





# FARMING SYSTEMS RESEARCH PROGRAMME

PROGRAMME REVIEW OF THE IFAD FSR GRANT SUPPORT N° 110 2 - 6 MARCH 1987 OUAGADOUGOU, BURKINA FASO

SAFGRAD SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT ORGANIZATION OF AFRICAN UNITY
SCIENTIFIC, TECHNICAL AND RESEARCH COMMISSION
(OAU/STRC)

PROGRAMME REVIEW OF THE IFAD FSR GRANT
SUPPORT N° 110
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OUAGADOUGOU, BURKINA FASO

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SAFGRAD
SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT

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#### PROGRAMME REVIEW

#### FSR - CONCEPTUAL FRAMEWORK

On March 2nd and 3rd 1987, a meeting was held at the SAFGRAD Coordination Office in Ouagadougou to discuss the Farming Systems Research (FSR) concept. The meeting was to define and agree on a conceptual framework to guide the IFAD-financed FSR activities being carried out in Benin, Burkina Faso and Cameroon. The participants included the Director of Research of SAFGRAD and all SAFGRAD scientists who are members of the three FSR teams. They were joined by three Burkinabe scientists who are members of the Burkina Faso national FSR programme. Agreements were reached on the following points:

#### I. DEFINITIONS AND CLARIFICATIONS

# 1. A HOLISTIC APPROACH TO AGRICULTURAL RESEARCH

There were discussions about whether FSR should be considered as a methodology, a science, a discipline, a research approach or a methodological approach. It was fully 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. Re-orientation of agricultural research priorities; and,
- c. Provision of inputs into agricultural policy.

# INSTITUTIONAL ARRANGEMENTS

It was unanimously agreed that the most approapriate 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 advantage and disadvantages were discussed.

# 1. 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 interdepartmental communication problems; and
- could tend to look inward rather than opening out, thus leading to "compartimentalisation".

# 2. 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 as the programme has diffused boundaries.

# PROJECT

Acceptable if established within the National Agricultural Research Structures.

In conclusion all three institutional arrangements have advantages and disavantages. In order to choose the appropriate arrangement, each country should begin by studying the 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 IMPLEMENTATION

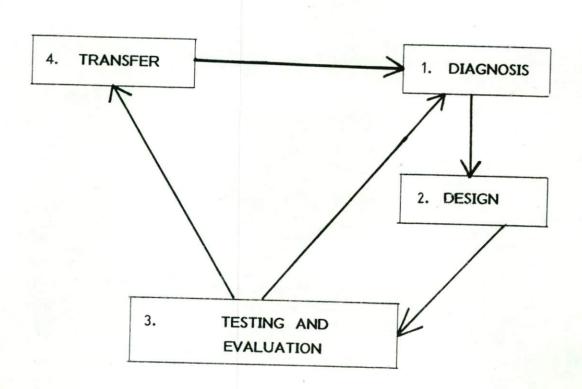
FSR activities or research stages have already been defined. Because research "activities" or "stages" are often executed simultaneously, it was decided that the term FSR "activities" would be less misleading than "stages".

Having compared various lests of FSR "activities" fundamentally different activities were distinguished, each one including subactivities:

Activity	Subactivity	
1. DIAGNOSIS	<ul> <li>constraint identification</li> <li>farmers' own solutions</li> <li>current systems description</li> <li>literature review</li> <li>hypothesis formulation</li> </ul>	
2. DESIGN	. as function of the need expressed by the farmer.	
3. TESTING AND EVALUATION	. Farmers objections	
4. TRANSFER AND EXTENSION	<ul><li>pre-extention</li><li>extension</li><li>adoption studies</li></ul>	

The transfer stage also includes the transfer of inputs to policy making decision.

The four activities can be linked as follows:



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#### IN-HOUSE REVIEW MEETING

Ouagadougou, March 5 - 6, 1987

# I. SAFGRAD/BENIN FSR PROGRAMME

Discussion of the Benin FSR Programme focused on ways to improve the technical and economic analyses of the agronomic trials conducted in 1986; the need to reduce the scope of the programme in view of the size of the SAFGRAD/Benin mandate area and suggestions for improving the presentation of the final 1986 annual report and the implementation of the final 1986 annual report and the implementation of the 1987 research proposal.

Summary and preliminary conclusions of the 1985-86 research activities

- Over the last two years the programme has evolved in two directions;

  (a) socio-economic studies in 6 sites; and (b) agronomic trials (researchermanaged) in three agro-climatic zones of northern Benin. Detailed results are reported in the 1985 annual report.
- In 1986 the programme focused on agro-economic studies to measure field level environmental and managerial variables on selected farms in the three agro-climatic zones. There was also the repetition of research-managed trials to confirm the 1985 trend. In addition, more trials were initiated to include other cultural practices of major farming activities of northern Benin including yam production, forage crops and forestry production systems.
- The preliminary conclusions were. 1) Improved varieties of maize (TZB) and sorghum (Ghana 1) outyielded local varieties under most conditions.

  2) Local and improved varieties respond positively to the application of inorganic fertilizer. 3) Yields of individual cereal crops are reduced when grown in association; however, the total yield per unit area is generally the same. The motive for growing crops in association has more to do with socio-economic factors than with agronomic factors. 4) There is no agronomic advantage in growing maize in association with cotton.

5) The advantage of cereal/legume association has yet to be established. Legumes grown as green manure (fodder) might be more beneficial to cereal crops than legume grown for grain. 6) Preliminary trials to investigate the establishment and performance of tree and forage crops in the integrated crop-livestock-forestry production system seem promising; however, more work is still to be done (see reseach proposal for 1987 agroforestry programme). 7) Land preparation and weeding for crop associations is undertaken earlier than when individual crops are grown in monoculture. Crop associations have higher labour productivity than pure stands.

# Suggestions/Observations made

- There is a need to delineate northern Benin into homogenous farming systems zones using more criteria than agro-climatic aspects (socio-cultural, cropping systems, land utilization, land tenure, soil characteristics, etc...). Selection of a few representative sites where major constraints can be addressed is also needed (diagnosis to transfer model). Preliminary investigations and arrangements are underway in collaboration with the extension agency (CARDER/Bongou, Atacora). The involvement of university students (Faculty of Agriculture) is expected.
- The Benin FSR programme still places heavy emphasis on agronomy. Although this is understandable, given the importance of crops in the farming systems of northern Benin, there is a sense of urgency in initiating livestock and agroforestry components within the programme. A plan of work and and a tentative research plan have been presented by the agroforestry specialist. Initial work will be on pasture management and reinforcement of on-going studies of cereal/legume associations with pasture species.
- . Despite the large number of crop associations in northern Benin, it is suggested that a more focused approach be used. Work needs to be concentrated on a few major crop associations so that the SAFGRAD team can deliver a finished product in the short-run (maize/sorghum, millet/sorghum and cereal/legumes).

. The trial for maize/cotton association which was repeated twice has shown that intercropping maize with cotton results in lower yields of both crops while the aggregate field was no higher than monoculture maize.

A revised version of this trial involving cotton/maize rotation (rather than association) was suggested. Maize can and should also be promoted on its own merit as a cash crop.

- . The study on the striga problems for maize and sorghum should receive less emphasis because thematic research is underway at some international centres.
- . The importance of initiating farmer-managed trials in 1987 was recognized. This view is supported by the national programme at INA station. This, however, will be limited to reflect results obtained during the last two years.
- The experiment planned for 1987 in Karimama district on the use of a ridge-tier will require a more cautious approach. Karimama's heavy soils may not facilitate the use of oxen. The merits of this technology may first have to be demonstrated in villages where farmers have not yet been exposed to be ridge-tier. Experiments with other farm tools could also be initiated.

# II. INERA/SAFGRAD FSR PROGRAMME, BRUKINA FASO

Programme presentation

The team for the INERA/SAFGRAD FSR programme presented highlights of work conducted between 1985-1986 and the proposed plan for 1987 research activities. The objective is to enhance food sufficiency in Burkina Faso. This can be achieved through indentification of farmers'needs, design of adapted technologies and provision of information for policy making. The FSR programme helps strengthen linkages between various research and development partners in order to resolve small farmer technology needs.

There have been several years of FSR activities in Burkina Faso. The INERA/ SAFGRAD FSR has advantages over previous ones in that:

- . it has direct links with national agricultural research programmes and is in a position to influence research priorities:
- . it can draw on the wealth of existing research results; and
- . it includes animal, agroforestry and soil resource aspects, besides the usual crop systems.

#### RESEARCH ACTIVITIES

The national goals for agricultural production are to achieve food selfsufficiency, to improve farmers' objectives where identified. The primary needs are for food security and increased income.

# Major constraints

Principal constraints to achieving the stated goals include inadequate moisture and low soil fertility for crop production and inadequate feed resources and water supply, especially during the dry season, for animal production. These were discussed with respect to:

- . their effect on agricultural productivity;
- . farmers' strategies to alleviate the constraints;
- . development solutions underway;
- . existing technologies; and
- . research efforts of INERA/SAFGRAD FSR programme.

# Solutions to constraints

# Crop production:

Major emphasis of work has been on improvement of soil water management techniques and selection of varieties tolerant to moisture stress.

Tied-ridging has been widely tested and results look encouraging for sorghum, millet and maize when combined with fertilizer application. Work is ongoing on ways to reduce the labour requirement for tied-ridging.

Mulching is known to have a significant positive effect on crop yields, however mulching materials must be available. Contour bunds have been tested in the northern part of the Mossi Plateau with encouraging results. Wider use of the practice is dependent on availability of rocks for bund construction. Varieties of white sorghum, red sorghum and cowpeas that perform well under this environment have been released.

# Soil Fertility

Major emphasis is bein put on organic matter build-up through manure application and composting. Attempts are being made to enhance solubility of rock phosphate. Cereal/legume association for soil fertility improvement is receiving more attention from researchers.

The role of legumes in providing a linkage between (crop/soil/livestock) systems was emphasized.

# Animal feed resources

. Conservation of natural pasture and forage legumes can contribute to animal feed supply during the dry season. The nutritive value of forage legumes grown on fallow fields with no fertilizer was found to meet animal feed requirements, with respect to quality. Some forage legumes and cowpea varieties have been identified for this purpose.

# 2. COMMENTS ON INERA/SAFGRAD FSR PROGRAMME

a. Need for common understanding of programme objectives

There is a need for a common conceptual framework organization expectation Attention was drawn to the original agreement between OAU/STRC and Burkina Faso.

# b. Targeting activities

It was emphasized that the programme must foucs on farmers' needs, start with farmers' solutions and use existing research results to test under farmers' environment. It was recommended that where ready-made technology was not available, the attention of disciplinary researchers should be drawn to this deficiency. FSR work should search for technologies which have a regional implication.

# c. Dissemination of promising technologies

Information on promising technologies should be accessible to users and the attention of national authorithies should be drawn to this information. SAFGRAD should inform nationals of the propects for the use of ridges. Efforts have already been made in this direction.

- d. Integration of livestock to crop production
- . The important role of animal production in semi-arid regions, especially on the Mossi Plateau was recognized.
- . Integration of crop and livestock systems already exist on the farms.
- . Ways of increasing the complementarity of crop and animal production systems should be pursued.
- . Legume crops; as a key link between the crop/livestock systems, was recognized.
- . Concern was expressed over the conflicting space requirements for onfarm crop and animal productions. It was recognized that farmers will give priority to food security crops on good soil. However, aspects of feed resources can be introduced in fallow or millet fields. Intercropping of millet/forage legume crops is such a possibility.

# e. Synthesizing existing data

As much as possible, information should be drawn from existing data. By way of illustration, an example was given on how to use rainfall probability, evapotranspiration and crop growth cycles to delineate period of stress. By super-imposing the data with those of labour supply and demand profiles, period of peak labour demand can be delineated. Similarly, by treatment of data on differential farmer management of field practices (the ring system) one can focus on promising management options. Attention was drawn to the use of:

# f. Reporting procedure

The need for a clear format on reporting was expressed. This would help researchers know how much information needs to be submitted.

# 1987 RESEARCH PROPOSAL

The following suggestions were noted.

Avoid conducting more activities than available resources permit.

On socio-economic studies

Focus baseline surveys on data not available from previous FSR projects. There has been much work done on this area already.

On soils and agronomy

Investigations on soil and water management are needed. On the other hand, studies on village water supply are of an investment nature and should not be included.

On the animal production component

Studies on feed resources are encouraged. Aspects of primary research work should be directed to disciplinary researchers.

Investigations on the flattening of animals should be jointly conducted with other departments of INERA. This suggestion was accepted.

It was pointed out that farmers have expressed willingness to participate in such experiments and are already providing experimental animals.

Delay in budget release

The team stated that the delay in fund release was hindering timely execution of work. It is hoped that funds can be released in time.

# III. OAU/SAFGRAD - CAMEROON FSR

# 1. Research Highlights

After the signing of the OAU/STRC agreement with Cameroon in November 1985, FSR activities began in April 1986. The main objectives are (a) to develop agricultural production technologies adapted to conditions and needs of small scale farmers in the semi-arid zone; (b) to strengthen the National Farming Systems Programme; and (c) to foster the transfer of agricultural research results. The transfer will be encouraged by conducting on-farm adaptive trials and socio-economic studies which provide feedback to researchers, development agents, policy makers as well as farmers. Specifically in 1986, the following activities were undertaken (i) socio-economic studies were conducted to identify agricultural production constraints; (ii) the performance of sorghum, maize, groundnuts and improved varieties were tested; (iii) soil moisture conservation techniques were tested and (iv) the effects on crop yields of animal manure as compared to chemical fertilizers were studied.

#### 2. Constraints

An important constraint in Cameroon with its population of 10.68 million people and an average density of 21 persons/km2 is its uneven population distribution. Three zones Diamare and Margui-Kloudala in the far North, Bamenda to Douala in the West, and Lekie to Yaounde in the Central-South include 61% of the population but only 13.3% of total land area. As a result, the government is interested in resettling the population, for example, from the far North Province which is the SAFGRAD/FSR project area. Other constraints noted during the preliminary investigations include drought and/or prolonged dry spelles at planting time, poor soils and declining soil fertility.

1986 FSR activities included socio-economic baseline studies and onfarm researcher-managed as well as farmer-managed agronomic trials. The concentration of research activities was at three levels. Seven primary sites and eighteen secondary and tertiary sites. For socioeconomic studies ten farmers were selected from primary sites and 4 to 5 farmers from the secondary sites. This provided a total of 186 farmers of whom 115 were cotton farmers and 71 were non-cotton farmers.

# 3. Socio-Economic Findings

- 1. The project area can be divided into three agro-climatic zones according to rainfall and vegetation: Sahelian (600-800 mm), Sudan savanna (800-1000 mm) and Guinea Savanna (1000-1200 mm) of annual rain. The area can also be divided into three agricultural regions according to government institutions: North East Benue region, West Benue and South Benoué. The average farm family has 2 to 10 persons of whom 29;5% are of age group 0-8 years, 23.9% of age group 9-16 years, 35.3% of age group 17-42 years, 8% of age group 43-59 years and 3.3% of age group 60+ years. There are about 5.46 man-units of labour available for farm work per farm family.
- 2. The existing farming systems in the area consist of (a) a cotton-based cropping system where farmers plan cotton-sorghum or cotton-maize-groundnuts in rotation and (b) a sorghum/groundnut-based cropping system where farmers plant sorghum-groundnuts-maize-sorghum in signle rotation or in various associations. The principal crops grown by farmers are cotton, red and white sorghum, groundnuts, cowpeas and muskwali.

When croppint activities are correlated with the rainfall pattern, plaintign time is the most critical period to farmers. With the onset of the rains in May, the first crops to be planted are sorghum and groundnuts. This is followed by cotton, maize and cowpea. Generally planiting is done between mid(May and mid-June. In the Sahelian zone (600-800 mm of rain), however, farmers stagger the plantings from mid-May to early July. This is probably due to unreliable rainfall patterns.

Farmers' agronomic practices include digging with a hoe. They also use ox-plough or tractor and farrow for soil preparation. About an equal number of cotton and non-cotton farmers use ox-plough and/or dig with a hoe. Planting can be done with a hoe, with fingers or a stick. Cotton farmers plant in lines and make mounds or

ridges at weeding time in order to increase the soil moisture retention capacity. Cotton farmers also apply fertilizers and use insecticides on their crops.

- 3. Livestock production is an important activity in the FSR project area. There are some farmers who are just herders and others who keep cattle and cultivate crops. The average farm family has 8 cattle, 2 of which are oxen for animal traction, 6 goats and 3 sheep. The feeding of livestock, especially during the dry season, poses a problem to farmers who must move their animals further south or to valleys in search of grazing ground and water. Farmers use various sources of animal feed: crop residues, tree leaves, grain husks and hay. Dried sorghum residue and groundnut stalks are kept and fed to animals when other sources have been exhausted during the dry season.
- 4. Tree planting is popular in North East Benoue and West Benoue where 10 to 20% of the farmers consider the planting of trees an important farm activity. Farmers plant Nime, Guava, Eucalyptus, Mango, Citrus, and Acacia trees. The main reasons which farmers give for tree planting are to stop desert encroachment and to provide fruits.
  - 5. Using a combination of three approaches, five major production constraints were identified in the area. In order of importance these are (i) poor soils and declining soil fertility (ii) drought and/or prolonged dry spells at the time of planting, (iii) moisture stress, (iv) lack of appropriate farm tools and/or imported chemical inputs and (v) crop diseases.
  - 6. It was noted that farmers can make some adjustments when faced with the above-mentioned constraints. For instance, strip tillage, ridging, terracing, mulching and proper digging of the soil are used to minimise the effects of drought and moisture stress.

# 4. Agronomic Research Activities

 In order to address some of the identified production constraints, a number of agronomic trials were conducted in 1986. The included researcher-managed on-farm trials and/or farmer-managed trials with development agents, extension workers and farmers. The onfarm trials involved one to three levels of management including soil fertility, soil water conservation and crop management.

- 2. All together there were 2 fertilizer and manure trials, 14 soil moisture conservation trials on maize production, 14 soil moisture conservation on sorghum production, 12 maize density and 24 maize variety trials. Thus, there were 94 trials of which 83 (88.3%) were successfully harvested and recorded.
- 3. With one year of agronomic data, no conclusions can get be drawn. Some trends however, were observed in the agronomic results.
- 4. For fertilizer and manure trials, the yields obtained with 100 kg N/ha were almost the same as those obtained with 5 tons of animal manure + 50 kg N/ha at two sites. This suggests that animal manure can substitute for chemical fertilizers to some extent and could be beneficial in the long run. This experiment was done in two types of soils. At Badjouma, soils are quite heavy with a higher cation exchange capacity and exchangeable cations, arganic carbon, total N and available-P. The soils at Ngong are sandy in nature, low in exchangeable cations and cation exchange capacity and quite low in available phosphorus and total nitrogen.
  - 5. For the soil moisture conservation trials on maize production, there were significantly higher yields at Ngon with its sandy soils and tied ridging at 2 m intervals after one month of planting. There were no significant yield differences at Badjouma with its heavy soils. This suggests that the benefit of ridging and/or tied ridging is location specific depending on soil type and rainfall pattern. Results from the on-farm trials in Hamakousson and Tchollire also gave no significant yield differences. However, the results from on-farm farmer-managed trials at Ngon and Baikwa indicate that ridging one month after planting does give about 37.3% higher maize yields.
  - 6. Results from the soil moisture conservation trials on sorghum production from the on-farm researcher-managed trials showed no significant difference between treatments, although, at Pitoa ridging was found to be quite beneficial. The non-significant sorghum yields could be because sorghum is a hardy crop which is quite tolerant to moisture stress as compared to maize.

7. For maize density trials, various planting arrangements at 80 x 40 cm, 80 x 30 and 80 x 15 cm with one or two plants per stand were tested. This gave a planting density of 62,500 to 83,333 plants/ha. the planting distance of 80 x 15 cm with one plant per stand gave significantly higher maize grain yield. Farmers at Hamakoussou, Ngong and Pli were quite impressed by these results.

It was also observed that due to a number of factors such as soil insects (termites) the germination rate and moisture stress, only 62 to 82 per cent of the planted crop could be harvested.

- 8. For maize variety on-farm managed trials, there were no significant differences between the maize varieties tested. Farmers at Pitoa, North East Benoue, however, showed a preference for cms 8501 because of its earliness, resistance to streak virus and cycle of 90-100 days. Among the tested maize varieties with a 120 day cycle, TZPB-SR appears to have greater advantages because it is streak-resistant.
- 9. For sorghum variety on-farm researcher-managed trials, S-34 out yielded the local check, followed by CS-63. Although S-34 yields higher than CS-63, the two sorghum varieties were not significantly different. Because S-34 is a short cycle variety of 90-95 days, its planting date must be adjusted to avoid decoloration of grain, grain moulds and extensive bird damage. It is also important to maintain the optimum plant density of 62500 plants/ha in order to obtain good yields.
- 10. In the two sets of groundnut variety farmer-managed trials, the variety K1 441 is promising in West Benoue because of early maturity date and higher shelling percentage. Variety K1 332-78 is promising in South Benoue because of its better shelling percentage. Variety K1 332-78 was not signficantly different from the local check, 28-206.

It should be emphasized that no conclusions can be drawn from one year's agronomic data. Most of the experiments need to be continued for at least another year.

# 5. Fertility Status of the Soils

Soil samples were collected from 94 trials and analysed for pH, organic carbon, total nitrogen, exchangeable Ca, Mg, K. Na and available phosphorus. Chemical analysis data show that most of the soils are almost normal in soil reaction (pH.) but are slightly on the acidic side. Most of the soils are low in organic carbon and total nitrogen content with a declining trend of exchangeable K. If continuous and intensive cropping in the area is to be followed, there is a great need to apply sufficient amounts of K fertilizers or to ensure the return of crop residues to the field. The available P content in most of the soils varies between low to medium range, suggesting a need for a more balanced scheduling of P fertilization.

- Comments and Suggestions by the In-House Review Committee on 1986 FSR/Cameroon Report.
  - The socio-economic part of the 1986 FSR/Cameroon activities is interesting to the agronomists and will be useful for the design stage.

The idea of correlating rainfall pattern to cropping activities such as planting dates is a good one. Other scientists may want to work with this type of socio-economic data as well.

- 2. It was noted that the FSR team is Cameroon had a short year (April-December) in 1986 and despite logistical constraints was able to quickly begin the on-farm farmer-managed activities. They were successful because the technologies were available and the host institutions (IRA and SODECOTON) were ready to implement on-farm testing as their number one priority.
- 3. When correlating rainfall with cropping activities, the rainfall graphs for the three regions should be drawn on the same scale so that differences can be seen at a glance. In subsequent reports, there should also be two types of rainfall patterns: the long term average annual rainfall to show the general trend and the rainfall variations during the current year to indicate possible rainfall deficit.

- 4. With the experiments on the use of animal manure, it is important to first assess whether farmers in the area can find enough manure to justify the merits of the manure experiment. The socio-economic studies indicate an average of 6 cattle per farm family, which suggests that most farmers can get access to some animal manure. Even if farmers cannot find large amounts of animal manure, using little amounts of manure on their fields is still quite beneficial.
- 5. In comparing animal manure vis-à-vis fertilizers, the treatment; of 100 kg/N/ha appears to be more efficient than the treatment of 5 t/ha animal manure plus 50 kg N/ha. This is because animal manure takes longer to release nitrogen for crop use. The effects of animal manure however, are usually larger in the long run.
- 6. Because there are two types of cropping systems in North Cameroon a cotton based and sorghum/goroundnut based system - it was aked if FSR should give preference to one system or the other. Because each of the predominant cropping system has substantial numbers of farmers, it was decided that the FSR team should design activities for each of the cropping systems.
- 7. The question of research priorities for the FSR/Cameroon programme in 1987 was then discussed. Because these research priorities have already been discussed at the national level by the National Farming Systems Review and Planning Committee in February 1987 in Yaoundé, the same order of priority was maintained by the SAFGRAD FSR in-house review committee. The order of FSR/Cameroon research priorities is:
  - 1. Soil moisture conservation studies
  - 2. Socio-economic studies and farm management storage and marketing
  - 3. On-farm testing
  - 4. Agroforestry
  - 5. Use of animal power for different agricultural operations.

# ANNEX 1.

# PROJECT MANAGEMENT COMMITTEE MEETING OF IFAD-FUNDED SAFGRAD FSR PROGRAMME Ouagadougou, March 6, 1987

# AGENDA

 Summary of 1986 FSR activities (Director of Research)

Discussion

Report of the In-House Review deliberations
 (Director of Research)

SAFGRAD/Benin FSR (Team Leader)
SAFGRAD/Burkina Faso FSR (Team Leader)
SAFGRAD/Cameroon FSR (Team Leader)

- . Discussion on PMC composition
- . Comments by national FSR representatives
- . Any other matters

# IN ATTENDANCE

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Team Leader, SAFGRAD/Benin FSR
Financial Controller, SAFGRAD

The director of research presented a report on IFAD-supported FSR activities beginning with a summary of achievements and major constraints faced by each country FSR programme.

The report covered the implementation strategy of FSR programmes, the institutional and logistical support and the placement of staff to date.

The report was briefly commented on, however, a general discussion was delayed until all country FSR programmes were reviewed. The presentation by each leader (Benin, Burkina Faso, Cameroon) was limited to preliminary results of the 1986 season and suggestions for programme improvement made earlier during the In-House Review meeting.

The floor was open for general discussion. The following main points and issues were raised.

# I. COMMENTS ON FSR PROGRAMMES

# 1.0 BENIN FSR PROGRAMME

1.1 There has been a considerable delay in translating the 1985 annual report into French. The representative of the Benin national programme stressed the need to complete the translation, in view of the demand for the SAFGRAD/FSR programme results by the extension agency (CARDER). Timely release of reports would improve the work efficiency and collaborative efforts of the station and CARDER.

- 1.2 In view of the size of SAFGRAD mandated (Borgou and Atacora) area links between the FSR programme and CARDER in both provinces must be reinforced. This approach could have a multiple effect and could reduce costs of travelling. Zoning the region into homogenous areas will be the first step toward the implementation of more focused FSR work in Northern Benin.
- 1.3 There are serious social/cultural constraints at the farm level in the Atacora province. The FSR team requested the assistance of an experienced sociologist as a consultant. This proposition was approved provided funds are available and this view is also shared by the nationals.

# 2.0 BURKINA FASO FSR PROGRAMME

- 2.1 The implementation of the World Bank project introduces an element of change into the SAFGRAD FSR programme. Soil-water management is expected to receive more attention. The ministry requested SAFGRAD to include its contribution within the framework of the forthcoming World Bank project. This needs clarification because it is difficult for IFAD to conceptualize such cooperation without direct contact with the World Bank.
- It was noted that basic or applied research results in animal production are virtually lacking, Since the INERA animal improvement program me lacks both the manpower and resources to carry out research that could support the FSR program me. After lengthy discussion on this issue, it was decided that some effort could be made to fill essential research gaps in collaboration with other agencies including the International Agricultural Research Centres. As much as possible national researchers need to be encouraged to carry out research in animal production.
- 2.3 With regard to FSR programme development, it was reported that the FSR team based at Kamboinse, led by the national FSR coordinator have carried out series of discussions with research, extension and development partners from November 1985 to March 1986. The objectives of the visits were to discuss the basis of collaboration and the expectations of each partner vis-à-vis the NFSR programme. During the visit available technologies and resources from national programmes were surveyed. Discussions were carried out with research units of INERA (8 departments), the University of Ouagadougou, IRBET (research on ecology and forestry, forest management), the extension service of the Ministry of Agriculture and Rural Development Organizations (8 departments of ORD and animal production services).

Based on national research priorities, a series of discussions that were held and field visits, the NFSR team, Rural Development Organizations (ORD) and farmers assisted in the identification of three village sites in the Koupela, Koudougou and Ouahigouya zones. A reconnaissance survey was then carried out with the full participation of the INERA staff (national coordinator research assistants).

2.4 It was stressed that frequent dialogue between INERA and SAFGRAD Coordination Office is necessary in order to implement the FSR programme. It was recommended that each partner occassionally inform the other and attempt to resolve issues wich are impeding the implementation of the FSR programme.

# 3.0 CAMEROON FSR PROGRAMME

- 3.1 It was stressed that the SAFGRAD FSR activities should be limited to semiarid regions between 400 and 1000 mm rainfall ecological zones provided funding was available.
- 3.2 It was recommended that the agro-forester be based in Garoua where the rest of the team is located. This person should establish linkages with the forestry research unit of IRA located in Maroua.
- 3.3 It was suggested that a cost/benefit analysis (i.e economic feasibility) be undertaken for each technology being evaluated.

# II. GENERAL REMARKS

- 1.0 The mechanical ridge-tier is not a panacea in semi-arid areas. Its design needs to be improved as the original ridge-tier was heavy. Cost/benefit studies still need to be done in order to evaluate its profitability under different circumstances.
- 2.0 Crop associations on the other hand are a key element in our approach to improving farmer's productivity. More research should be undertaken in order to increase yields and maintain stability. Maize-cowpeas relay and sorghum-cowpea mixture have shown a higher productivity than pure stands.

- The FSR programme of each country is evaluated and screened by a national research committee prior to the In-House Review. Representatives from Benin and Burkina felt, however, that it was necessary for the national directors and researchers to participate in order to facilitate the implementation of its deliberations. This suggestion was accepted by the committee.
- 4.0 The FSR conceptual framework as outlined earlier during the In-House Review emphasised farm level activities. It was observed that other levels are also relevant, particularly when the constraints to be removed can only be tackled at the village level (i.e a small region).
- 5.0 With reference to the actual integration of FSR into national programmes, the director of research pointed out that FSR programmes are realized as part of the national research system. Both the technical and administrative aspects of the programme are developed within the national framework. For example, the FSR programme in the three countries is jointly executed by a national FSR coordinator and the SAFGRAD team leader.

Generally, programme integration into the NARS is a slow process and much depends on how FSR is institutionalized within each national research system, its rural development agencies and its linkages with farmers.

The linkage between the national FSR programmes and the international agricultural research centres (IITA, ICRISAT) should be improved so that FSR can provide relevant feedback and influence the research agenda and strategy of the international agricultural research centres. It was, therefore, recommended that FSR teams in the three countries should not attempt to fill research gaps. It is felt that the national research system and other agencies (SAFGRAD/IITA and SAFGRAD/ICRISAT) can conduct basic research. It was emphasized that IARCs also want to receive feedback from farmers in the three countries through the FSR programmes.

# 6.0 AGROFORESTRY

The problem of integrating agroforestry research activities into existing FSR programmes was also discussed. With regard to initiating and developing the agroforestry component of the FSR programmes, the director of research pointed out:

- As soon as the recently recruited agroforesters are established in the respective countries, the FSR team can begin to make contacts with (a) the national forestry research and development units, (b) the Ministry of Agriculture extension and development agencies, and (c) with all national research stations of the particular country.
- 6.2 Pre-diagnosis of the information gathered from the above mentioned initial technical survey could enable the FSR team to determine global constraints and resources from which a general research framework could be realized (to initiate exploration surveys at field level).
- 6.3 Through SAFGRAD/ICRAF collaboration (to be further elaborated) technical back-up support would also be provided.

# III. INSTITUTIONAL SUPPORT

# 1. TRAINING

Improvement of the national FSR capacity is ensured if the training component is included within FSR activities. It was pointed out that given the financial constraints facing SAFGRAD only short term training has been undertaken. The committee stressed the need for donor collaboration (USAID, World Bank, etc...) to support long-term training (MSc. and Ph.D level). As an example, the USAID financed cereals improvement project in Cameroon and the FSR support, with strong training components (both short and long-term) in Mali, were cited.

The need to involve more national research scientists in the FSR programme was not realized in all three countries. Whereas two to three FSR national research homologues are assigned within the Benin and Burkina Faso FSR, the national agronomic research institute of (IRA) in Cameroon has only made promises to base some national research scientists with the FSR programme in Northern Cameroon. Since the major objective of the IFAD-FSR support in the three countries is to improve research and development capabilities, the committee stressed that host countries should take advantage of the programme and involve more national researchers in various aspects of farming system development.

# IMPROVING DATA ANALYSIS CAPABILITIES

FSR team leaders pointed out some of the problems encountered in processing data and analysing it within a short period of time. Although compilation of field data from different villages is aided by field technical staff, its analysis within planned statistical framework seems to take long time because computer time must be rented. The committee stressed the need for the SAFGRAD Coordination Office to alleviate these constraints. It was noted that arrangements have been made to purchase computers with adequate capacity for each FSR programme.

# 4. CONSTRAINTS TO STRENGTHEN NATIONAL FSR

Some of the participants indicated adequate funds need to be allocated and disbursed on a timely basis. This has been one of the major constraints in implementing the FSR programmes in the three countries. As a result, only very few equipment requirement have been purchased. The committee recommended that the SAFGRAD Coordination Office look into the problems of improving the financial pastures and timely disbursements of funds to each country FSR programme.

# IV. DISCUSSION ON THE COMPOSITION OF THE PROJECT MANAGEMENT COMMITTEE

The restructuring of the management entities of SAFGRAD were considered during a recent meeting of the national agricultural research directors. This restructuring is to ensure better coordination and administrative efficiency. The management of the IFAD-supported FSR programme also needs to be linked to the Oversight Committee. This executive entity of the Directors of Agricultural research council is mandated to closely monitor the implementation of SAFGRAD project activities. While the committee endorsed the fact that FSR programme implementation should also be monitored by the oversight committee, it raised the following points:

 The proposed composition of the PMC as indicated below may be too large.

# Proposed membership:

- a. directors of agricultural research of the three countries (Benin,
   Burkina Faso, and Cameroon) as members and rotating chairman
- b. national FSR coordinators of the three countries;
- C. donor representatives;
- directors of IITA FSR programme;
- e. leader of the West African Agricultural Resource Management Programme;
- f. one member of the Oversight Committee;
- the international coordinator of SAFGRAD;
- the director of research of SAFGRAD;
- i. SAFGRAD team leaders as observers; and
- j. financial controller as observer.
- 2. Since the function and deliberation of the Oversight Committee and PMC would be overlapping, the committee recommended strengthening the In-House FSR Review committee by including representatives of international agricultural research centres (IITA and ICRISAT), senior national research scientists and external consultants in addition to the existing participants.

After lengthy deliberations, the committee recommended the merging of the Project Management Committee with the Oversight committee to maximize administrative efficiency.

# BRIEF REPORT ON IFAD-SUPPORTED FSR ACTIVITIES

#### INTRODUCTION

Based on several years experience, the Burkina Faso programme has been oriented to cover defined ecological zones. The IFAD-supported FSR team based at Kamboinsé was mandated to cover largely—the Mossi Plateau. As a result, reconnaissance and verification surveys were carried out in order to select villages that adequately represent the traditional system of production in the region. The national FSR team also consulted with several research and development agencies in order to establish linkages and to determine the type of FSR programme that could be realized.

Based on the major constraints of food production in the region, the programme covers crop and animal production systems, the improvement of management of natural pastures, soil-water management, agroforestry and socio-economic studies.

In Northern Benin, the farming practice is characterized by an association cropping system consisting mostly of intercropping cereal crops, shifting cultivation and cotton as the main cash crop.

In the Benin FSR programme, the testing and evaluation of crop production technologies initiated in 1985 were continued. These included evaluation of the performance of local and improved varieties in monoculture and in associations. In addition to baseline surveys, economic analysis of inputs and outputs associated with the trials was carreid out so that experiments could be analysed in terms of benefits and costs. The programme based at Ina station is integrated with on-going research activities, and linkages were established with international and regional programmes.

The IFAD-supported FSR programme in Cameroon was initiated in 1986. Based in Garoua, Northern Cameroon, the team began by reviewing existing research results. It made a reconnaissance survey to substantiate major constraints of food production, to document existing traditional systems of production and to delineate the major agricultural zones of the area on the basis of agroclimatic characteristics (i.e rainfall patterns, rainfall distribution, vegetation, major soil types and cropping pattern). The FSR programme was developed in cooperation with other agencies, IRA scientists, professional input from the ACPO programme, IITA Testing and the Liaison Unit (TLU).

#### IMPLEMENTATION STRATEGY

# 1.0 FSR Programme Development

In all three countries, the DAU/STRC-SAFGRAD FSR programme has encouraged the national research teams to evolve their own FSR programme based on national needs and priorities. First, the process involved conducting exploratory, socio-economic and technical verification surveys in order to identify the major constraints to food production in the area. Second, representative villages were established which could serve as primary and secondary sites for FSR activities. Third, major agricultural zones of the region based on variation of rainfall, vegetation, cash crops and livestock were delineated. Fourth, through the diagnosis of constraints the FSR programme defined major themes of operation. Finally, the design and formulation of the FSR programme was based on identified major constraints and the technologies available to resolve these problems. Technical and institutional development aspects of FSR of each country were also considered.

Furthermore, the 1986 SAFGRAD FSR programme in the three countries has been submitted to various reviews and discussions by structured technical committees of the OAU/STRC SAFGRAD (i.e the In-House FSR Programme - Review Committee and the Project Management Committee) and the national research and extension systems.

2.0 Mechanism for Monitoring the Implementation of the Programme.

The following structured technical committees reviewed both the technical components and research progress of the programme.

2.1 The In-House FSR programme Review meeting was held on 21 January 1986 at the SAFGRAD Coordination Office in Ouagadougou. The first meeting was held in order to do a technical review of the IFAD-supported FSR programmes in Burkina Faso and Benin.

After recognizing the progress made in the improvement of the national FSR capacity, the committee stressed the following points:

- . FSR activities should be oriented to fit appropriate ecological zones in order to optimize food production;
- one of the major efforts should be to consolidate the FSR programme, since resources are limited;
- . Each programme should develop a clear conceptual framework on the integrated nature of FSR, particularly on the actual linkages of the components ensuring resource cycling and economic complementarity;
- . There is a need for the FSR programme to provide a technical base that will serve as a guideline for immediate development projects and also be capable of influencing national policy making;
- . FSR should focus on developing a workable FSR Model based on interdisciplinary research in the respective countries; and
- . host countries should enable national researchers to fully participate in the FSR activities.
- The Project Management Committee meeting took place 23 January. This meeting was attended by all committee members including representatives of the three beneficiary countries of the IFAD-FSR-support. Although the minutes of this meeting have been reported elsewhere, it should be noted that FSR activities should put greater emphasis on institutional development. The PMC viewed the 1986 FSR programme as ambitious and endorsed the technical changes proposed by the In-House Programme Review Committee.

# 2.3 FSR Consultancy Meeting

In order to follow-up the implementation of the IFAD-supported FSR, a meeting of FSR team leaders, scientists and the Director of Research, was held on 23 June 1986. As indicated in the minutes a report of the implementation of the 1986 FSR programme in Benin, Burkina Faso and Camerooun was presented. The possibility of an FSR workshop, as one of the mechanisms to facilitate the exchange of technical information, was discussed. It was agreed that while the workshop could be organised in 1987 it should be combined with field visits. It was agreed to organize a monitoring tour in 1987 comprising IFAD-supported FSR scientists, their respective national research scientists and the

Director of Research of SAFGRAD.

# 2.4 Monitoring tour

The FSR tour comprised national research scientists and SAFGRAD/FSR experts. The purpose of the field tour was to share the field experiences of scientists and country programmes. This was to facilitate interactions between scientists, to discuss FSR methodological issues and to appreciate the different approaches of the institutional development of FSR in the three countries. This tour also provided an opportunity to discuss FSR development with national research directors and administrators. The implementation of the FSR programme was also discussed. With regard to Benin and Cameroon FSR, it was suggested that the initial emphasis should be to develop cotton-based FSR at an appropriate stage of farming system development. Other components of FSR such as animal production and agroforestry could be considered.

During discussions on the FSR programmes in the countries, it became clear that was a need for a better understanding of the integration of the farming system both at the conceptual and practical level. It was suggested that this issue be discussed in greater detail at the proposed FSR conceptual unity meeting.

Two major approaches were employed to test this hypothesis. At the field level, it included researcher-managed trials where multidisciplinary research comprising different production systems (i.e crops and animal production, soil-water management, soil fertility, forage legumes and agroforestry practices) were evaluated on fixed primary village sites. This approach enabled one to monitor input and output flows and the interactions of systems of production with regard to recycling of resources for improving the resource base for productive agriculture. Economic complementarity among systems of production can also be investigated. Because various promising research results are being verified on farmers' field this can be considered as a "packing phase". Concurrently, promising technologies, not necessarily "in packages", could be extensively evaluated by the farmers both at primary and secondary village sites.

After visiting various activities of SAFGRAD/FSR in Northern Cameroon (Garoua region) it was suggested that non-SODECOTON farmers be included in the study and that the number of field trials be reduced.

Similarly, work on animal traction, use of crop residues, tied-ridges and animal traction and manures are a long term-activity and need to be monitored on the same site in order to quantify long-term effects. Furthermore, there is a need to concentrate on selected themes of research activity by limiting trial sites.

With regard to the Benin FSR programme the following comments were made:

- (a) the availability of land in Northern Benin favors integrated FSR programmes (i.e cropping and livestock systems) and the potential for widespread use of animal traction also exists;
- (b) soil conservation and maintenance of soil fertility should receive particular attention;
- (c) there is an urgent need to review many FSR concepts and their applicability to each country;
- (d) the programme is still heavily oriented towards the cropping systems due to lack of expertise in other areas; and
- (e) research support for INA should include some modest improvement of the basic facilities of the station, and are absolutely necessary for effective FSR work.

With regard to the Burkina Faso FSR programme, activities on the fallow field showed the anticipated integration of crop and animal production systems. At the moment, however, agronomic activities on the fallow field are lacking. The output of one component is expected to serve as an input to another. This hypothesis needs to be tested in order to formulate a clear conceptual framework. In order to carry out such work, the permanent sites need to be retained for several seasons so that long-term effects can be quantified.

The idea of integrating all the components on the same sites, was accepted.

Improving the research capacity to evaluate and verify promising technologies by most national programmes is strongly affected by their respective research agencies. The focus of the FSR support in each country has been to facilitate the institutionalization and practice of multidisciplinary research among thematic research programmes. Institutional support in assistance covered the following areas:

# (a) Elaboration of appropriate farming system methodologies

With the addition of an agroforester to each FSR programme in 1987, the input of professional, technical staff by IFAD to Burkina Faso (4), Benin (3), and Cameroon (3) would be complete. These scientists, in cooperation with respective national research scientists, and the international Agricultural Research Centres (IITA, ICRISAT) provide technical assistance for the expansion and development of agricultural centres. IITA and ICRISAT provide technical assistance for the development of suitable farming system methodologies in each country. National researchers and administrators, with regard to the institutionalization of FSR, should be the focal link for undertaking multidisciplinary research.

# PLACEMENT OF STAFF

ICRAF/SAFGRAD collaboration in agroforestry is encouraged. This collaboration was initiated in early 1986. The main foucs of research cooperation is to support research in agroforestry in the three IFAD-FSR-supported countries. ICRAF identified potential research candidates. Announcements of the agroforestry research positions were made to 41 countries in Africa and 24 international and regional organizations. Three candidates were selected upon successful completion of their training at ICRAF and three scientists were recruited.

The former senior agronomist and team leader of SAFGRAD/Benin FSR terminated his contract on 30th August 1986. He was replaced by the new agronomist in January 1987. The current team leader of the Benin FSR programme joined the IFAD-supported FSR project in July 1986.

#### LOGISTIC SUPPORT

The SAFGRAD Coordination Office provided administrative and technical back-up support in order to facilitate the implementation of the FSR programme in the three countries. Regular contact with the SAFGRAD FSR scientists was maintained and field visits were made in order to resolve administrative issues. The disbursement and management of grant funds at the country level was monitored by the financial controller. Administrative problems, particularly those of installing the Cameroon FSR, were resolved by trips made by the International Coordinator and the Director of Research. At the regional level the following services were provided: staff services; scientist to scientist or programme to programme interaction; enhancement of linkages with regional and IARC programmes; and, help in resolving policy and research support issues. This includes occasional discussions with officials and scientists of host countries in order to promote the development of the appropriate farming system.

# PROPOSAL TO REORGANIZE THE PROJECT MANAGEMENT COMMITTEE

The management and technical entities of the SAFGRAD programme have been restructured in order to provide services to NARS. At the recent Agricultural Research Directors' meeting (SAFGRAD member countries) it was agreed that:

- An advisory committee comprised of national research scientists would provide guidance, direction and management of research networks (for sorghum, maize, millet and cowpea).
- (b) The oversight committee, as an executive entity of the Direcors of Agricultural research council, would closely monitor the implementation of the SAFGRAD project activities as well as follow-up the realization of both policy and technical issues recommended by the council.

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