ORGANIZATION OF AFRICAN UNITY
SCIENTIFIC, TECHNICAL AND RESEARCH COMMISSION
(OAU/STRC)

FARMING SYSTEMS RESEARCH PROGRAMME

CONCEPTUAL FRAMEWORK OF THE IFAD-SUPPORTED FSR ACTIVITIES

The Coordination Office
OAU/STRC/SAFGRAD
BP. 1783 - Ouagadougou, BF

October, 1987

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Rec 13-11-87.

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The focus of the Semi-Arid Food Grain Research and Development project SAFGRAD has been to provide the ~~knowledgeable~~ base necessary to achieve significant increases in food grain production in its 27 member countries. FSR programmes are implemented to develop sets of location specific improved farming practices that could sustain high yields under small farm conditions.

The development of FSR varies considerably among countries influenced by ~~previous~~ experiences, prevailing constraints, the availability of research results, manpower, financial resources and institutional environment. A broad analysis of the physical environment in which the application of technology occurs is a prerequisite for the development of the FSR programme. FSR should be based on farmers' goals and preferences, and the social and biological environment within which particular constraints and sub-system of production operates. The FSR conceptual framework brings together on-station scientists and development planners to a closer understanding on the perspectives of total farm interactions. The FSR process allows a "holistic approach" rigourous testing of technological innovations not only to attain increased yield but also to ensure that new practices are adaptable, profitable and sustainable.

The FSR development programme that is being pursued through the IFAD support comprises of sub-systems of production (such as cropping, livestock, agroforestry, etc..) and management of available resources (such as labour, land, capital, off-farm activities). FSR is based on systems approach and looks into the interactions, interdependance of the sub-systems of production in order to optimize recycling

of resources and economic complimentarity among FSR components under specific environmental and socio-economic condition. FSR philosophy and methodology is that it places special emphasis in the systems approach in the design and dissemination of improved agricultural technologies based on the farmers' need. An FSR team of multidisciplinary nature work together to identify farmers' constraints so that new technologies and research results from research stations can be adapted more closely to farmers' conditions and needs. Concurrently, the performance of improved technology and farmers' reactions to it, is fedback to thematic researchers and policy makers.

The productivity of a farm is a function of the environment and the management alternatives available. The latter refer to those factors which are subject to modification. These factors are researchable and can optimize agricultural productivity with respect to specified performance criteria. (6)

Approaches to FSR range from those which assumed that factors can be modified, such as public policy, to those which assume that only modest reforms within interventionist approach with marked changes. The second or submissive approach, however, gives rise to the design of technologies with a similar impact on the short term (11).

FSR process

The objectives of the FSR process under various conditions is to analyse and understand farmers' production systems ; to identify constraints of food production and set out priorities of research ; with farmers' participation, to evaluate technologies to provide solutions so as to alleviate constraints ; to establish functional linkages with development units and to dynamize the national extension system through improved technical interventions ; to provide feedback into the research programme and improve its reorientation and allocation of resources ; and finally to influence agricultural research policy so that farmers would have the incentives to increase food production.

At the meeting of 2 - 3 March, 1987 of the IFAD supported FSR activities, the following definitions and overall conceptual framework was agreed upon (1,6) :

Definitions and clarifications

1. There is a need for a "holistic approach" to agricultural research.

The discussions focused about whether FSR should be considered as a methodology, a science, a discipline, a research approach or a methodological approach. It was finally agreed that FSR should be considered a "holistic research approach."

2. Characteristics of FSR

a. It looks at the farm as a whole, including family labour
b. It is an interdisciplinary research.
c. The farm includes subsystems which are :

- cropping subsystems
- livestock subsystems
- trees and shrubs, and
- off-farm activities.

3. FSR output

Expected output from FSR includes :

a. Generation of improved adapted technologies ;
b. Reorientation of agricultural research priorities, and
c. Provision of inputs into agricultural policy.

Institutional framework by FSR practicioners

It was unanimously agreed that the most appropriate institutional arrangement is an integration of FSR within National Agricultural Research structures (NARS). The question was then asked, "in what form should it be implemented ?". The existing institutional arrangements were reviewed and their advantages and disadvantages were pointed out :

(a) FSR as a department

Advantages

- horizontal connections with other departments ;
- vertical links with policy-making decisions ;

- strong and well defined operating procedures and operational set-up ; and
- could attract more resources.

Disadvantages

- could get too big and become competitive with other research departments ;
- could lead to overlapping of research mandates of different departments ;
- could create frictions and interdepartemental communication problems ; and,
- could tend to look inward rather than opening out, thus leading to "compartimentalisation".

(b) Interdisciplinary research committee

A typical example of such an institutional arrangement exists at Ahmadu Bello University in Nigeria (Faculty of Agriculture and Institute of Agricultural Research). Different programme leaders are requested to contribute their expertise to a common FSR programme. The basic idea is to have individual team members, provided by their respective departments, to work together on an FSR programme.

The advantages of such a committee are that it allows researchers to retain their departmental affiliation and identity, creates less friction between departments, has a better chance of transforming the methodology of agricultural research and of generating a long lasting programme.

As a disadvantage, it may not attract funds because the programme has diffused boundaries and departmental interests.

(c) Project

Acceptable, if established within the National Agricultural Structures. ?

Pro ...
Con ...

In conclusion all three institutional arrangements have advantages and disadvantages. In order to choose the appropriate arrangement, each country should begin by studying its own National Agricultural Research structures. The programme should then try to establish research links with the national universities and get senior staff and students involved in FSR work.

FSR Stages

Pre-diagnosis

In the three countries of the IFAD supported FSR activities, a multidisciplinary FSR team untertook reconnaissance ex ante survey to identify primary and secondary problems of food production. Global constraints are well known to farmers themselves (i.e drought, soil fertility degradation, shortage of livestock feed during the dry season, etc.,). Critical and indepth literature reviews were carried out concurrently with field surveys to acquire broad base data on existing farming systems practices and improved technologies. Constraints were ranked according to their importance (although conditions may change). Research objectives and strategy were developed based on exploratory and informal surveys and following inventory of available technologies and resources. Reconnaissance surveys, furthermore, familiarized the FSR team with actual farm situations and farmers perceptions in making adjustments and solutions to specific constraints . (2, 7)

Diagnosis - is a descriptive phase and involves analysis of existing farming system practices providing data of farm resources, where the total farm environment could be examined. During this stage, attempt was also made to understand farmers' decision-making process, goals, objectives and motivations as determinants that could affect the development of appropriate farming system. In general, the diagnosis phase could be viewed as quantification of different farming systems variables i.e determination of the existing input/output coefficients and assessment and sequencing of known technologies to alleviate particular food production constraints (. 2, 4, 5).

Design stage

The need was expressed by the farmers for the current FSR programme to be formulated. This entailed broader participation and cooperation of commodity or thematic researchers, extension agents, farmers. A range of strategies are being identified to address constraints delineated in the prediagnosis and diagnosis stage. The designing of the FSR programme also depends on research results and data available from experiment stations, through on-farm testing, technical information obtained from development agencies and on technologies that were being utilized by farmers .

Testing and evaluation

There is also a continuous dialogue among thematic researchers and FSR practioners whether initially evaluation of improved technologies should be carried out on experiment stations since conventional researchers test technologies in a disciplinary manner and not through an interdisciplinary research approach. Evaluation of research results through FSR approach takes into account linkages between sub-systems of production in order to exploit the recycling of resources and economic complimentarity among FSR components. Considering the technical and socio-economic determinants that affect the development of suitable farming system an interdisciplinary research team is required under farm conditions. The two approaches that were being employed to test technologies were :

(a) "Researcher-managed trials"
Within SAFGRAD FSR approach, technologies are initially evaluated by an FSR team at primary village sites. Once promising combination of technologies are identified several researcher managed trials are conducted on-farmers' field.

(b) "Farmer-managed trials"
Monitored by an FSR team, but implemented by farmers. Farmers themselves could also be responsible for testing, managing and implementing of trials.

Technology dissemination

Farmers themselves and the national extension or rural development agencies play a key role in the dissemination and application of technologies, as well as the implementation of research strategies. Some of the promising interventions which are technically sensible, financially profitable and socially acceptable to farmers have a good chance for adoption. One of the principal output of the adoption of suitable technology is to narrow the yield gap realized on-station, and that on-farmers' field. Farmers feedback on performance of technologies may also open new research opportunities.

In practice, FSR activities could be initiated at any of the stages mentioned above and much depends on available research results, information of farming practices and related development activites.

In Burkina Faso, during the first year (1985), testing and evaluation was continued on former FSU villages since socio-economic baseline data and technologies were available. The focus of the FSR activities during that year has been to verify various technological options that were recommended. Due to changes of research policy and reorientations, in Burkina Faso, it became necessary to change FSR sites. Diagnosis and design stages of FSR were carried out simultaneously, in order to identify and establish FSR activities at the current primary and secondary village sites in the Mossi Plateau. Testing and evaluation of technologies as well as their economic feasibilities through research and farmer managed trials were established on new sites since 1986.(7, 9, 11).

In northern Benin, FSR information was virtually lacking. Although the programme was initiated in March/may 1985, at the begining of the growing season, quick exploratory surveys were carried out. Concurrently, design and testing and evaluation of researcher managed trials were started in order not to miss the season. At the latter stages of development of FSR in northern Benin, existing farming practice, in the three ecological zones (northern Guinea savana, Sudan and Sahel savana) constraints and research priorities were established based on more refined farm resource surveys..(2, 3, 8)

IFAD-supported FSR activities in northern Cameroon became operational in 1986. Reconnaissance survey, assessment of available technologies, design of soil and water management conservation techniques and the evaluationof improved technologies were carried out simultaneously, since the data base for agronomic research was adequate. Continued resources inventory baseline studies have contributed not only to the identification of constraints but also indicated the need for functional linkages and indepth dialogue of the FSR team with on-station research, development agencies and farmers.(10)

Improvement of national FSR capacity is not an easy task and requires a long process, for the following reasons :

1. Perceptions of FSR vary considerably among researchers, policy makers, development agencies and research administrators.

2. Institutionalization of FSR within a particular NARS is slow and could delay the evolution of relevant farming system.

3. FSR scope was limited to cropping systems in many countries of Africa without concurrent integration of complementary sub-systems of production (i.e livestock, agroforestry, etc..).

4. The efficiency of external technical FSR support is much influenced by particular NARS research capabilities such as institutional setting, linkages, defined research objectives, priorities, and perception of FSR. As a result, the pace for developing relevant farming system is much influenced not only by available resources, environmental and socio-economic factors but also to the interactions of the above mentioned research parameters.

With regard to IFAD-supported FSR activities in the three countries (Benin, Burkina Faso and Cameroon), multidisciplinary research is pursued on FSR principles in order to tune technologies suitable to resource poor farmers "target group", of the project.

The emphasis of the project is to develop technologies that require low-input by optimizing the recycling of resources among FSR sub-systems of production with major emphasis of improving the total farm environment for productive agriculture. For example, the integration of animal production system enhances crop production through traction, incorporation of manure, construction of soil and water conservation structures and also provides economic incentives : meat, milk, labour, etc.. Concurrently, crop residues, if properly utilized, not only can be used as livestock feed but also as mulch to improve the soil fertility, its texture and water holding capacity.

Through collaborative activities of ICRAF/SAFGRAD, the agroforestry sub-systems

of FSR was initiated in the three (in 1987) countries through IFAD support. This component of FSR , although an old practice, is a new research approach. Its integration to food production system contributes not only to the production of fuel wood, for construction, but also increase crop production by improving the fertility of the soil, water and soil conservation. Useful trees also serve as livestock feed. Forage legumes link crop and livestock production sub-systems (as source of feed and improvement of soil fertility through nitrogen fixation).

The IFAD-supported FSR programme is unique, in that, for the first time, (within national framework) it is evaluating the resource and economic complementarity of the above mentioned sub-systems of food production. Given adequate gestation period, for FSR development, it is expected that stable and sustainable systems of food production could be realized.

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1987-10

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