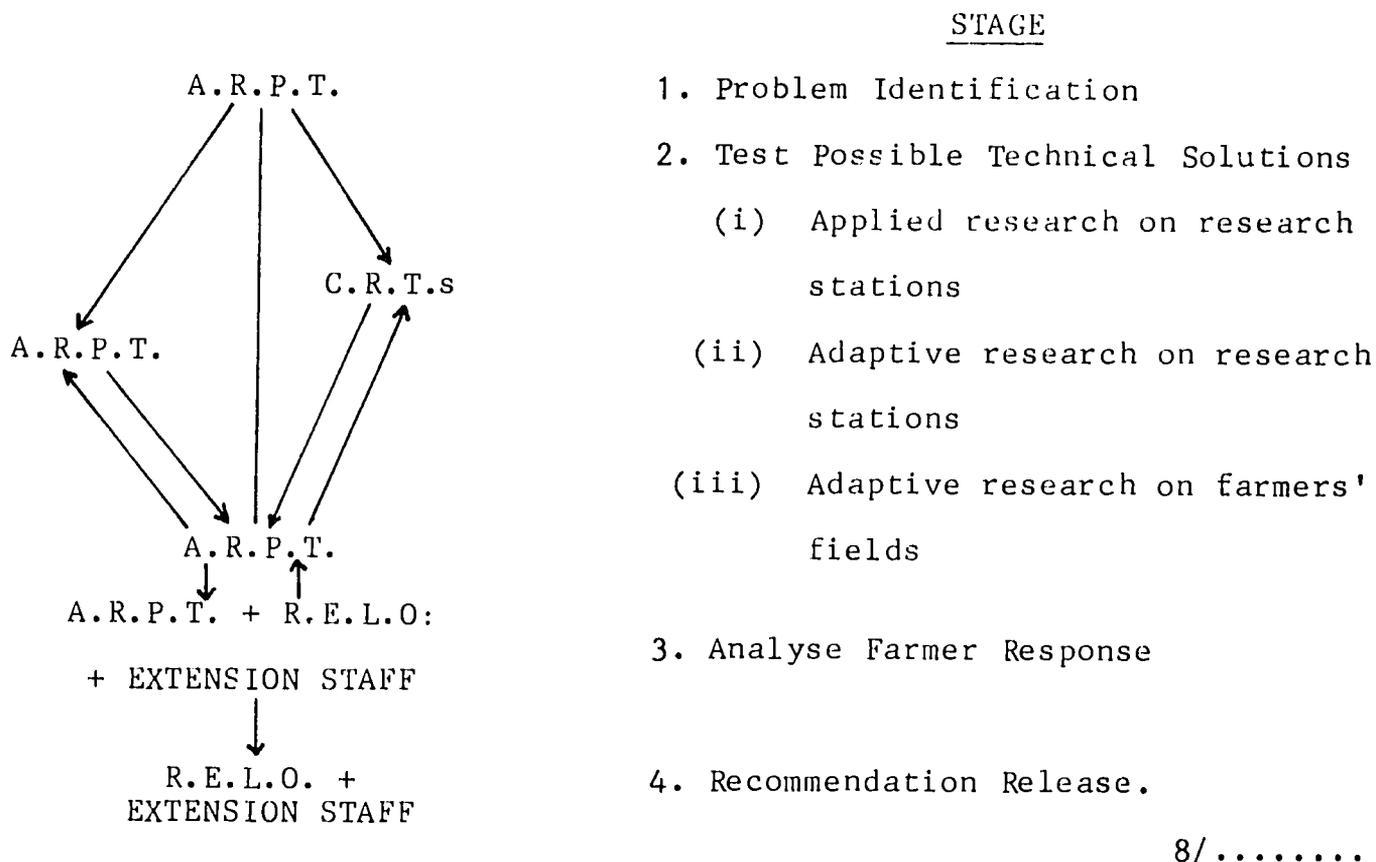
ADAPTIVE  
 RESEARCH PLANNING  
 TEAMS (ARPT)  
 (Area Focus)

Lusaka  
 Northern  
 Luapula  
 Copperbelt  
 North Western  
 Eastern  
 Central  
 Southern  
 Western

2

which there will be no immediate technical solution and these problems will be channelled to the relevant C.R.T.s. It is anticipated that eventually the nine A.R.P.T.s will be providing up to 60% of the C.R.T.s applied research programme.

There will be several ways in which the C.R.T.s can participate in the work of the A.R.P.T. and these are best understood by following the sequence of A.R.P.T.s activities from Problem Identification to Recommendation Release. This can be illustrated as follows:



STAGE ONE - PROBLEM IDENTIFICATION

The first step for A.R.P.T. is to identify the different farming systems and their coverage (i.e. recommendation domains) in each province. This zoning exercise groups farmers with similar priorities, resource levels, activities and problems into broadly homogenous

\*R.E.L.O. = Research Extension Liaison Officer.

categories, each of which requires its own set of recommendations. From the information collected the recommendation domains can be listed in the order of priority in which they should be surveyed in detail.

For each recommendation domain exploratory surveys are then undertaken to discover the basic characteristics of the farming system and thus enable the more detailed questionnaire to be drawn up for the main verification survey. Scientists from those C.R.T.s dealing with crops and activities relevant to the particular recommendation domain participate in the exploratory survey for one or two days in order to gain an understanding of the particular activities with which they are concerned. They then contribute to drawing up the detailed questionnaire.

The verification survey investigates in detail the priorities, resource constraints, management strategies and development opportunities of the farmers and assesses their reaction to possible technical solutions. From the data collected, the A.R.P.T. Agriculturalist and Economist, together with natural scientists from relevant C.R.T.s draw up a research programme which could comprise both applied and adaptive research.

#### STAGE TWO - TEST POSSIBLE TECHNICAL SOLUTIONS

At this stage the A.R.P.T. and relevant C.R.T.s undertake the adaptive and applied research programmes identified at Stage 1.

(i) Applied research on research stations:

When there are no possible technical solutions to farmers' problems which could be tested on farmers there will need to be applied research carried out by appropriate C.R.T.s. This research is often long term and technical in nature and aimed at one or more agroecological areas, comprising e.g. plant breeding, variety introductions, soil productivity trials, tests on new pesticides and herbicides etc. Such research has to be undertaken on research stations, usually under high management conditions.

- ii) Adaptive research on research station: From all the research that has been undertaken to date, there exists a pool of data and possible technical solutions appropriate for certain agroecological areas which could prove, with or without modification to be acceptable to farmers in several recommendation domains. A.R.P.T. and C.R.T. staff examine the possible technologies existing for a farming system and decide which can be tried immediately on farms and which need adaptation on research station first. Some technologies may require testing on research station but under management levels similar to those of the farmers e.g. testing an intercropping pattern keeping fertiliser levels and timing and frequency of weeding at those levels used by farmers. The need for this type of research could arise when, for example, an idea has come from research done in other agroecological areas or countries and again when the possible solution has only been tested at high management levels. This type of adaptive research is likely to cover mainly agronomic issues and may be carried out by either the A.R.P.T. or appropriate C.R.T.. It may prove necessary to carry out such research on unit farms in order to be able to simulate farmer conditions more effectively. If the trials at this stage appear satisfactory, they will then go on to be tested on farmers' fields, but if problems appear they will be referred to the C.R.T.s for more applied research to be undertaken.
- iii) Adaptive research on farmers' fields: If a possible solution needs no research station testing, it is tested on a limited number of farmers' fields in the particular recommendations domain. The trials, put on by A.R.P.T., may be on between six and nine farms and involve using the farmers' land and labour, whilst the managerial input is provided by A.R.P.T., who also bear the risk element of the trial. If the limited number of farmers accept the possible solution after two or three seasons, it can then be tested without A.R.P.T. support (see Stage 4). However,

if the technology is unacceptable to farmers, then it is referred to the relevant C.R.T. for more applied research to be undertaken. The methodology for conducting these trials is being carefully monitored to assess particularly the complexity of trials that can be effectively managed and understood by farmers.

#### STAGE THREE - ANALYSE FARMER RESPONSE

Once a possible technical solution has been accepted by farmers under the controlled management of Stage two, it is tested by many more farmers in the vicinity of the on-farm trials. At this stage A.R.P.T. support is withdrawn and farmers provide land, labour, capital and management. This test of farmer response is closely monitored by A.R.P.T., the Research Extension Liaison Officer and other extension workers. If the solution is unacceptable, it returns to Stage two for further research but if the response is favourable, the solution will become a recommendation for all the farmers in the recommendation domain.

#### STAGE FOUR - RECOMMENDATION RELEASE

When solutions have been accepted by farmers they are included as recommendations in the crop memo for the particular recommendation domain.

#### LINKAGES BETWEEN THE ADAPTIVE RESEARCH PLANNING TEAM AND OTHER ORGANISATIONS

The A.R.P.T. affords the opportunity for closer links to be developed between those involved in agricultural research and other individuals and institutions providing services to farmers. The cooperation can be achieved mainly by A.R.P.T. sharing the data it collects with those who plan projects and develop policies aimed at improving such services.

1. Extension Branch

The A.R.P.T. has very close links with the staff of the Extension Branch in the Department of Agriculture, especially those at the grass roots agricultural camp level. The camp level staff are involved at all stages, from providing information of their area to help with the zoning of the farming systems to managing the on-farm trials and organising farmer comment sessions to help analyse farmers' reactions. Provincial and District level officers are also involved at certain important points in the sequence. There are also Provincial Research Extension Liaison Officers in the Extension Branch who will be working side by side with A.R.P.T., especially during the on-farm trial and farmer response stages. In these ways it is expected that the gap between research and extension workers will be narrowed.

2. Agricultural support services

In an attempt to ensure that farmers are not prevented from adopting the technology emanating from A.R.P.T. because of problems with ineffective agricultural services e.g. extension, input supplies, credit, marketing, information collection by A.R.P.T. on such problems will be channelled to the planning sections of the relevant institutions at District, Provincial and National levels.

THE NEED FOR A FLEXIBLE APPROACH

Farming systems research is a totally new approach for agricultural research in Zambia and, because of this a very flexible approach is required, which is capable of adopting any ideas which improve the effectiveness and relevance of the work undertaken by A.R.P.T. Changes have already been made in the structure and methodology to make them more effective and at present several issues are under study, including; the appropriate size and nature of a sociological input into A.R.P.T., the use that A.R.P.T. can make of quantitative nutritional data, the need for quantitative farm management data from frequent visit surveys, the conduct of on-farm trials and the need for unit farms. On all of these subjects and, indeed, on the structure as a whole, critical analysis is required and any information from experiences in other countries is most welcome.