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Scientific Technical and Research Commission

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THE SECOND CONSULTATIVE COMMITTEE
MEETING ON SEMI-ARID
FOOD GRAIN RESEARCH AND DEVELOPMENT PROJECT
JP 31 SAFGRAD

7 - 8 NOVEMBER 1983

OUAGADOUGOU, UPPER VOLTA

630.7
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COORDINATION OFFICE

B.P. 1783 Ouagadougou, Upper Volta

Telex : SAFGRAD 5381 UV

ORGANIZATION OF AFRICAN UNITY
SCIENTIFIC TECHNICAL AND RESEARCH COMMISSION

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1. INTRODUCTION

The Semi-Arid Food Grain Research and Development (SAFGRAD) Joint Project N° 31 was started in 1977 to develop improved varieties of three cereal and two grain legume crops as well as suitable cultural practices for the small farmers in the semi-arid regions of Africa. The project is implemented through contracts with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) for millet, sorghum and groundnuts, the International Institute of Tropical Agriculture (IITA) for maize and cowpeas, and Purdue University for farming systems research in collaboration with research institutions of SAFGRAD member states.

Multi-donor funding is provided by the United States Agency for International Development (USAID), the French Aid and Cooperation Fund (FAC), and the International Fund for Agricultural Development (IFAD). Management of SAFGRAD is achieved through the Consultative Committee (CC) which provides policy guidance and programme oversight, the Technical Advisory Committee (TAC) which reviews research and training programmes and submits appropriate recommendations to the CC and, finally, the Coordination Office which implements the SAFGRAD programme as directed by TAC and CC. The administrative systems and inter-institutional agreements are provided by the Scientific, Technical, and Research Commission of the Organization of African Unity (OAU/STRC).

Although the CC and TAC are supposed to meet at least once a year, the two Committees have only succeeded in meeting once and twice, respectively, since 1977. There was, therefore, a strong desire to reactivate these important Committees to ensure the smooth running of SAFGRAD.

2. THE MEETING

The second CC Meeting took place on 7 - 8 November, 1983 at the headquarters of the Economic Council of West Africa (CEAO) in Ouagadougou, Upper Volta, under the Chairmanship of Professor A.O. Williams, Executive Secretary of OAU/STRC.

It was attended by representatives of member states, donor organizations, cooperating International Agricultural Research Centres, and other institutions and OAU/STRC.

2.1 THE OPENING SESSION

In his address, the Executive Secretary of OAU/STRC, Chairman of the Consultative Committee, thanked the Government of the Republic of Upper Volta for its continued support to the SAFGRAD Project. He also thanked H.E., the Minister of Higher Education and Scientific Research and H.E., the Minister of Rural Development for coming to open the second meeting of the Consultative Committee. The Chairman further called on the Deputy Director of USAID who emphasized the food production problem of many countries in sub-saharan Africa and how through its research coordination, SAFGRAD is expected to influence technological change so as to enhance more food production in member countries. Furthermore, the USAID representative stressed the complexity and difficulties of reaching farmers with innovations even when they are available. He promised continued USAID support to SAFGRAD in its effort to increase food production.

In his opening address, the Minister of Higher Education and Scientific Research welcomed the participants to the second Consultative Committee Meeting, and expressed his appreciation for selecting Upper Volta since 1976 as the headquarters of JP 31 SAFGRAD. He stressed the need for promoting inter-African research cooperation through projects like SAFGRAD in order to harness food production constraints such as conservation of soil and water as well as the application of other improved packages of technology by the farmer. The Minister pointed out the importance of the second Consultative Committee meeting, since it would examine the problems of regional research activities in order to reinforce regional cooperation for the Unity of Africa.

2.2 DISCUSSION OF THE AGENDA.

2.2.1 BACKGROUND INFORMATION

The International Coordinator pointed out that the second Consultative Committee Meeting would be considered as a revitalization of the two important management bodies of SAFGRAD since both TAC and CC had not been meeting regularly. Furthermore, he briefed the Committee on the current status of research and development activities of the Project. It was reported that the thrust of research emphasis continued to be the stimulation for increased production of cereal grains (sorghum, millet, maize) and grain legumes (cowpeas and ground-nuts). The Coordinator further elaborated on the specific course of action that was taken based on the 1981 mid-term evaluation of the project as well as the recommendation of the 1982 ad hoc committee. The Committee recommended that the ad hoc committee report be made available to all CC members.

2.2.2 THE ROLE OF CC AND TAC

Briefing was given by the Chairman on the meetings in Brussels and Ouagadougou which were attended by representatives of donors, implementing agencies, and OAU/STRC. During this meeting, it was proposed that the membership of these committees be reduced to make them more effective. Although this concern was recognized, some members of the committee pointed out that such a reduction of members may limit representation of African member states. After a lengthy discussion on this matter, the committee decided to balance the representation of donors, African representatives, and research cooperators. It was agreed that total membership for TAC be 12 and that of CC 10. The membership role of CILSS and Purdue University in these committees was also resolved. It was decided that the quorum for TAC be 7 and that of CC 6. In determining African member country representation on both committees, permanent membership was granted to Upper Volta as host country of the SAFGRAD Project. It was also agreed that the duration to serve in any of the committees be limited to three years, but staggered to maintain continuity.

2.2.3 RESEARCH PROGRAMME REVIEW

2.2.3.1 IITA/SAFGRAD

The IITA representative explained the overall objective of the programme and approaches taken to achieve the objectives. In order to strengthen national programmes, IITA/SAFGRAD had placed great emphasis on regional research trials, training, and workshops in maize and cowpea improvement. From 20 - 25 SAFGRAD member countries as well as scientists from International Institutes participate in the workshops. It was explained that some improved varieties and agronomic techniques were being recommended and transferred through regional cooperative trials and ACPO programmes. Furthermore, IITA had continuously carried out practical training oriented to research as well as workshops for many SAFGRAD countries. As to future plans, IITA research thrust emphasized development of drought and striga tolerance and the development of varieties and agronomic practices suitable for low inputs. The programme of an integrated approach to crop improvement and production was reported to continue. Considering that drought and continued soil fertility degradation are major constraints to food production in the Sub-Saharan Africa, the committee emphasized that the thrust of research effort should be to develop varieties and agronomic practices to overcome these production constraints.

2.2.3.2 ICRISAT/SAFGRAD

Realizing that sorghum and millet are major staple food crops in most sub-saharan semi-arid regions of Africa, future emphasis of ICRISAT/SAFGRAD should include strengthening of regional trials at various sites so that improved varieties and cultural practices could be utilized by national programmes. The representative of ICRISAT reported that one of the ICRISAT/SAFGRAD inputs for the improvement of sorghum and millet is located at the Institute of Agricultural Research of Ahmadu Bello University, in SAMARU, Nigeria. Members expressed concern that research reports from this

station as well as those on ICRISAT's regional activities were not being received regularly. Mention was also made of the sorghum and millet coordination, a programme of ICRISAT/SAFGRAD for East and Southern Africa which was started in 1982. Since its establishment the programme had established good linkages with the national sorghum and millet programmes of the region. Two regional workshops had been organized and successfully completed; the first one in October, 1982 in Ethiopia and the second one in Rwanda in June, 1983. It was also reported that this programme had already established research networks with 7 - 9 countries in the region. The USAID representative informed members that 9 Southern African (SADCC) countries had been organized and funded by USAID and other donors to strengthen sorghum, millet, and groundnut research with the technical assistance of ICRISAT. SAFGRAD, therefore, would need to limit its activities to East Africa but with cooperative link with the SADCC programme.

Recognizing the continued degradation of the fertility of the soil, the committee stressed the urgent need to expand research in the improvement of soil fertility, water harvesting and its efficient use. It was reported that varietal response to water management using tied ridges as microcatchment was very promising. In general, substantial yield increases on certain types of soils were reported due to increased conservation of water for both improved and local varieties. The microcatchment technique is known to reduce weeding, particularly when both tied ridges and straw mulch were used. The importance of animal traction in increasing the farmer's output was also emphasized.

2.2.3.3 PURDUE UNIVERSITY/SAFGRAD

The Farming Systems Research model evolved in Upper Volta by Purdue University was discussed. Since a farming system is location specific, the acceptability of the model in other African countries needs to be ascertained. The Chairman, commented that although the FSU model was the only one

brought to its attention, it was the policy of CC also to consider other models. The proposed model generated broad issues on the approaches and kinds of FSR conducted within Upper Volta and other member countries of SAFGRAD. The committee proposed that the Purdue University FSU team interact with several FSR programmes in the region. It was stressed that each region or country may need to develop a farming systems programme suitable to its own area. Members generally agreed that SAFGRAD should endeavour to harmonize and coordinate FSR in its member countries. They also suggested that FSR should not be limited to the identification of constraints but also to workout practical solutions in cooperation with biological scientists as well as policy makers.

2.2.4 ACCELERATED CROP PRODUCTION PROGRAMME

The Accelerated Crop Production Officer (ACPO) within this programme has been serving as the principal link between research and extension programmes of member states. Since the ACPO's main role is to promote increased food production, it was agreed that the ACPO programme should be continued. While striving to establish better linkages between the ACPO and SAFGRAD research entities, the ACPO should also be encouraged to utilize results from research sources other than just those of SAFGRAD. To be of maximum benefit to the host country, the ACPO should be fully integrated into the national programme of the member state in which he is serving.

The need to extend ACPO activity into other needy countries was expressed. The difficulty resulted from insufficiency of funds and the fact that some countries did not yet have trained counterparts so that the ACPOs could be used for other countries. To this it was agreed that the OAU/STRC and USAID should agree on the level of financial support for ACPOs and a time frame established for each ACPO programme. The contract period should be well specified and firm arrangements made to train counterpart ACPO in time so

that the host country could assume full responsibility of the programme at the end of the contract. The Coordination Office (International Coordinator and the Director of Research) should thoroughly review the role and activities of all the ACPOs and submit a report during the next CC meeting.

2.2.5 COORDINATION OF RESEARCH

It was emphatically stressed that agencies involved in agricultural research should inform one another in order to avoid unnecessary duplication of efforts. Members of the committee stressed that SAFGRAD and INSAH should work very closely in order to support each other and streamline their activities. Some of the major issues raised were about effective mechanisms necessary to improve coordination of regional and national programmes.

Recognizing the coordination role of SAFGRAD, the committee stressed the need for increased working relationship with national programmes through ACPOs, regional trials, training and workshops. Some of the members of the committee suggested that INTSORMIL, a collaborative research support programme (CRSP), a consortium of 8 United States Universities with more than 60 scientists working on sorghum and millet, be invited to the next TAC meeting in order to explore possible areas of cooperation with SAFGRAD.

2.2.6 EVALUATION OF THE SAFGRAD PROJECT

The USAID representative informed the committee that the SAFGRAD project would be evaluated sometimes in January or February, 1984. A draft scope of work for the upcoming USAID evaluation was distributed for information and comments. It was emphasized that ideas and any recommendations by CC would be helpful to the evaluation team. Some CC members commented on the nature of the composition of the evaluating team. After a lengthy discussion, it was agreed that an outstanding African scientist be included in the team.

When the mechanism of the evaluation was raised, it was pointed out that the main purpose of the evaluation was to assess the impact of the project by reviewing research activities, the ACPO programme, training and the overall SAFGRAD effectiveness as a coordinating unit. It was suggested and agreed that the draft report of the evaluation team be made available to all SAFGRAD cooperating agencies for appropriate comments before the final version was produced.

The level of funding for SAFGRAD II was also indicated. Recognizing that the food production situation in Sub-Saharan African countries was worsening, the level of funding should be based on projects that were developed to overcome urgent food production constraints. The CC recommended that SAFGRAD should also be able to attract other donors to expand its programme to other member states.

The Committee was also informed that a project identification and planning team would follow the evaluation team.

.2.7 TRAINING

Realizing that training of African scientists in various disciplines of agriculture is the major means of improving the indigenous research and development capabilities of many member states, the committee treated this topic with great concern. The Chairman emphasized that training should receive top priority and specific programmes should be drawn up in order to:

- a) determine minimum needs in terms of quality and quantity for national programmes;
- b) identify type and area of training;
- c) establish an indicative ratio of training needs i.e. per unit of population;

- d) delineate short and long-term training needs;
- e) identify those training programmes that require immediate support.

In general, it was recognized that survey and quantification of minimum training needs for various member states was beyond SAFGRAD's capability and financial resources. However, such a study would be very useful to plan short and long-term training needs. After a lengthy discussion on this topic, the CC endorsed the criteria as temporary guidelines to facilitate the recruitment of participants for training (refer to working document CC/2/83/7). It was also suggested that the training programme should take into account existing environmental conditions in the candidate's country during thesis preparation (in case of M.Sc. and Ph.D. training). Thesis projects should often be related to major factors and constraints of food production. In this regard, SAFGRAD should also establish contacts with appropriate African Universities so that some candidates could receive their training in the semi-arid regions of Africa.

Some members of the committee stressed that some SAFGRAD-sponsored candidates for advanced degrees from francophone countries had faced difficulties and delays in completing their studies from American and other Anglophone Universities. Although some members felt that this problem was specific only to certain countries, some possible solutions were proposed: A more rigorous method of selection of candidates could be adopted or the training capabilities of some francophone African Universities strengthened to facilitate such training.

As regards personnel from member countries who had undertaken training through SAFGRAD cooperators, the Chairman requested IITA, ICRISAT and Purdue University to bring to the next CC meeting current information on follow-up action on their respective SAFGRAD trainees.

The ICRISAT representative reported that the ICRISAT regional centre in Niamey when completed would provide short duration training. It was also suggested that the SAFGRAD Coordination Office be strengthened to facilitate coordination of training and establish linkages with universities and other training institutions.

2.2.8

THE COORDINATION OFFICE: ADMINISTRATION AND MANAGEMENT

The Chairman described the role of USAID as a grantor and that of OAU/STRC as a grantee with the contractors as the beneficiaries. Therefore, the relationship in terms of lines of action should be: USAID - OAU/STRC - Coordination Office - Contractors. It was necessary to describe and to agree upon a specific line of action since the role of USAID was gradually changing whereby less emphasis was being placed on operational and administrative involvement and more emphasis on the traditional monitoring role. Any modifications to reflect the current situation should be done through project implementation letters (PILs) accepted by both parties. This view was shared by several members who also felt that in line with the above, changes in contracting modalities should be studied to enable OAU/STRC to enter directly into contractual arrangements with the implementing agencies. However, the USAID representative indicated that no major changes were foreseen before March, 1985.

It was suggested that the Coordination Office should develop budgeted guidelines for the second phase of the USAID-funded SAFGRAD component. This should be presented and discussed with the USAID design team for SAFGRAD II together with the Ad Hoc Committee report of January, 1982.

2.2.9 DATES OF THE NEXT MEETINGS

In determining the dates for the TAC and next CC meetings, the Chairman remarked that the SAFGRAD Project had been criticized because of the inactivity of the two committees whose guidance was vital for the smooth running of the project. Accordingly, the TAC meeting was fixed for 9-11 January, 1984, and the next CC meeting for 9-10 April, 1984. Both meetings were to take place in Ouagadougou Upper Volta.

The meeting closed at 18.30 hours.

2.3 RECOMMENDATIONS OF THE SECOND CONSULTATIVE COMMITTEE
MEETING OF SAFGRAD

2.3.1 CONSULTATIVE AND TECHNICAL ADVISORY COMMITTEES (document
CC/2/83/2)

Recognizing the urgent need to revitalize the management bodies of the SAFGRAD project, the Committee restructured CC and TAC as follows:

1. Among the African representatives recommended for both the Consultative and Technical Advisory Committees, Upper Volta (as host country) should be one of them;
2. There shall be four African representatives on TAC from four different countries;
3. Membership shall be for a varying number of years and staggered to ensure continuity;
4. Purdue University shall have observer status on CC and INSAH shall be a full member of TAC;
5. CILSS shall have observer status on CC and INSAH shall be a full member of TAC;
6. CC shall have a total membership of 10 and TAC 12;
7. The total membership of CC and TAC shall be reviewed as deemed necessary.

2.3.2 ACCELERATED CROP PRODUCTION PROGRAMMES (document CC/2/83/5)

Realizing the broad task envisaged for ACPOs in the original document of the SAFGRAD project and the need to provide clear guidance regarding the specific role and level of activities, the Committee recommends that:

1. The role and activities of ACPOs, which should continue, shall be thoroughly reviewed by the International Coordinator and Director of Research. The International Coordinator shall submit a paper to the next CC meeting in which the ACPO programmes are well defined;
2. OAU/STRC and USAID should meet and agree on the level of financial support for ACPOs and a time frame established for each ACPO programme;
4. The initial contract of an ACPO should be for three years with the possibility of renewal for another three years. The host country should assume full responsibility of his programme at the end of six years.

2.3.3 COORDINATION OF TRAININIG (document CC/2/83/7)

The Committee recognizes that training of African scientists is the major means of improving the indegenous research capabilities of national programmes and recommends that:

1. Top priority should be given to the development of indigenous manpower in SAFGRAD member states. Levels of training should be clearly established in relation to a definite time table. In this regard, the USAID evaluation team should look into this matter and ensure that a corresponding financial allocation is attached to it in their report;

2. During the next CC meeting, ICRISAT, IITA and where possible, Purdue University should present information on follow-up action on trainees who have benefited from SAFGRAD training opportunities through their different institutions;
3. The USAID should incorporate a well defined training policy in its new project on millet and sorghum in Southern Africa as well as strengthen coordination between SAFGRAD and the SADCC project;
4. The Coordination Office should be strengthened so that it could adequately coordinate the training of SAFGRAD candidates in universities both in Africa and abroad.

.3.4 COORDINATION OF RESEARCH (document CC/2/83/8)

The Committee notes that resources for development are limited and emphatically stresses the need for research coordination and recommends that:

1. It is appropriate for SAFGRAD and CILSS/INSAH to work together as closely as possible;
2. Representatives of the U.S.-supported Collaborative Research Support Programmes (CRSPs) should be invited to the next TAC meeting so that their programmes could be explained to TAC and opportunities explored for collaborative programmes on sorghum, millet, cowpea and groundnuts.

2.3.5 COOPERATIVE PROGRAMMES (document CC/2/83/3C)

The Committee appreciates the need to establish good linkages particularly between farming systems research and other programmes and recommends that:

The new Farming Systems Research (FSR) programme to be initiated by SAFGRAD should take full advantage of the experience of the Farming Systems Unit of Purdue University/SAFGRAD and experiences of other FSR programmes carried out by other organizations in Africa.

2.3.6 COORDINATION OFFICE:ADMINISTRATION AND MANAGEMENT (document CC/2/83/12)

Based on the recommendations of the 1981 mid-term evaluation team, the management structure of SAFGRAD is evolving and recognizing the need to define specific areas of action, the Committee recommends that:

1. In view of the evident changes which have evolved in the project management structure of SAFGRAD Project (as compared to the SAFGRAD planning document), project implementation letters (PILs) should be executed between USAID and OAU/STRC to reflect the current situation;
2. Contractual procedures which will enable the grantee, OAU/STRC, enter directly into contract with the implementing agencies (contractors) should be studied and considered for implementation;
3. The Coordination Office should develop guidelines for SAFGRAD II to include a description of the major components and a budget for each component. These should be made available to the USAID design team for SAFGRAD II. Reference should be made to the Ad Hoc Committee report of January, 1982.

.3.7 SAFGRAD PROJECT EVALUATION (document CC/2/83/10)

A draft document on the scope of work for the upcoming USAID evaluation team was distributed for information and comment. After a lengthy discussion on this matter, the Committee recommended that:

1. One African member be nominated by the Coordination Office to join the evaluation team;
2. USAID should ensure that all SAFGRAD contracting agencies have adequate opportunity to review the evaluation draft report for appropriate comments before it is put into its final form;
3. The projected USAID level of funding of \$15.0 million for SAFGRAD II be considered inadequate. In this regard, the CC recommends that the AID planning for SAFGRAD II be based on programme needs and not upon a pre-determined funding level. The International Coordinator, in consultation with SAFGRAD contracting agencies, should establish a scope of work for SAFGRAD II and present its financial implications to USAID.

The CC expresses its indebtedness to USAID for its continued interest and support of the SAFGRAD Project.

PROGRESS REPORT AND FUTURE PLANS

IITA-SAFGRAD

IITA is one of the major links in a world-wide network of 13 agricultural research and training centres and was established in 1967 with headquarters at Ibadan, Nigeria. IITA is governed by an International board of trustees, the membership of which includes representatives from developing countries. The institute has world-wide mandate for cowpeas, yams and sweet potato and has continental responsibility for maize, rice, soybeans and cassava. In addition, it has a mandate to study and seek ways to improve traditional farming systems in the humid and sub-humid tropics.

Three out of four of IITA's principal programmes are crop centred. These are (i) Cereal Improvement Programme (CIP) concentrating on improvement of maize and rice (ii) Grain Legume Improvement Programme (GLIP) concentrating on improvement of cowpea and soybean (iii) Root and Tuber Improvement Programme (TRIP) concentrating on the improvement of sweet potato, yam and cassava. The fourth heart of total effort is the Farming Systems Programme.

In addition to resident 'on site' research programmes, IITA also has formal cooperative contracts and agreements with several nations and scientific organizations to help strengthen national research capabilities and to present opportunities for developing and testing crop lines under different ecological conditions. These cooperative activities are handled and coordinated by International Programmes Office. Presently, all International Programmes are supported by contributions from various agencies for specific activity, primarily focused in Africa.

IITA initiated its activity in Upper Volta in 1977 by locating one of its scientists - a cowpea breeder - to strengthen the national grain legume improvement programme. Funding for this project is provided by IDRC, Canada. In 1978, IITA signed another contract with USAID to participate in the SAFGRAD project to conduct regional oriented research in cooperation with national, regional and international research centres/agencies to develop improved varieties of maize and legume crops, especially cowpeas and cultural practices

which are compatible with African small farm semi-arid farming systems for these crops, and promote their adaptation and use in farmers' fields. Under this contract, four of the IITA scientists - maize breeder and project leader, maize agronomist, cowpea agronomist and an entomologist were located in Upper Volta, headquarters of the SAFGRAD/IITA efforts. Cowpea breeder (funded through IDRC) provides the cowpea breeding support to IITA/SAFGRAD project efforts.

IITA has thus carried out the IITA/SAFGRAD programme through multi-disciplinary teams viz (1) the maize team (breeder, agronomist and entomologist) and (2) cowpea team (breeder, agronomist and entomologist) with the backstop support of the IITA core scientists in the Cereal Improvement Programme (CIP) and the Grain Legume Improvement Programme (GLIP) and by International Programmes based at IITA, Ibadan (Nigeria). The Upper Volta national scientists working at Kamboinse Research Station (headquarters for IITA efforts in Upper Volta) work as maize and cowpea team members along with the IITA scientists.

IITA initiated the SAFGRAD work in July 1978 with screening of wide germplasm of maize (and cowpea) to identify the promising materials for the semi-arid environment. This job was handled by a core IITA maize breeder based at Ibadan with the help of a consultant maize breeder who was located in Upper Volta during the crop season. Full implementation of SAFGRAD/IITA programme started in 1979 crop season with all five scientists on board. Except for one change (cowpea agronomist in 1982) the whole team continued the IITA/SAFGRAD efforts to-date.

Right from the inception, IITA/SAFGRAD programme has defined the following major objectives:

Under the overall direction and coordination of IITA core programmes;

- (i) to assist and strengthen national maize and cowpea programmes in the semi-arid zone;
- (ii) to develop improved genetic materials and agronomic practices capable of producing stable higher yields in

semi-arid ecology;

- (iii) to organize systematic testing in semi-arid areas and exchange of improved genetic materials, technology and results among SAFGRAD countries;
- (iv) to assist in developing scientific capability through training efforts;
- (v) to assist in transfer of technology through the SAFGRAD ACPO linkages.

To accomplish these objectives the IITA/SAFGRAD has adopted the following:

- (i) Resident research at different research stations in Upper Volta representing guinea savanna, sudan savanna and sahel savanna areas of semi-arid ecology to generate new genetic materials and agronomic technology;
- (ii) Regional research and testing in the semi-arid regions in collaboration with national scientists in the SAFGRAD member countries;
- (iii) Support and assistance to SAFGRAD national programmes through consulting visits, advice, encouragement and motivation and by providing crucial small research supplies;
- (iv) Training at Kamboinse, Upper Volta and IITA, Ibadan, Nigeria.

RESIDENT RESEARCH

IITA/SAFGRAD conducts research on selected regional problems at four national stations in Upper Volta representing different agroecological conditions normally encountered in semi-arid tropics in West Africa.

These Stations are:

1. Kamboinse Research Station: representing sudan savanna zone with annual mean rainfall of 800mm;
2. Farako-Ba Research Station: representing northern guinea savanna zone with annual mean rainfall of 1000mm;
3. Pôbe/Saouga Research Station: representing sahel savanna zone with annual mean rainfall of 400mm; (This station is used for cowpea work only);
4. Loumbila Research Station: falls in sudan savanna zone and is primarily used for irrigated nurseries during the dry season.

SAFGRAD/IITA Resident Research in Upper Volta is focused on few selected problems of semi-arid region which are discussed and decided at SAFGRAD maize and cowpea annual workshops. National scientists from 22-25 SAFGRAD countries as well as the representatives from IITA core programme, IRAT, CIMMYT etc. participate in these workshops. Most of the resident research work up-to-date has been for the West African semi-arid ecologies. The bulk research in different disciplines has been on the following problems:

1. Maize Breeding: Earliness and drought tolerance;
2. Maize Agronomy: Soil compaction and risk for drought;
3. Maize Entomology: Termites and millipedes;
4. Cowpea Breeding: Adaptation, insect and striga resistance;
5. Cowpea Agronomy: Relay and mixed cropping and local varieties;
6. Cowpea Entomology: Sources of resistance and pest management.

Following is the general outline of work of IITA/SAFGRAD maize breeding activities:

1. To combine early maturity with yield

Three approaches are being followed for this objective (i) recurrent selection for yield in early maturing populations, (ii) simultaneous selection for earliness and yield in the

crosses of promising early x medium maturing populations, (iii) utilization of temperate crossed with tropical materials;

2. Breeding for tolerance to drought.

Three approaches being followed for this work are (i) unidirectional selection for drought tolerance based on performance of families in multi-location testing in 6 to 8 national programmes, (ii) screening of germplasm for tolerance to drought, artificially induced by cutting off irrigation at different stages of plant growth, (iii) recurrent selection in three promising populations identified earlier in screening tests, using few criteria of selection for tolerance to drought;

3. Evaluation and utilization of local varieties.

Efforts have been made to collect, evaluate and utilize the local varieties with the objective to obtain earliness, tolerance to drought and adaptation.

4. Semi-arid regional testing.

IITA/SAFGRAD breeding programme organizes and coordinates Regional Uniform Variety Trials (RUVT and RFTT) conducted by 20 to 22 national programmes, members of SAFGRAD Project. In addition, the maize breeding programme cooperates in conducting International and Regional Variety Trials organized and coordinated by IITA headquarters, CIMMYT, INSAH etc.

IITA/SAFGRAD Maize Agronomy programme conducts research trials in the following areas of work:

1. Soil preparation studies.

Maize Agronomy programme tries (i) various methods of ploughing the field to find the effect of soil preparation, (ii) different numbers of scarifications at different times, to increase infiltration and (iii) creating small catchment areas between the crop-rows through tied-ridge system to increase availability of moisture;

2. Agronomic practices

Studies are in progress to determine the effect of location of maize field (toposequence studies), dates of planting and plant density;

3. Fertility studies

Research trials are done to find the dose, time and residual effect of nitrogen application. Some studies on rock phosphate are also done;

4. Plant residue management

These studies are done to find out the effect of maize residue after harvest on the yield of the following crop;

5. Intercropping and rotation studies

The objective of these trials is to find out role of legume crops (specially cowpea and groundnut) on the following maize crop;

6. Regional agronomy trials

With the collaboration of 4 to 5 national programmes, maize agronomy programme organizes and coordinates the regional trials on the promising agronomic practices.

Cowpea breeding programme in support of IITA/SAFGRAD research is conducted by a cowpea breeder funded by IDRC Grain Legume Project. The major areas of work consists of:

1. Breeding for adaptation and yield

Much effort is done to identify and breed the varieties adapted in Sahel Savanna Zone. The focus in selection is for suitable plant type, early maturing and tolerance to drought;

2. Breeding for insect resistance

In collaboration with IITA/SAFGRAD entomologist, efforts

have been made to incorporate resistance to aphids, thrips and bruchids into selected high yielding, promising varieties;

3. Breeding for Striga resistance

Screening varieties for resistance to Striga and incorporation of Striga resistance into superior genetic backgrounds is being followed;

4. Breeding for grain quality

Screening for white and brown, rough seed coat and large seed size and the incorporation of these grain qualities in agronomic superior backgrounds is underway;

5. Regional Testing

In addition to collaboration with International and Regional trials of IITA headquarters & INSAH, the cowpea breeding programme organizes and coordinates SAFGRAD Uniform Regional Variety Trials which are conducted by 20 to 22 national programme-members of SAFGRAD Project.

Major efforts of IITA/SAFGRAD cowpea agronomy programme have been to develop a maize-cowpea relay cropping systems in the northern guinea savanna, cereal-cowpea intercropping systems in all three ecological areas of semi-arid zone and the cowpea management studies in sahel savanna zone. Cowpea agronomy studies can be grouped as:

1. Maize-cowpea relay cropping system

Cowpea Agronomy Programme is trying several cowpea cultivars in combination with maize cultivars of different maturity, in different agronomic systems, to maximize the production of both maize and cowpea per unit area in guinea savanna zone and in the hydromorphic areas of sudan savanna zone.

2. Cereal-Cowpea intercropping systems

Cowpea Agronomy Programme is trying to determine time of

planting and plant density of early cowpea in a cereal-cowpea intercropping system in Guinea, Sudan and Sahel savannas.

3. Cowpea management

Through agronomic manipulations like date of planting, plant density and plant arrangement, ^{the} cowpea agronomist is trying to increase cowpea production in all the three zones of semi-arid tropics;

4. Fertility management

Possible utilization of rockphosphate is being tried;

5. Soil improvement studies

Studies on few legume crops, as a means for soil improvement are underway;

6. Regional testing

In collaboration with 6 to 7 national programmes, the cowpea agronomist organizes and coordinates regional testing of few promising cowpea agronomic practices.

IITA/SAFGRAD Entomology Research Programme which has so far concentrated its efforts in West Africa, has through personal visits, communications and some surveyys found out that insect pests do not constitute a major limiting factor in the maize production in semi-arid West Africa. However, it has been recognized that termite and millipede infestation could be a major source of yield reduction in certain years. Therefore, most efforts of IITA/SAFGRAD entomologist have been in cowpea entomology research. Major areas of research of IITA/SAFGRAD entomology programme are:

MAIZE 1. Control of termites

Studies to evaluate different soil insecticides to control the termite attack have been done. Preliminary studies on screening maize germplasm for tolerance to termite have recently been initiated:

COWPEA

1. Host plant resistance studies

IITA/SAFGRAD Entomology Programme, in addition to providing the necessary support to cowpea breeder in the breeding for resistance to insects, has screened cowpea germplasm for identifying or confirming, the sources of resistance to important insect pests like aphids, thrips, maruca and bruchids;

2. Insect control

Studies to identify most effective and safer insecticides and the time of application to control cowpea pest are in progress;

3. Population trends of insects

These studies are being done to evaluate the insect pressure on cowpea in different ecological zones as well as in the farmer's agroecosystem;

4. Insect problems in monoculture vs. intercropping

In collaboration with IITA/SAFGRAD agronomy programme, studies are in progress to evaluate the effect of cowpea-sorghum intercropping on insect population and their effect on cowpea yield;

5. Regional Testing

In collaboration with 7 to 8 national programmes, regional cowpea entomology trials are organized and coordinated by IITA/SAFGRAD Entomologist.

REGIONAL RESEARCH AND TESTING

IITA/SAFGRAD Programme has, since its inception, given a lot of importance to the regional research and testing programme which is carried out in complete partnership with the national research programmes of the SAFGRAD member countries. These regional trials have been organized and coordinated by IITA/SAFGRAD team each year since 1979. At present maize and cowpea variety, agronomy and entomology trials form the core of SAFGRAD regional research programme. Each year 20 to 22 member countries voluntarily participate in conducting the SAFGRAD maize and cowpea regional trials, at selected sites, representing semi-arid ecology in their country. Maize and Cowpea Researchers from member countries, actively participate each year in deciding the composition of these trials and the sites where these trials will be conducted. In the maize and cowpea regional variety trials, the promising varieties not only developed by IITA/SAFGRAD Programme but also by other international institutions like IITA, CIMMYT, IRAT and different national programmes, are included for uniform testing across the semi-arid tropics in Africa.

The objectives of this regional testing are (i) to provide elite maize and cowpea germplasm to national programmes for their semi-arid region, (ii) to provide national scientists an opportunity to have their elite materials systematically evaluated over a wide range of environments, (iii) developing varieties possessing tolerance to common problems and higher stability and (iv) evaluating promising cultural practices which could solve some production constraints common to the semi-arid region.

Since 1979, about 500 sets of trials have been sent from SAFGRAD/IITA headquarters for testing in different SAFGRAD member countries.

SAFGRAD MAIZE AND COWPEA WORKSHOPS

IITA/SAFGRAD Programme has organized Maize and Cowpea Workshops each year since, 1979. Forty to fifty national maize and cowpea scientists from 20-25 countries as well as the scientists from international institutes (IITA, CIMMYT, IRAT, INSAH, etc) are invited to participate in these workshops.

The fifth SAFGRAD Maize and Cowpea Workshop was held in Ouagadougou, Upper Volta from April 25 to 28, 1983. The results obtained during the year by individual national research programmes, as well as by the international institutions are discussed and reviewed in the workshop. These workshops provide an opportunity not only to exchange ideas and results but also to identify the weaknesses and strengths of various programmes for mutual benefit. The workshop helps in strengthening the bond of friendship and trust among various scientists and helps in a better focus on problems and planning of research strategies. In addition, these workshops have provided an excellent opportunity to IITA/SAFGRAD Team to plan their resident research and the regional programme focused on the production problem which are common in the sem-arid areas of tropical Africa.

MONITORING TOURS

With an objective to provide an opportunity to national maize and cowpea researchers to observe the performance of different promising varieties and the agronomic treatments in different countries, a group visit of national scientists as a 'monitoring tour' is organized and coordinated by IITA/SAFGRAD scientists not only to broaden their knowledge on the practical problems and the facilities available in various national programmes, but also to help to strengthen the friendship among the research workers. Monitoring tours have been organized each year since 1979. Two tours - one for maize and the other for cowpea researchers are organized. In each group, six to eight national scientists from 6-8 SAFGRAD member countries visit 5 to 6 countries in a group alongwith the researchers from IITA/SAFGRAD and IITA-Ibadan. Scientists who are invited and the countries they visit in monitoring tours are rotated each year. In the monitoring tour, the group not only visits the SAFGRAD regional maize and cowpea trials but also the other national research trials and production plots. These tours provide an additional opportunity to IITA/SAFGRAD team to develop personal contacts with the research staff and research Directors in various SAFGRAD member countries.

TRAINING

Strengthening of national maize and cowpea programmes in the semi-arid tropics is one of the important objectives of IITA/SAFGRAD efforts. This objective is accomplished through various activities including training of young scientists and technicians working in the semi-arid zone of SAFGRAD member countries.

The annual workshop and the monitoring tours organized each year and discussed earlier, provide an excellent opportunity in increasing the research capabilities of the SAFGRAD member countries.

In addition the SAFGRAD Project arranges higher degree-related training for maize and cowpea scientists through OAU/STRC coordinating unit and the USAID.

Maize and Cowpea production courses arranged and conducted each year by IITA headquarters at Ibadan, train 20 to 25 technicians each in maize and cowpea research production. IITA/SAFGRAD assists in identifying the potential trainees.

IITA/SAFGRAD Programme also provides in-service experience to 6-7 young scientists from national programmes each year, in which they spend 6 months (June-December) working as members of IITA/SAFGRAD team. By spending the whole crop season, these scientists not only gain the experience but contribute substantially in the on-going resident research activities of the IITA/SAFGRAD team. IITA/SAFGRAD provides facilities to students of the University of Upper Volta to conduct their thesis research at Kamboinse under the guidance of members of the IITA/SAFGRAD Team.

IITA/SAFGRAD team constantly endeavours to have consulting visits to various national programmes and provide necessary advice, encouragement and motivation to the national scientists. Individual short visits of national scientists to IITA/SAFGRAD headquarters during the crop season also proved to be useful for this objective.

RESEARCH-EXTENSION LIAISON

IITA/SAFGRAD Programme does not have the direct responsibility for research-extension liaison programme in the SAFGRAD Project. However, in order to better serve the national maize and cowpea programmes of SAFGRAD member countries, the IITA/SAFGRAD team maintains close relationships with the SAFGRAD Accelerated Crop Production Officers (ACPO) based in various SAFGRAD countries. These ACPOs provide useful links between IITA/SAFGRAD team and the national research and production programmes. IITA/SAFGRAD team assists the ACPOs in providing necessary breeder seed and technological information for conducting on-farm tests in the country, where they are based.

IITA/SAFGRAD team also maintains a close liaison with the SAFGRAD Farming Systems Unit based in Upper Volta and provides the necessary seed and technological information for their on-farm testing programmes.

In addition, IITA/SAFGRAD team conducts some research verification trials (with research objectives) in few selected farmers' fields in Upper Volta. This activity is done in collaboration with the Research Liaison Department of the Ministry of Rural Development.

ACCOMPLISHMENTS - GENERAL

Research Facilities

Soon after the arrival of IITA/SAFGRAD Team, fifteen hectares of land were cleared and properly developed at Research Station, Kamboinse with assistance of IITA farm manager, for the IITA/SAFGRAD research. Office buildings were constructed and support staff were employed. During the last four years, reasonable facilities for resident research, like well laid area of 22 hectares, worksheds, seed store, workrooms, entomology and agronomy labs, screenhouses, farm machinery and farm machinery sheds have been acquired and developed. In addition 12 hectares irrigated land for off-season nursery work were also acquired and developed at Loumbila. Through successful negotiations with IRAT and DSA, arrangements for research facilities at Farako-Bâ and Gorom-Gorom have been assured.

Network of national scientists

Through proper contacts and constant reciprocal visits a strong network of national maize and cowpea scientists of most of the SAFGRAD member countries has been developed. Feeling of cooperation and friendship amongst them and with IITA/SAFGRAD team has been inculcated.

System for regional testing

An organized working system for testing promising varieties and agronomic technology developed by any national or international organizations has been developed which appears to be working well and proving to be beneficial for the mobilization of improved genetic materials and technology among the SAFGRAD member countries. Most national scientists actively participate in these activities and consider this programme as their own programme and therefore, it has good chances of being sustained.

Working closely with the national scientists, IITA/SAFGRAD team now believes to have a better understanding of problems in the Semi-Arid tropics of Africa.

RESEARCH

Improved maize and cowpea varieties

IITA/SAFGRAD team fully recognizes and believes that several scientists and organizations (particularly IITA headquarters) directly or indirectly contribute in several ways (source materials or testing facilities) in breeding and development of improved varieties. However, IITA maize and cowpea breeders based in Upper Volta could mention the names of few varieties, in the development which, they have had the most input.

Cowpea: KN-1 and SUVITA-2 are two varieties which have been widely tested and are released in Upper Volta. The two varieties have also done well in the semi-arid zone of several other countries and are in on-farm testing and pre-release stage.

Maize: SAFITA-2, SAFITA-102 and SAFITA-104 have been widely tested and identified as promising varieties in several SAFGRAD member countries. SAFITA-2 and SAFITA-104 have been released in Upper Volta and are in pre-release on-farm testing stage in several other countries.

Maize and cowpea technology

Consistent results have shown that in Sudan Savanna Zone, method of soil preparation greatly affects maize and cowpea yields. It has been proved that deeper the ploughing higher is the yield (tractor ploughing - bullock ploughing - hand-hoe no ploughing). Another exciting agronomic practice which has proved to be very effective in significantly increasing the yield of both maize and cowpea, is the system of 'tied ridges'. Maize and cowpea relay-cropping system particularly in Guinea Savanna Zone has been shown to increase the yield of maize and cowpea per unit area. It has also been shown that some of the photoperiod sensitive local varieties possess useful characters which provide better adaptation in the dry environments and that these varieties respond differently to agronomic management practices as compared to non-photoperiod sensitive improved varieties.

Maize and cowpea entomology

Another bio-type of cowpea aphid (Aphis craccivora) was identified and named as bio-type 'K' and through vigorous screening, varieties TVu 3000 and TVu 36 have been found to be resistant to all the three bio-types - A, B, and K. In addition to finding the spraying schedules to control important insect pests of cowpea, a very strong team approach in providing the screening support for host plant resistance work has been accomplished. A local cultivar, Kamboinse local, has been identified as resistant to Maruca.

FUTURE PLANS

Although the general plan is to continue most of the on-going research projects, however, few studies which have been done for the last three years and enough convincing data has been obtained will be terminated. On the other hand, work on certain aspects of research will be strengthened.

The research areas which will be strengthened or the work initiated are:

Maize breeding:

Breeding for drought tolerance, striga tolerance, low fertility level and extra earliness.

Maize agronomy

Regional testing of promising practices, soil nitrogen balance under low or no fertilizer use as affected by tied ridges, changes in soil physical and chemical parameters associated with promising agronomic practices, develop package of recommended practices and assist national programmes in promotion and adoption of improved maize technology.

Maize entomology:

Systematic survey of pests of maize and control of termite damage.

Cowpea breeding:

Breeding for drought tolerance, adaptation to sahel environment, seed quality and acceptability and for relay/inter-cropping system.

Cowpea agronomy:

Determine agronomic factors limiting production in sahel environment, physiological parameters to understand inter-crop competition in relay/mixed cropping systems, assisting national programmes in promotion and adoption of improved cowpea technology.

Cowpea entomology:

Biological studies to understand lifecycle of important cowpea pests in sudan and sahel savanna zones, source of resistance for pod sucking bugs, easier methods of screening varieties in semi-arid environments.

Most of the research work done till now has been for West African semi-arid ecology. Depending on future funding, IITA/SAFGRAD would like to extend its research activity in the semi-arid ecology of Eastern and Southern African countries. Breeding for improved genetic materials and cultural practices compatible with semi-arid farming systems in East and Southern Africa will be general plan of work for this ecology.

IITA/SAFGRAD also plans to strengthen the national capabilities in conducting research verification trials to test the promising improved technology as well as to assist the national programmes to digest and utilize the research data so generated. Training efforts particularly the degree related training will also receive increased attention in the future efforts of IITA/SAFGRAD programme.

IITA is developing its plans for SAFGRAD Phase II and the preliminary proposal has been prepared for discussion and decision.

ICRISAT PROGRESS REPORT
THE SEMI-ARID FOOD GRAINS RESEARCH
AND DEVELOPMENT (SAFGRAD) PROGRAMME, PHASE I

1. WEST AFRICAN SORGHUM IMPROVEMENT PROGRAMME, NIGERIA BASED

A. Sorghum Breeding

Objectives

The primary objective is to breed and adapt suitable cultivars of sorghum that could lead towards development of production systems of higher levels of yield performance and stability of production across a range of West African environments.

Phase I results

1. Adaptation of Tropical Cultivars

During 1981, the potentialities and problems involved in introducing tropical cultivars were assessed. Diagnostic studies with two commercial hybrids, CSH5, CSH6 and two improved varieties, across a range of environments brought out the possibilities for such cultivars as normally sown crops in low rainfall areas and late sown short season crops in high rainfall areas with a long growing season. In spite of poor management, low populations, and an abnormal season, yield levels ranged from 1.2 to 3.4 tons per hectare. Better management with identification of superior cultivars could lead towards rapid advance of yield levels. Based on the present studies, SPV245 was identified as a useful introduction and some state Governments like Kano and Bauchi launched seed multiplication of SPV245.

During 1982, promising cultivars were evaluated in multi-locational studies in Nigeria and Cameroon. These studies enabled identification of promising Cultivars. S35 was chosen for studies in farmers fields and demonstrations in Cameroon.

2. Problems of Adaptation: Insect and Disease Resistance

Host plant resistance is of particular significance in cultivar adaption to diverse environments.

- a. Seedling deadhearts: Seedling deadhearts result due to the attack of both stem borers and shootfly. During normal season plantings, the deadhearts are primarily due to stem borers (mainly Busseola fusca). Late plantings result in heavy shootfly attack.

Studies during 1981, at Kano and Samaru revealed significant varietal differences for seedling deadhearts which were mainly caused by stem borers. Shootfly damage in relation to population levels at both locations revealed that the percentages were higher under low plant populations. Both nitrogen x cultivar and plant population x cultivar studies indicated that vigorous plants are preferred by the borers, while the reverse is true for shootfly. In both studies, the differences due to treatments and interactions were significant indicating scope for selection of vigorous seedlings resistant to stem borer attack.

During 1982, seedling deadhearts at 4 locations, Samaru, Kadawa, Kokwa and Yandere were studied 40 days after planting. The deadhearts were primarily due to stem borers. At Samaru the deadheart percentages were also studied in a late July planting when the shootfly attack was serious. The studies were all replicated. Transformation of deadheart percentages into angles reduced co-efficients of variability. The varietal differences were statistically significant. Of the 48 entries studied, those which showed least deadheart percentages, were S36, S40 and S2. Several of the entries showed moderate resistance and such entries which combine agronomic worth include K4, S17, S19, S20, S35, S37 and SPV245. Based on values from the five environments, the stability of shootfly resistance has been analyzed. The most stable varieties are S40, S36, S35 and S2.

- b. Mature plant resistance to stem borer: During 1981, the tunnelling was very heavy at Samaru. Since the estimation of percent tunnelling in all entries became difficult, the plants were vigorously shaken at harvest time and the percent plants that did not break were estimated. Tunnelling in some such plants was studied. Entries with moderate levels of resistance have been identified. Of them SPV314 and SPV315 and some of their selections were particularly promising.

Compared to 1981, stem borer damage was less during 1982. In selected high yielding entries, even though there was some tunnelling, this did not affect grain yield. Apparently, the most susceptible ones have been eliminated and the selected entries have reasonable levels of tolerance.

- c. Disease resistance: Evaluation for resistance to the prevalent leaf spots grey leaf spot (Cercospora sorghi), anthracnose (Collitotrichum graminicola), and sooty stripe (Ramulispora sorghi) during 1981 resulted in the identification of some highly tolerant lines. Compared to 1981, leaf disease incidence was low during 1982 and the reactions recorded during 1981 were maintained. Occurrence of October rains during 1982 enabled mould development and all the entries were scored for mould incidence and grain deterioration. The most promising entries from the over all point of view of disease resistance and agronomic worth include, S1, S10, S12, S13, S17, S18, S19, S20, S23, S31, S32, S34, S35, S36, S37, S38, S40 and K4.
- d. Durable resistance: Screening of the same breeding material from dry to wet locations under different planting times enabled identification of lines resistant to prevalent and potential pests and elimination of susceptible ones. Selected material, limited in numbers, could now be studied in greater detail.

3. Selection and Adaptation of Tropical Cultivars

Based on rainy season and off-season evaluations during 1981-82, about 50 lines were selected for yield evaluation during 1982. This selected yield material was evaluation in two yield trials at Kano and Maroua (Cameroon) in the dry zone, Samaru in the moderately wet North Guinean zone and Kokwa and Yendeve in the long season South Guinean zone. Additionally a West African regional trial was conducted at Samaru.

The trials clearly separated the high yielding from the low yielding and 14 promising lines have been identified. Their insect disease reactions and behaviour of yield at a range of planting dates and locations is available. The yields reported are at constant populations of 50 - 55 thousand plants per hectare which is known to be the optimum for local farafara and available improved varieties. The short and early duration varieties as listed can take populations upto 150,000 plants per hectare. To optimize their yields, it is necessary to work out the production technology.

Selections like S40, S35, S19, S20, K4 etc., are promising under August plantings as well and could stand a range of planting dates. Such varieties will provide the basis for studies on new cropping systems. SPV35 was particularly promising in Nigeria and Cameroon.

The striga resistant SRN4841 could provide the basis for improving West African sorghums.

4. Evaluation of Sorghum Collections

Sixty selected sorghum collections from Africa were evaluated and were found to be not useful. IS8245 was very clean for leaf diseases. It was very late with a broom corn type panicle.

During 1982, a sorghum collection of Northern Nigeria comprising of 203 entries was critically evaluated with the following objectives.

- a. Whether there is adequate variability so as to warrant selection and isolation of superior types
- b. Whether the hybrid races established under natural selection have advantages of yield or other attributes warrant their further exploitation.

The collection did not provide much variability for leaf spot resistance. Some collections viz S. No 15, 45, 51, 59, 65, 69, 72, 78, 82, 85, 91, 94, 126, 128, 138, 144, 145, 160, 162, 180 and 183 offered some promise for resistance to stem borer attack. They need further study.

The range for grain yield was from 13.7 to 172.7 g/plant with a mean (\bar{x}) of 98.1 g and S.D. 35.7. Using one standard deviation as the class interval, the yield classes were divided into five groups. Varieties with an average single plant yield level of more than 135 g per plant represented the highest yielding class. The S.nos. 51, 59, 65, 69, 72, 78, 82, 92, 126, 128, 138, 144, 162 and 183 combined stem borer tolerance with grain yield.

B. Sorghum entomology

Objectives:

Major objectives of the entomological research programme in Nigeria to serve the region are:

- a. Regional insect pest surveys of sorghum and millet.
- b. Development/application of proper techniques for resistance screening.
- c. Evaluate breeding stock and germplasm for pest resistance.
- d. Study plant-disease-environment interactions.
- e. Studies on population dynamics of important sorghum and millet pests.

Evaluation of Results

The ICRISAT/SAFGRAD Phase I entomology programme commenced in 1981 and has, so far, had two cropping seasons.

Stem borers

Stem borers, Busseola fusca and Acigona ignefusalis, are the most serious insect problems on sorghum and millet respectively. Infestations often reach 100%. The yield losses due to these pests are unknown and the local sorghums seems to have some tolerance. Stem borers could become a more serious problem with the introduction of the short duration of dwarf shorter, high yielding sorghums.

Progress to date

- a. Late planting of sorghum and millet ensures high populations of stem borers (up to 100% infestation levels), for resistance screening under natural infestation.
- b. Current parameters, such as per cent tunnel length and per cent internodes bored for estimating stem borer damage cannot be correlated to yield loss.

1983 Programme: The emphasis for the sorghum stem borer project is to find new and better parameter(s) to relate stem borer damage to loss in grain yield and should answer the following:

- a. relationship between time of infestation, internodes bored, peduncle damage, and grain yield.
- b. relationship between peduncle damage, peduncle diameter, and grain yield,
- c. relationship between internodes bored, stalk diameter, and grain yield.

There is also need to find adequate, non-destructive parameter(s), to estimate stem borer damage in the farmers' fields.

Sorghum head bugs

This project was initiated because very little is known about the head bug species that cause damage, the extent of

yield losses, and their biology and population dynamics. This project has received full support and high priority from IAR. The IAR entomologists have other responsibilities. Head bugs may, currently, be of little importance with the farafara type of sorghum, but could be serious problem with the introduction of compact head sorghums of different maturity dates.

Progress to date: Fourteen species of head bugs representing four families have been collected and tentatively identified from sorghum heads at Samaru. Of the 14 species only 4 species, Campylomma livida, Campylomma sp. Harpedona sp. and Eurystylus sp. appear to be of economic importance. They are the most abundant accounting for more than 80% of the bugs collected. The Campylomma species feed on the developing grain and on the head as it emerges from the boot while Harpedona sp. and Eurystylus feed on grains when is in dough stage. The field loss studies have shown no consistency in the first year but sorghum heads which were covered had better grain quality, (white and free of blemishes), than uncovered heads, (brownish with many blemishes which are assumed to be feeding punctures of the head bugs).

1983 Programme: The study of the species complex and population dynamics will be continued. A study of the biology of the four most abundant species will be initiated. The yield loss and damage symptom study will be continued.

Sorghum shoot fly

Sorghum shoot fly, Atherigona scoccata, is no problem under the current farming system where planting is done in May to early June. It could become a serious problem when planting is done after the middle of July, i.e., new short season cultivars.

The screening of resistant material will be continued in 1983.

Sorghum midge

Sorghum midge, Contarinia sorghicola, is a pest in isolated areas and more especially in river valleys where humidity is high. In the Samaru area, it is a problem occasionally and there is no consistent high population suitable for resistance screening.

The screening of resistant material will be continued in 1983. Surveys will be conducted to locate hot spots for a consistent and high midge population which are essential for resistance screening.

Regional Insect Surveys

Surveys of sorghum and millet insects will be continued.

The Phase II perhaps should include groundnuts and farming systems as new elements. Maize-sorghum relay cropping has increased in the northern Guinea Savanna and research should be conducted in this area. Pathology should also be considered as a new element or, if not a new element be funded as part of the entomology programme, i.e. crop protection. Currently there is a senior technician in the entomology programme who could take charge to run the pathology, especially the international nurseries.

C. Sorghum Agronomy

Background

In the countries of "Sorghum and Millet Belt" of Africa the rate of increase in population is exceeding that of production. In some countries including Nigeria the production, in fact, is declining. So little progress has been made in yields that there is serious question if improved technology is available. The challenges to agronomists are: to identify the yield limiting factors, to design and evaluate techniques to overcome these limitations and to facilitate the adoption of improved technology by farmers on a broad scale. It is evident that there is an urgent need to develop improved management techniques which can better utilize the environment.

The ICRISAT-OAU/STRC JP 31 - SAFGRAD/IAR/ABU Cooperative Agronomy Programme will be initiated during the 1983 Cropping Season by designing and testing improved crop management systems in cooperation with the national and regional research programmes.

Objectives

The major objective of the ICRISAT/SAFGRAD Agronomy programme is to develop improved cereal based farming systems which will result in increased yields and more stable production. Programme will aim at generating a positive change shifting from traditional to technical agriculture.

Recently, breeders have introduced and/or released alternate, improved cultivars of Sorghum and millet suitable for Sudan and Guinea zones of West Africa. Production technology for these new cultivars needs to be developed to optimise productivity. Priority Agronomic areas which need to be examined include crop density and geometry, soil management in terms of fertility, erosion and moisture storage and management of Striga and other weeds. There is also a need for studies on competition between species in space and time (cropping systems involving improved genotypes).

Initially, simple agronomy trials will have to be conducted to demonstrate and quantify differences in cultivar responses between local and improved types as a result of such management factors as crop density, weed control, fertilization, reclamation of problem soils, land preparation, intercropping and crop sequence.

(Dr. Shetty joined the ICRISAT/SAFGRAD Programme in Nigeria as agronomist in February, 1983. He is yet to submit a progress report on his research, this year being his first season of field work).

II. SOIL AND WATER MANAGEMENT PROGRAMME, UPPER VOLTA BASED

The main purpose of the programme is to develop and improve techniques of water use efficiency through controlled field plot studies, water harvesting technology and soil conservation practices for rainfed agriculture.

Objectives

1. Design and construct terraces, contour ridges and conveyance systems for the most efficient use of soil-water management employing animal traction.
2. To measure, using controlled studies, the effect of microcatchment techniques on yield in relation to the use of anti-transpirants, mulches and crops.
3. To develop and evaluate rainfall-runoff and water harvesting techniques to restrict surface water losses, prevent soil erosion and increase soil water available for improved crop production.

PHASE I EVALUATION RESULTS

An evaluation of the ICRISAT Phase I project of the soil-water management programme in Upper Volta was carried out in the Fall of 1980. The results of the evaluation were extremely positive as to ICRISAT's progress in the research programme of soil-water management. In general, all tasks of the Phase I programme have been investigated, implemented and, where possible, evaluation has been completed and reports are being written for eventual publication. An example of the performance of the soil-water research programme is given as follows:

1. Microcatchment using tied ridges. For sorghum, a microcatchment basin of 0.50m in width by 1.00m in length was significantly better than other basin sizes tested, e.g., yield for E35-1 was 5.17 tons/Ha and 3.00 tons/ha for the local Kamboinse variety. Whereas

for the millet varieties, a basin of 1.00m in width by 1.00m in length was significantly better than other sized basins, e.g., yield for souna-3 was 2.59 tons/Ha, 2.41 tons/Ha for Ex-bornu and 1.14 tons/Ha for the local Kamboinse variety. In addition, by plowing before planting, yields were increased by more than 200 percent.

2. Application of Mulch. Yield is improved significantly when straw mulch is applied as a surface treatment. The traditional method of planting is on flat bare surfaces which restricts yields. By adding straw mulch, the mean yield of sorghum variety E35-1 was increased by 500 percent. The mulch not only reduces raindrop impact and evaporation but promotes termite and biological activity which increases the number of micropores at the soil surface and down in the soil profile, thus, providing a direct pathway for increasing the entry of water into the root zone. To be effective, the straw mulch must be applied at the time of planting.
3. Varietal response to water management It was found that the E35-1 variety of sorghum responds to water management at a greater rate than does the local Kamboinse variety. For millet, the souna-3 variety responded significantly better than either the Ex-bornu or local Kamboinse varieties (Ex-bornu responded significantly better than the local Kamboinse variety). In the same vein, the plant index (the ratio of the total dry matter to the total yield of grain) for E35-1 sorghum was 2.6 and, for souna-3 millet, it is 1.6. These were the superior varieties. Therefore, if the farmer will expend more energy in the cultivation of varieties that respond to management, his rewards should be more favourable. However, the principle conclusion found in the microcatchment studies was that yield of all varieties was significantly improved when straw mulch was used as a soil surface treatment at seeding time.

4. Weeding and soil-water management. It was found that by the use of microcatchment techniques that the amount of weeding necessary was greatly reduced. In addition, if both tied ridges and straw mulch were used, then weeding was only necessary in "hot" spot areas. This is a critical point because it has been shown that weeding uses the greatest portion of the farmers labour, however, by constructing tied ridges and laying straw mulch there could be a shared relationship for that labour.
5. Animal Traction Programme. The training of four operators for the soil-water programme has been completed. In addition, several pairs of oxen and donkeys have been trained for work in the experimental areas with tradition drawbar equipment. The equipment for each moving projects has been designed, manufactured and, in some instances, purchased for constructing roads, terraces, field plot levelling and contoured ridges (open and tied). The animal traction personnel and equipment are being trained to design and implement village and field trials for the most efficient use of soil-water management techniques.
6. Water harvesting Programme A team of technicians has been trained to survey and layout rainfall-runoff plots to measure the effect of soil surface treatment on slope, evapotranspiration, chemical losses, seepage loses and erosion losses. An interactive computer programme for simulating the hydrologic characteristics of watersheds will be calibrated and verified using data from the runoff plots. The model is able to simulate daily, monthly, and annual runoff, deep percolation, soil erosion, soil chemical losses, temperature, soil-water and evapotranspiration. This information will be used in the design and layout of hydrologic agricultural management systems at the village level.

III. EASTERN AFRICAN SORGHUM AND MILLET IMPROVEMENT PROGRAMME,
KENYA - BASED.

In Phase I of the SAFGRAD Project, ICRISAT and SAFGRAD jointly initiated an Eastern and Southern Africa sorghum and millet programme in which the main objective was to initiate a regional network of sorghum and millet research and to organize and coordinate regional sorghum and millet trials. The Regional Coordination Office was set up in August, 1982 and now operates in cooperation with the OAU/STRC/IBAR in Nairobi. Since its establishment the programme has established good linkages with the national sorghum and millet programmes of the region. Two regional workshops have been organized and successfully completed, the first one in October, 1982 in Ethiopia and the second one in Rwanda in June, 1983. The proceedings of the first workshop were published. Four sorghum regional trials representing four major sorghum ecological zones: High Elevation, Intermediate Elevation, Low Elevation and Very Dry Lowlands, have been organized and distributed to national programmes of the region early in 1983. Both through the regional workshops and the trials it has been possible to establish good linkages among the national programmes of the region. Through these linkages, the flow of the germplasm, technical information, and research techniques among the national programmes of the region are expected to be smooth and fast.

Although this SAFGRAD/ICRISAT Programme was first envisioned to cover the Eastern and Southern Africa Region, a major sorghum and millet project to cover the SADCC countries alone is likely to be implemented in the near future. This means that it would be necessary to handle the Eastern Africa Region alone as a unit and develop a programme that would cover the region. Capitalizing on the regionalization effort which has been underway during the year it would be of advantage to the whole region to have a larger team of scientists and expanded programme to address to the sorghum and millet improvement needs of the region.

Objectives

1. To contribute towards improved cooperation and effective interaction among the national sorghum and millet improvement programmes of the region.
2. To strengthen the national sorghum and millet research programmes of the region and to contribute towards the development and growth of a comprehensive and viable national sorghum and millet improvement programme in each of the countries of the region.
3. To initiate and develop sorghum and millet research activities which are regional in scope and in the long run to sustain such activities so that they will continue to support the national programmes and be sensitive to regional sorghum and millet improvement needs. Regional trials and nurseries will form a major part of these activities.
4. To contribute towards enhanced sorghum germplasm and technical information flow to, from, and within the region.
5. To contribute towards the development of stable and high yielding, insect and disease resistant cultivars suitable for the region.
6. To contribute towards training of local scientific personnel in sorghum and millet improvement and crop protection.

(Dr. Gebrekidan joined the ICRISAT/SAFGRAD Programme in East Africa as the SAFGRAD Regional Coordinator in August, 1982. He is yet to submit a progress report on his activities in the region).

THE PURDUE/SAFGRAD FARMING SYSTEMS UNIT PROJECT

It is a privilege for Purdue University to cooperate with OAU/STRC, ICRISAT, IITA, and the U.S. Agency for International Development in the conduct of research under auspices of the SAFGRAD-JP-31 Project. This project is an important effort to contribute to the modernization of the agricultural sectors of countries which are members of the SAFGRAD. We believe that through the Farming Systems Unit (FSU) Purdue University has contributed to the attainment of this objective and that it will continue to do so in the future.

This report to the Consultative Committee of SAFGRAD is not technical. Technical findings of the Purdue/SAFGRAD/FSU project may be found in the several published technical reports as well as others currently in the process of being published.² Rather, this report is designed to contribute to the policy guidance responsibilities of the Consultative Committee. It will:

- describe the general objectives and approaches which have guided the work of the Farming Systems Unit Project since its inception in 1979;
- briefly outline the farming systems research model which has evolved over the life of the FSU project;
- indicate the manner in which this conceptual model has been operationalized;
- provide suggestions and recommendations for future farming systems work under SAFGRAD auspices.

¹ Prepared by Drs. Ronald P. Cantrell, Mahlon Lang and D. Woods Thomas of Purdue University.

² See Appendix A for a list of reports and other publications of the FSU Project.

General Objective and Approach

Farming systems research is a fairly new concept as a method of contributing to the acceleration of agricultural development in the developing countries. The evolution of this concept is attributable to several factors.

One was the belated recognition that the modernization of traditional agriculture requires the development, transfer and adoption by farmers of improved technologies capable of shifting farm level production functions upward. The development of such technologies is dependent upon a nation's capacity to conduct systematic research directed at factors constraining increased productivity at the farm level. An institutional mechanism for transferring improved technology and associated information from the agricultural research system to farmer decision makers is also essential.

A second factor undergirding the evolution of farming systems research as a development "tool" has been the recognition that most developing nations are characterized by the absence of or imperfections in institutional means of linking farms with national, regional and international agricultural research institutions. Limited national agricultural research capacity means that such capacity as does exist must be directed toward the resolution of the most pressing constraints to increased agricultural resource productivity. The lack of effective institutional means of communicating the specific character of farm production constraints to the agricultural research investments of developing countries.

A third factor has been the imperfections in institutional means for transferring adapted, improved technology from research institutions to farm level decision makers. The result has been

one of technology and related information capable of shifting farm level production functions upward not being available to farmers. This appears to have contributed significantly to the stagnation of agricultural resource productivity.

In the long term, the answer to this set of dilemmas rests in the development on indigenous institutions capable of linking effectively agricultural science and agricultural production. This ultimate solution will acquire a long time and relatively heavy, continuous investment in the formation of scientific human capital and institutional infrastructure. Farming systems research as presently conceived, constitutes a useful first step and, simultaneously, contributes to the building of national education; research, extension and public policy institutions adequate to the development and maintenance of highly productive agricultural sectors.

At the time the Farming Systems Unit Project was conceived and implemented, there existed no universally accepted conceptualization of farming systems research as an agricultural development intervention. A considerable amount of work on farming systems methodology still remains to be done; however, the Purdue/SAFGRAD Farming Systems Unit has made important contributions and continues to be a pioneering effort to conceptualize farming systems approaches to accelerated agricultural development and to develop methodologies and procedures to make this type of intervention productive.

Within the above framework, the general objective of the Purdue/SAFGRAD/FSU project has been one of developing and testing a set of empirical methodologies and procedures which function effectively in the Upper Volta context and which might be useful in the regionalization of farming systems research.

The specific approach utilized by the FSU toward the end of achieving this goal has been one of: (a) developing and refining an operational model of farming systems research in Upper Volta;

(b) making this model available as a functioning example useful as a "training tool" for the development of farming systems units in other SAFGRAD countries and elsewhere; and (c) providing technical, economic, managerial and social information on resource productivity constraints as well as means of their resolution to research, extension and other technology transfer entities and policy-making bodies functioning in areas where the findings of on-farm research and analyses conducted in Upper Volta are relevant

The Purdue/SAFGRAD/FSU Farming System Research Model

The farming systems research model which has evolved out of the work of the FSU project to date is undergirded by three basic characters.

One of these is that agronomic research is conducted under the most realistic conditions possible. This means that researcher managed field trials and farmer-managed field trials are both conducted in the fields of sample farmers in selected villages.

The second is that the choice of agronomic trials conducted is based on site-specific, socio-economic research and existing agronomic knowledge of conditions in the areas in which farm-level trials are conducted. This is the resource productivity constraint identification process.

The third characteristic is that data from both socio-economic and agronomic surveys and trials are quickly analyzed with resultant findings utilized in the design of agronomic trials and socio-economic studies in the following cropping season. These same sets of data are also used in the conduct of in-depth analyses of constraints to increased resource productivity, output and incomes in the study areas.

In an operation context, this farming systems research model is employed in a two year or longer cycle.

During the first year in a study village:

- Researcher-managed trials are conducted using standard experimental designs such as the split plot randomized complete block design. Typically, this involves seven to eight experiments per village with two replications per village.
- Socio-economic research conducted involves an initial detailed village census as a basis for drawing a stratified random sample of farm operations. A random sample of some 30 households is drawn. Detailed interviews of decision-makers within the sample are conducted. These interviews provide basic input-output data on the farm/household operation, farmers' goals and objectives, factors affecting resource allocation and utilization decisions, farmer-specified production constraints and other data necessary to test specific hypotheses. The socio-economic work also involves regular monthly interviews throughout the year to obtain input/output data and to investigate a series of specific hypotheses through variable theme monthly interviews. The socio-economic work also involves the determination of farm crop enterprise patterns including field sizes and yields.

During the second year in a study village:

- Farmer-managed trials are established on the basis of findings of the researcher-managed trials and socio-economic investigations conducted in year one. Farmer-managed trials tend to be relatively extensive involving 1000 to 2500 square meters per treatment. Sample size is approximately 25.
- Researcher-managed trials are continued. These trials are based on findings of experiment station work, findings of socio-economic analyses and other observations pertaining to possible constraints to increased resource productivity.

- Socio-economic research designed to refine empirical findings or test hypotheses generated through prior work in the village or area are conducted.

Operational Characteristics

Experience to date has provided practical information relative to the resource and other requirements for functional farming systems research as conducted in the Farming Systems Unit model. Some of the more important of these matters are:

- This approach to farming systems research requires one mature, responsible, socio-economic interviewer per village site. It also requires one agronomic assistant for each farmer-managed field trial.
- The central professional staff must provide the scientific design, support and control requisite to effective work by the village-level staff. In the FSU model, it necessitates a senior agronomist, a senior agricultural economist, and a junior agricultural economist or agronomist.
- Data handling and in-field analyses require a state-of-the-art (micro computer) data processing facility and system and a staff including a computer programmer, an information specialist and a keypunch technician.
- A wide range of socio-economic and technical issues may be relevant to the farming systems research programme and its objectives. Given the limited full-time professional staff available, the availability of outside expertise to assist in the design of certain of these socio-economic or technical investigations in the design of the socio-economic surveys and/or researcher-managed trials can be critical.

- As a practical matter, it is essential to devote substantial project resources and time to the development and maintenance of working relationships with village leadership and individual farmers. It is necessary to work closely with cooperating farmers in the design and implementation of farmer-managed trials.

As a result of several years experience with farming systems research under the SAFGRAD/FSU rubric, we have concluded that the FSU model of farming systems research outlined above is one that works and one which provides significant information relative to possible means of increasing resource productivity on farms such as those in the several regions of Upper Volta. This FSU model constitutes a practical approach which, appropriately modified and adapted, would have utility in other areas but more importantly it helps some of the institutional imperfections in the Upper Volta situation.

In the first of the last two years, it was possible to conduct work effectively in three Voltaic villages. This included the design and conduct of one farmer-managed trial on millet including such variables as the use of phosphate, urea and tied ridges. Eight researcher-managed trials were conducted in the three villages. The collection of extensive socio-economic data permitted the study of several important constraints hypothesized to be relevant to farming in the areas under study. Two new farmer-managed trials were conceptualized and designed on the basis of findings generated during the first year of the biennium. One of these involves the study of relationship by farmers between fertilization, tied ridges and sorghum yields. The other is concerned with the relationship between tied ridges and the productivity of resources used in maize production.

The design of these new farmer-managed trials takes into consideration:

- The subsistence position of the farmer and the role of cash in his economic behaviour;
- risk aversion behaviour of farmers with respect to crops characterized by a high yield variability;
- labour constraints and/or labour availability during different periods within the cropping season;
- space and storage
- soil and water management constraints to increased output;
- the residual effects of fertilizer and water inputs of millet trials conducted during the prior year; and
- empirical results of researcher-managed trials on sorghum and maize.

It was possible to expand significantly the field work programme during the second year of the most recent biennium. During that year, farming systems research work was conducted in five widely dispersed Voltaic villages. It was possible to generate extensive empirical data relative to risk behaviour and markets and marketing practices of farmers. Interview forms were developed, tested and utilized.

Useful data were also generated on variable themes through "one shot, one month" interviews of sample farmers. Variable themes include such issues as seed varieties used; non-agricultural levels and sources of revenue; farmer marketing practices; farmers' goals, objectives and expectations; non-cereal food consumption patterns; crop yield expectations and farmers perceptions of the kinds and importance of problems which they face in their decision making process.

In addition, three farmer-managed agronomic trials and seven researcher-managed agronomic trials were conducted in the five villages.

An important procedural innovation was implemented during the second year of the biennium. This was scheduling of regular monthly meetings involving all village level staff, the central professional staff and the data managers, processors and analysts. This provides a vehicle for improved control over the entire process, keeps the entire research team well informed relative to on-going work, provides useful insights to senior scientists and analysts vis-a-vis details provided by the field staff on data generation at the village level, and flags specific problems being faced by farm level decision makers.

The FSU research team has begun utilizing the FSU farming systems research model as an educational and training tool for other workers involved in farming systems research activities. During the current year, several major educational functions were under-taken:

- The Nigerien/INRAN/Purdue Major Cereals Research Project - This national agricultural research system development activity has a farming systems research component. Personnel from that project travelled to Ouagadougou and spent considerable amount of time with the SAFGRAD/FSU staff in studying the FSU model as a basis for developing the farming systems research work within INRAN.
- An International farming systems research conference was jointly sponsored by ICRISAT, IRAT, and the FSU. This conference involved farming systems research workers and others from some 20 different countries.
- The SAFGRAD/FSU project was utilized as a living example for participants from seven countries in the region in a regional workshop conducted by the Farming Systems Support Project (FSSP) centrally funded by the Science Technology Bureau of AID and headquartered at the University of Florida.

- At the recent Kansas State University workshop on farming systems research, Drs. Cantrell, Lang, and Sanders presented a professional paper on the FSU model of farming systems research. William Jaeger also presented the results of his research in Upper Volta on the FSU project on the economics of animal traction at this same conference.
- There are available or will soon become available approximately 25 publications on various aspects of the work conducted under the FSU. A number of additional professional papers are in the publication process and will be available in the near future.

Other Lessons from the SAFGRAD/FSU
Farming Systems Research Experience

The FSU project has constituted an important learning experience vis-a-vis the conceptual and methodological issues of farming systems research as an innovative agricultural development intervention. A few of these significant lessons are:

- The interest, comprehension and competence of the village-level farming systems research staff is absolutely critical to the success of the entire endeavour. It is at this level where the reliability and currency of socio-economic and agronomic data is determined. Subsequent analyses can be no better than the data obtained. The village level staff is critical to entire process in terms of the necessity of maintaining excellent working relationships with farmers and with the leadership of the villages under study.
- Detailed and continuous communication among all members of the farming systems research team is necessary. The communication process between the professional staff and the village staff during visits to the field and during monthly team meeting is an important determinant of productivity of undertaking. Equally, continuous communications among the professional staff is essential to effective identification

of priority research thrusts, approaches to specification of data needs, determination of cost effective means of obtaining necessary data, coordination of the overall research endeavour, specification of appropriate analytical methods and the interpretation of the empirical findings of the research. This follows from the fact that farming systems research, by its very nature, is an interdisciplinary problem.

- It is imperative to adjust the data generation process to the capacity of the analytical resources available to the project. With resource constraints faced by the FSU project and by most farming systems research projects, there is a tendency to generate more data than can be utilized in the analytical processes. It is essential to process and analyze priority data in time to use these results as an input to design of socio-economic studies and field trials to be conducted in the succeeding year. Appropriate micro computer capacity in the field is essential to the farming systems research activity. The maintenance of computer hardware and availability of appropriate computer software are continuing problems in developing countries, but this is an essential component of the farming systems programme.
- Effective farming systems research requires attention to ongoing educational and training activities for the entire staff. The professional staff must allocate sufficient time to keep fully abreast of the burgeoning literature associated with farming systems research work. The data management, processing and analytical staff must be knowledgeable about appropriate analytical tools and keep abreast rapidly changing technology in both hardware and software applicable to the types of analyses required of farming systems researchers. Village level staff must constantly strive to improve their skills as interviewers and in collecting physical data associated with on farm trials. New staff entering the village level cadre must be brought up to speed through on-the-job training. Specific technical training is required for all village level staff as new and different inquiries are initiated.

- There is need for innovative mechanisms and methodologies for establishing operational linkages with organizations in the LDC's responsible for the transfer of technology to end users at the farm level and elsewhere as well as of ancillary information and knowledge requisite to the adoption and utilization of new technologies.

Recommendations

The SAFGRAD/Purdue/FSU Project strongly recommends that the Farming System Unit component of the SAFGRAD programme be extended beyond its current termination date (March of 1985). Significant refinements and improvements in the conceptualization of farming systems research, extension, and policy work and the methodology for conducting such are needed. This would be most efficiently accomplished by building on the FSU investment.

The SAFGRAD/Purdue/FSU Project recommends that serious consideration be given to increased utilization of the FSU project as an educational and training device for new farming systems research, extension/policy projects to be developed bilaterally in Upper Volta and in other SAFGRAD countries as well. While by no means complete or perfect, the FSR project of the SAFGRAD/FSU work is a valuable resource which could be effectively used across the region.

- As a training model, the FSU project in the future could serve as an effective place to bring representatives from other SAFGRAD countries to learn and observe conceptual, empirical and procedural matters of potential usefulness in their own countries. Such individuals or groups might well include staff at all levels -- professional data management, analysts, administrators and village level personnel.
- Specific subject matter training could be provided on such things as technology evaluation, design of agronomic trials questionnaire design, data management and processing, analytical models, etc. It would also be possible to provide through the extended FSU project on-the-job training for village level staff from farming systems research/extension/policy projects in other SAFGRAD countries.

To accomplish this end, it would be necessary to expand the minimal professional staff by the addition of a training officer and the resources to develop appropriate training materials in cooperation with FSU project professionals and to arrange and coordinate visits of personnel from other SAFGRAD countries.

The ongoing FSU project would appear to be highly complementary with the IFAD farming systems project currently being developed, the bilateral, AID/Upper Volta Farming Systems Project and with incipient farming systems research projects in other SAFGRAD countries. It is recommended that these areas of complementarity be recognized and pursued.

SAFGRAD - BACKGROUND INFORMATION

The Semi-Arid Food Grain Research and Development programme (SAFGRAD) was initiated by donors, representatives of member countries and research organizations at the Ouagadougou Conference in 1976. SAFGRAD as regional project has concentrated to:

1. intensify plant breeding for major cereals and grain legumes;
2. facilitate regional cooperative research trials including specific crop cultural management practices;
3. focus on increasing food production in drier and marginal areas where there is frequent drastic crop loss due to adverse climatic conditions;
4. facilitate the flow of improved plant materials and other innovations to cooperating national research programmes;
5. develop linkages between research and extension programmes; and
6. stimulate farming systems research in the region.

In general, project activities of SAFGRAD are focused on strengthening regional coordination of research on staple cereals and grain legumes, support national research programmes and extend new innovations to the farmer.

STRATEGIES FOR IMPLEMENTATION OF SAFGRAD PROJECT

The SAFGRAD project is coordinated by OAU/STRC Coordination Office. Its thrust of research emphasis is to improve sustained yields of sorghum, millet, maize, cowpea and groundnut. The project became operational since 1978 and is implemented through contracts with International Agricultural Research Institutes in their mandate crops.

The major components of the SAFGRAD project are:

1. improvement of sorghum, millet and groundnut, contracted to ICRISAT;
2. improvement of maize and cowpea, contracted to IITA;
3. farming systems research, contracted to Purdue University;
4. strengthening national programmes through training, workshops, seminars and field tours.
5. strengthening liaison between national research and extension programmes through Accelerated Crop Production Officers (ACPOs) placed in different countries.

Member States

Originally the SAFGRAD project was designed for 18 member states of the Organization of African Unity (Benin, Cameroon, Cape Verde, Central African Republic, Chad, Ethiopia, Gambia, Ghana, Guinea, Ivory Coast, Mali, Mauritania, Niger, Nigeria, Senegal, Sudan, Togo and Upper Volta). Based on the experience of the previous project of crop improvement known as JP 26, several other states became interested and were also granted membership through recommendation of OAU Council of Ministers. These include Sierra Leone, Botswana, Kenya, Somalia, Tanzania, Guinea Bissau and Zambia.

Highlights of SAFGRAD Research Components

As indicated above, SAFGRAD implements its research project through the International Institute of Tropical Agriculture (IITA), the International Crop Research Institute for Semi-Arid Tropics (ICRISAT), the Farming Systems research with Purdue University and the ACPO programme which is integrated into the national agricultural research and development systems.

Based on the contractual requirements, IITA started its programme without any delay at Kamboinse research station in Upper Volta. Through resident research and regional cooperative trials with national programmes, IITA has developed:

- promising varieties of maize currently being utilized in regional trials at different ecological zones; depending on the indigenous research capability of national programmes some of these varieties have been released and used by the farmer;
- (in cooperation with CIMMYT) a high quality protein maize variety that is promising to improve the nutritional quality (as in some Latin American Countries) of basic diets is scheduled for SAFGRAD regional trials;
- two cowpea varieties have been released; some resistance to bruchid aphids and striga is being incorporated into some varieties of cowpea and some resistant types are being screened;

Furthermore, through agronomic trials involving cultural practices major constraints for maize and cowpea production have been identified. The regional research and coordination of SAFGRAD for maize and cowpea through IITA programme has been conducted in 20 member states involving 45 national scientists (1982).

ICRISAT research work related to the SAFGRAD Project is carried out at Kamboinse, Upper Volta, and at the Institute of Agricultural Research, Samaru, Nigeria. In Nairobi, it has a Coordination Office for regional millet and sorghum trials for Eastern and Southern Africa. Evidence from regional research trials indicate that ICRISAT has identified and released varieties of sorghum and millet that are suitable for low rainfall ecological zones. Soil and water management trials conducted at Kamboinse are also of a regional impact. Due to lack of a suitable mechanism for research monitoring, SAFGRAD Farming Systems Research is carried out by Purdue University. FSU Research is based in Upper Volta. The project has focussed on developing broad research methodology in farming systems that could also be

applicable to other SAFGRAD countries. The programme, through its farm level studies has evaluated packages of technology and identified principal constraints for optimizing food production.

Workshops and Conferences

Regional research monitoring and coordination of SAFGRAD is also achieved through specific workshops and conferences. Such a mechanism is provided for exchange of experience, discussion and analysis of data obtained between the national research scientists and international research scientists in various disciplines of crop production. During such workshops, plans for the trials are discussed, formulated and more avenues of cooperation identified. Since the SAFGRAD project was started, it has organized the following workshops and conferences:

- Maize and cowpea	:	:	:	:	:	5
- Sorghum and millet	:	:	:	:	:	2
- Farming Systems	:	:	:	:	:	2

Accelerated Crop Production Programme

The transfer of innovation to farmers has continued to be one of the major constraints in increasing food production in many developing countries. The accelerated crop production officers (ACPOs) serve as principal links between SAFGRAD research and research extension programmes of participating member states. The programme has played a catalytic role in diffusion of improved technology to farmers, through its expanded farm level trials. The programme was started only in five member states due to lack of financial or donor support.

Training

Training of middle level research workers has been implemented through IITA, ICRISAT and FSU - SAFGRAD research collaborators. So far, IITA has trained 38 participants on maize and cowpea breeding, agronomy and overall production systems at Kamboinse and at its headquarters in Ibadan, Nigeria. ICRISAT has trained 10 in sorghum/millet improvement and production at its headquarters in Hyderabad, India.

Purdue University has trained several technicians and also on-farm level workers to start its own programme. As to degree-level training, the total number of candidates whose programme is already completed as well as those still in training for B.Sc, M.Sc. and Ph.D degrees from different SAFGRAD member states is around 25.

Project Landmarks

There have been three landmark events during the course of the project. The term landmark is used in the sense that these events have shaped or will continue to shape the course of the project in an important manner. These include. :

1. Evaluations : The 1981 evaluation had several management related recommendations which are vital issues today.
 - a) The CC and TAC should become more active;
 - b) The need for emphasis on the coordination of national with regional research;
 - c) The possibility of having OAU do the contracting for technical assistance was recommended for consideration;
 - d) The 1982 ad hoc committee proposed a management plan for SAFGRAD and assigned a capital role to the Coordination Office and proposed project expansion costs for SAFGRAD covering 1983 - 1990;
 - e) The upcoming evaluation will be a critical one in the light of the previous evaluation and audit and may largely shape Phase II of SAFGRAD. It is hoped that the CC will be able to make recommendations to the evaluation team in terms of priority areas to be evaluated and also contribute its own ideas about the organization and priorities of SAFGRAD II.

2. The audit which was largely directed at the Coordination Office in Ouagadougou resulted not only in personnel changes but also in the institution of a better financial management system. Other larger management issues, like the role of the CC, which will continue to preoccupy those responsible for the project were also raised.
3. The project is now in the sixth month of a 22-month extension. This extension not only bears testimony to the confidence given to SAFGRAD but also serves as an interim period to fully implement the recommendations made by the evaluators and auditors.

PRESENT IMPORTANT TRENDS

1. SAFGRAD is becoming a truly multi-donor project. The new IFAD element in the project is an important one and serves to establish OAU leadership in a large-scale multi-donor, regional project .
2. The role of OAU in the management of the project is becoming increasingly important in both technical and financial terms. It is envisaged that this will continue to be the case.
3. The role of ^{the} major donor (USAID) is changing: less emphasis is being placed on operational and administrative involvement and more emphasis on the traditional monitoring role. This is, of course, in line with the increasing responsibility of OAU/STRC.
4. In accordance with the above, changes in contracting and administrative modalities seem likely. It is hoped that OAU/STRC will be dealing more directly with the contractors and ACPOs, for example, through new types of agreements and contractual arrangements.

SAFGRAD II

A major commitment to a new Phase of SAFGRAD has already been made. Early next year, work will begin on the planning of Phase II by a team sent by the USAID. The inputs of the Consultative Committee in conjunction with those of the evaluation team will be critical elements in the design of this new Phase.

THE CONSULTATIVE AND TECHNICAL ADVISORY COMMITTEES
OF JP 31 SAFGRAD

The Consultative and Technical Advisory Committees are two important management/administrative elements of SAFGRAD which provide policy and technical guidance for the smooth running of the project.

. THE CONSULTATIVE COMMITTEE

A. Role

As contained in the original project document of 1977, the role of the CC includes:

1. review overall SAFGRAD project and make recommendations on policy matters;
2. review management, organization or technical problems and make recommendations for donors, implementators and participating cooperating countries to follow in seeking solutions to problems;
3. facilitate project implementation and assure sound administrative management and technical practices;
4. serve as a receiving and reviewing body for questions or suggestions from any participating or cooperative party.

B. Membership

In accordance with the project paper and the mid-term project evaluation report of July 1981, the CC consists of 12 permanent members representing SAFGRAD member countries, OAU/STRC, SAFGRAD donors and four ex-officio members who represent SAFGRAD implementing agencies. However, after high-level OAU-AID consultations in Niagadougou and Brussels this year in which ICRISAT and IITA officials participated (see list attached), it was decided and agreed that for the CC and TAC to be more effective, the total membership of both committees should be reduced.

The revised membership of CC is now as follows:

1. OAU/STRC Executive Secretary, or his designee, to also serve as Chairman of CC;
2. USAID , as a donor;
3. Two other SAFGRAD donors;
4. Two representatives from the International Agricultural Research Centres employed by the project, one each from ICRISAT and IITA. and
5. Two African country representatives.

"Of the eight CC members, five shall constitute a quorum, insofar as three of the five are from the international research centres and/or donors. In the absence of an African country representative, SAFGRAD Director of Research may sit in his stead. The International Coordinator shall fulfill the role of the secretariat to the CC. The primary functions of the secretariat are to announce meetings, issue invitations, prepare agenda, coordinate logistic support to the meeting, distribute the proceedings of the meeting, and monitor and/or carry out any necessary follow-up actions".

II. THE TECHNICAL ADVISORY COMMITTEE

A. Role

The TAC serves primarily a supporting and advisory role ; from the original document the proposed role of TAC was outlined as follows:

1. review annual research work plans and submit recommendations to CC;
2. review other research work plans/documentation related to SAFGRAD in the Sudan Sahelian Zone, and submit recommendations to CC on approaches for improvement or coordination of food crop research ;
3. review annual research work plans of ACPD and submit recommendations to the CC, National Officers and ACPDs,

4. furthermore, based on the OUA-USAID and international institute consultative meetings in Ouagagougou and Brussels, the TAC will review Farming Systems Research results and advice CC on coordination and approaches of FSR.

B. Membership

As indicated in the project paper and mid-term project evaluation report, TAC consists of eight members made up of senior scientists from member countries, an OAU/STRC representative and four representatives from the research agencies implementing the project. But as decided at the meeting in Brussels, TAC membership is presently as follows:

1. OAU/STRC Executive Secretary, or his designee, to serve as Chairman of the TAC;
2. USAID, as a donor;
3. FAC/IRAT, as a donor
4. Three African country representatives;
5. Two representatives from the International Agricultural Research Centres employed by the project, each from ICRISAT and IITA;
6. Purdue University; and
7. The OAU SAFGRAD International Coordinator.

"Of the 10 TAC members, six shall constitute a quorum insofar as one OAU representative, one donor and one international centre representative are among the six. The SAFGRAD Director of Research shall serve as the secretariat to the TAC. In the absence of the Research Director, the OAU International Coordinator shall fulfill the role of the secretariat. As with the CC secretariat, the primary functions of the secretariat are to announce meetings, issue invitations, prepare agendas, coordinate logistic support to the meetings, distribute the proceedings of the workshops and monitor and/or carry out any necessary follow-up actions.

PARTICIPANTS AT THE DISCUSSIONS IN BRUSSELS
(10 - 11 MARCH 1983)

1. OAU/STRC

Prof. A.O. WILLIAMS
Executive Secretary, OAU/STRC
Lagos, Nigeria.

Prof. Conaovi A. JOHNSON
Assistant Executive Secretary, OAU/STRC
Lagos, Nigeria

2. USAID

Mr. Robert E. GRAY
Agricultural Development Officer
Africa Bureau
Office of Regional Affairs
Washington, D.C. USA

Mr. Lawrence C. HEILMAN
Deputy Director, USAID/Upper Volta
Ouagadougou, Upper Volta

Mr. John A. BECKER
Agricultural Development Officer
USAID/ Upper Volta

3. IITA

Mr. Edmond HARTMANS
Director General
IITA
Ibadan, Nigeria

4. ICRISAT

Mr. Curtis R. JACKSON
Director for International Cooperation
Hyderabad, India

5. OBSERVER

Mr. Michael A. KAMBA
Director
Permanent Office of the OAU in Brussels
Brussels, Belgium.

ACCELERATED CROP PRODUCTION PROGRAMME

INTRODUCTION

Agriculture is the foundation stone of the economies of most African countries. Sub-Sahara Africa, where all SAFGRAD member states belong, has one of the poorest world economies. For example, 22 of the 36 low income countries of the world are in the Sub-Saharan countries. During the last two decades African countries in general and SAFGRAD member countries in particular have been experiencing a continuous decline of per capita food production. During the same period, population growth rate in most African countries has increased from 2.5% in 1960 to 3.0% in 1980-85. Increasing of food production has therefore become the focus of national development, particularly in the semi-arid region of Africa.

THE ACCELERATED CROP PRODUCTION OFFICER

One of the important components of JP 31 SAFGRAD is the stimulation of food production in the region. At the time the project was conceived, accelerated crop production officers (ACPOs) were envisaged to provide liaison between national research and extension programmes of member states. The ACPO was expected to be fully integrated into the national research and extension systems. The ACPO was given the following broad guidelines of activities but with particular emphasis to:

- a) conduct field trials of improved packages of technology at different ecological zones;
- b) strengthen linkages among national agricultural research and extension institutions by conducting broader farm trials and demonstrations, and induce a two-way flow of feedback information (Researcher \longleftrightarrow Extension \longleftrightarrow Farmers);
- c) upgrade the technical skills of national extension agents;
- d) contribute toward effective diffusion of packages of technology in order to impart a regional impact.

So far, ACPOs have been assigned only to five(5) of the 25 member states. These include Cameroon, Mali, Senegal, Togo and Upper Volta (See Appendix I). Except for the ACPO in Togo whose programme is financed by the French Aid for Cooperation (FAC), the rest are funded by USAID.

Based on reports received or visits made, the following brief remarks provide some information on the present status of the programmes of ACPOs in the five countries mentioned above.

CAMEROON.

The ACPO programme in Cameroon started in 1979. At that time the main activities of the ACPO were limited to variety screening trials which were conducted in cooperation with the national research station at Maroua. Some pre-extension trials were also carried out on farmers' fields. Liaison with the national extension programme was initiated in 1980 through cooperative trials implemented by services of the Ministry of Agriculture and the principal development corporation, SODECOTON.

Since 1982, Cameroon has succeeded to place two cowpea entomologists and a breeder each on sorghum, groundnuts, and maize at the Maroua station where the ACPO is based. With this reinforcement of the research capability of the station, the ACPO and his national counterpart no longer conduct on-station trials. Instead, they are now involved directly with on-farm trials (using improved varieties selected at the station), consumer tests and initial multiplication of seeds of varieties which have been accepted by the farmers. The seed is delivered to national seed multiplication and extension officials who receive advice from the ACPO on methods of extending research results to small farmer

Although agricultural extension and agricultural research are managed by two separate autonomous administrative bodies, the Cameroon ACPO has successfully demonstrated the necessity of working together, to help the small farmer to increase food production.

MALI

In Mali the programme was started in 1978 with pre-extension tests at 26 sites. The theme of the preliminary on-farm tests was on increased yields based on improved varieties of sorghum, millet, maize and fertilizer application. The results immediately indicated that the improved varieties of cereals and grain legumes (cowpeas and groundnuts) were generally yielding less than the local varieties. In general, yields were improved through fertilizer application.

It was also discovered that the problem of food production in the region of ACPO activity was also attributed to biological, physical and technological constraints. After analyzing data of the pre-extension trials the ACPO, in collaboration with the national research and extension staff, included trials designed to improve soil fertility. Since 1979, rock phosphate trials with other improved packages have been conducted on farmers' fields in the major ecological zones of Mali. During the 1983 crop season, there were 260 such trials. In most of the regions, yields of millet, sorghum, maize and groundnuts have substantially increased. The yield increase due to rock phosphate (applied once only), using both improved and local varieties, reached its maximum during the second year in some regions and during the third in others.

The success of the ACPO programme in Mali has been attributed to a better understanding and cooperation between the ACPO and the national research and extension services both of which, fortunately, fall within the same administrative structure. Besides, the national officials, right from the start of the ACPO programme in Mali, were concerned about the weak link between research/extension and the Malian farmer and were fully appreciative of the role of the ACPO in fulfilling this timely need. The programme is now being fully executed by a trained national ACPO assisted by a team of several Malians.

SENEGAL

The ACPO programme in Senegal was started in 1980. As an integral part of the national agricultural research system, it has helped to strengthen national research activities at Nioro

and Sefa stations. Evaluation of several sorghum varieties resulted in the identification of four promising lines which are currently being used in pre-extension trials. Furthermore, several improved millet varieties were also screened and four high-yielding lines have been included in pre-extension trials.

With regard to cowpea, five promising lines were identified for further evaluation. Studies on cultural practices relating to the improvement of soil fertility indicated that maize yield is substantially improved when preceded by cowpea (rotation and relay trials). During the current cropping season, several on-farm trials on maize, millet, sorghum and cowpeas are in progress.

TOGO

Unlike other ACPOs who are financed through USAID, the Togo ACPO activities are funded by FAC. The ACPO and his national counterpart, assisted by three agricultural technicians, are the only ones involved in on-station as well as on-farm trials on the mandate crops of SAFGRAD in northern Togo. The on-farm trials are located mainly on the fields of farmers involved in a government resettlement scheme in the Kara valley where more than 900 families have been settled.

Although some encouraging results have been obtained, for example from the use of rock phosphate as a local fertilizer, control of striga by use of a resistant high-yielding sorghum variety, etc, lack of a back-up team to conduct on-station research is a major constraint which, if not corrected, would greatly limit attainment of increased food production at the farmer's level in Togo. At the moment the ACPO cannot effectively serve as a good liaison between the farmer and the researcher.

UPPER VOLTA

The programme in Upper Volta was started in 1979 as an integrated unit to the national research system. Pre-extension trials as well as on-farm trials were conducted mainly within the 500 to 800mm rainfall ecological zone. Soil fertility and water retention are very low in most soils of Upper Volta - a common observation in the other semi-arid regions of Africa.

Several varieties of maize, sorghum and cowpeas were included in the study. The use of rock phosphate and improved cultural practices (such as tied ridges) showed that yields of the above mentioned crops could be increased substantially when both local and improved varieties were used.

The inability of the ACPO to play his role effectively within a system where agricultural research and extension are not within the same administrative unit has been a major constraint. Fortunately, arrangements are in progress to solve this problem.

GENERAL REMARKS.

The success of the accelerated crop production programme, based on the five present cases of JP 31 SAFGRAD, depends mainly on the extent to which national agricultural research and extension systems are functionally integrated.

From direct contacts with many host government officials, agricultural researchers and farmers, the ACPO programme is a success. They want it to be continued. Other member states want it started in their own countries. Unfortunately, only 5 out of the present 25 member states benefit from the programme. Ways and means should be found to expand the present programme. This would enable, East and Southern African member states in particular to benefit from this programme which has been restricted mainly to West Africa. Besides, a country like Benin, with which an agreement had actually been signed (See Appendix II) but still without an ACPO, would benefit from such an expansion. When should financial assistance be stopped in countries with ACPO programmes? After an initial on-the-job training by the expatriate ACPO, the national counterpart usually undergoes advanced University training. When the national ACPO has returned and fully taken over control of programme, for how long should SAFGRAD funding continue?

Although the overall role of the ACPO is fully defined, experience has shown that this role is gradually modified to suit existing needs of the host country. His most important role of assisting the small farmer to increase his yields can be achieved better if he devotes his time on on-farm trials. He should avoid, as much as possible, being too involved with on-station trials.

APPENDIX I

DISTRIBUTION OF ACPOs IN JP 31 SAFGRAD MEMBER STATES. a/

Member State	Name of ACPO	Donor	Location	Date ACPO Started Service	Remarks.
CAMEROON	OWEN GWATHMEY	USAID	MAROUA	MAY 1979	Contract ends Dec. 1983. Counterpart leaving soon for training.
MALI	LAMINE TRAORE	USAID	SOTUBA (Bamako)	SEPT. 1982	Trained national ACPO
SENEGAL	MANKEUR FALL	USAID	BAMBEY	FEB. 1981	
TOGO	ROBERT MARTIN	FAC	LAMA-KARA	JUNE 1982	Counterpart not yet trained.
UPPER VOLTA	MOUSSA KABORE	USAID	KAMBOINSE	MAY 1982	Trained National ACPO.

a/ An agreement was signed with the Republic of Benin since 28 June 1982 but no ACPO has yet been appointed for Benin.

APPENDIX II

STATUS OF AGREEMENTS SIGNED WITH JP 31 SAFGRAD MEMBER STATES
WITH ACPOs

Member State	Date agreement signed or renewed	Duration	Remarks
CAMEROON	15 NOVEMBER 1980	3 YEARS	For renewal in Nov. 1983
SIERRA LEONE	2 DECEMBER 1982	2 YEARS	For renewal in Dec. 1984
SENEGAL	18 OCTOBER 1980	2 YEARS	Not yet renewed
TOGO	14 DECEMBER 1980	3 YEARS	For renewal in Dec. 1983
UPPER VOLTA	24 AUGUST 1982	2 YEARS	For renewal in August 1984

COORDINATION OF RESEARCH

Very little emphasis was given to develop agricultural research and development in most sub-saharan countries of Africa since the last 30 years. Among other limited resources, trained manpower remains to be one of the major constraints which should be resolved in order to build a strong agricultural economy. Per capita food production in most SAFGRAD member states started to decline since the 1960's, long before the 1968-74 drought in the Sahel and parts of Eastern and Central Africa. The technological break throughs around 1970's to 1980's in African agriculture were insufficient to make any significant changes in increasing food production. As a result, the return in investment in food crop production using available technology is low. The biological, physical and socio-economic constraints to food production in semi-arid regions of sub-saharan Africa deserve special attention through coordinated research effort. Furthermore, only few countries with strong economies in most regions of Africa could support viable agricultural research and extension programmes. Strengthening regional cooperative agricultural research programmes on rainfed and irrigated agriculture is the alternative choice in order to stimulate food production in many of these countries.

The mid-term project evaluation team (on SAFGRAD) strongly recommended that "greater emphasis should be placed on the coordination of national with regional level research efforts and relatively less emphasis placed on direct research at the regional level. Doing so would help recreate the operation spirit of the research and development systems which existed without regard to national boundaries in pre-independence times. Greater coordination of all research resources can have a larger impact than can the national and regional institutions working independently. This effort should be pursued vigorously by OAU/SIRC with AID support"

Although effective coordination of SAFGRAD research project is yet to be improved, resources of the national agricultural research centres and that of the international research institutes were utilized to monitor the coordination of research through the activities of regional variety trials, scientific conferences

and workshops, farmers' field trials, (ACPO programmes), training and exchange of scientific information.

SAFGRAD, as a regional organization facilitates the assimilation of national research programmes with the work of international research institutes. SAFGRAD project is implemented through IITA and ICRISAT regionally oriented research in their respective mandated crops with major emphasis to develop improved varieties of cereal and grain legume crops and cultural practices which can be adopted by the small farmer in the semi-arid regions. Based on this general objective, IITA and ICRISAT have augmented the research (on cereals and grain legumes) that is being carried out in national research centres by placing scientists in national research stations, for instance, at Kamboinse Research Station in Upper Volta and the Institute of Agricultural Research (IAR) located at Samaru in Nigeria. Another objective of assigning the international institute scientists at national research centres is also to facilitate the development of regional agricultural centres viable enough to stimulate increase in food production in several countries of a given region.

After five years of operation, has the SAFGRAD project achieved its objective towards developing regional research centres that are typical to the ecological regions it meant to provide services. It is, therefore, suggested that a critical review (perhaps by IAC) of the experience gained as well as regional impact of the above mentioned research centres be made. There are two approaches for developing regional research centres:

1. Strengthening identified national research centres with regional and international inputs. This is the approach being currently followed by SAFGRAD and several international research institutes because it costs less.
2. Establishment of one or more regional research centres explicitly controlled by SAFGRAD and its member states. This approach entails significant investment.

ICRISAT, through SAFGRAD support, coordinates research on sorghum and millet in Eastern and Southern Africa. It is hoped that such a programme input can strengthen regional research effort and increase yields of sorghum and millet in the region.

The inter-relationship between SAFGRAD and other agencies needs to be studied in order to minimize duplication of efforts. The following case of INSAH is a good example.

The Sahel Institute (INSAH) was created as a specialized institution within the Inter-State Committee for Drought Control in the Sahel (CILSS) to coordinate scientific and technical research in the Sahel. At the moment, INSAH is involved with research on maize, millet, sorghum and cowpeas. This is aimed at making improved varieties available to national institutes, promotion of regional trials, production of improved seed, training of researchers and exchange of scientific and technical information. During the 1983/84 season, INSAH has been coordinating 167 trials in all the eight CILSS member countries.

In addition to agricultural research, other INSAH activities include:

- agricultural engineering, environmental studies (ecology and forestry), socio-economics (demography), crop protection information and documentation.

In 1982, INSAH and SAFGRAD signed an agreement to cooperate on matters concerning breeding, agronomy, entomology, farming systems, training, scientific and technical information on the main crops of interest to both organizations.

Areas of Cooperation:

Possible areas of cooperation between INSAH and SAFGRAD include the following:

1. Use of selected crop varieties from SAFGRAD regional centres in national programmes funded through INSAH.
2. Use of varieties selected at national research centres by ACPs for on-farm testing on the farmers' fields.
3. Identification and sponsoring of competent candidates from the CILSS member countries for training to strengthen national research capabilities.
4. Participation in workshops, conferences, or other meetings and seminars organized by INSAH, SAFGRAD or jointly by both organizations.

COORDINATION OF TRAINING

In many SAFGRAD member states there is acute shortage of highly trained scientific cadre to carry out various agricultural research programmes. The training component of the SAFGRAD Project emphasizes that the strengthening of research capability in member countries would largely depend on training scientists in short and long-term training programmes.

LONG-TERM TRAINING

Although JP 31 SAFGRAD was signed (between OAU/STRC and USAID) in May, 1977, it has only completed five operational years. During this period 25 candidates have been selected for long-term training as summarized in Table I. The candidates, for the most part, have been selected from the Sahelian countries. The areas of training emphasis include the following:

Agronomy:including plant breeding	:	:	:	:	:	:	:	14
Agricultural Economics	:	:	:	:	:	:	:	4
Soil Science	:	:	:	:	:	:	:	3
Plant Nutrition	:	:	:	:	:	:	:	1
Plant Pathology	:	:	:	:	:	:	:	1
Agricultural Engineering	:	:	:	:	:	:	:	1
Other Disciplines	:	:	:	:	:	:	:	1
TOTAL								<hr/> 25

The recommendations for choosing candidates for advanced degree training come to SAFGRAD from various sources such as Ministries of Agriculture of member states, major institutions associated with the project and sometimes from the ACPOs themselves. Whatever the case, the host country must give its approval before a candidate is accepted for training.

Once the participant starts training, progress reports relating to his studies are usually sent directly through the USAID office in the candidate's country to his home service; no copies are sent to the Coordination Office. There is, therefore, a lack of information by SAFGRAD and other interested parties concerning the progress of the participants.

The Coordination Office should be sent periodic reports and other relevant information about the participants in order to follow up their return and installation in the SAFGRAD activities of their respective countries.

SHORT-TERM TRAINING

Training from a few weeks to six months is conducted by the International Institutes and Purdue University (Table 1).

IITA.

The training effort of IITA includes in-service training at Kamboinse Station and IITA headquarters in Ibadan. Every year since 1980, 5-6 technicians from SAFGRAD member countries have undergone a six-month in-service training at Kamboinse in maize and cowpea breeding, agronomy or entomology. So far 16 such technicians have been trained. Three students from the University of Ouagadougou received graduate thesis guidance in maize breeding and cowpea agronomy while 24 others from Benin and Upper Volta participated in a one-month course in maize and cowpea production at Kamboinse. In collaboration with the "Institut Pratique de Développement Rural de Kolo" (Niger), two Voltaic students received a three-month training in entomology at Kamboinse.

At IITA headquarters in Ibadan, 25 technicians representing a wide cross-section of SAFGRAD members are trained annually since 1980. SAFGRAD funds have supported ten of these trainees.

ICRISAT

Short-term training with ICRISAT is currently done only in Hyderabad, India. Since the inception of JP 31 SAFGRAD, eight participants have been trained in crop production in 1982 and two more are undergoing training in 1983. The trainees were from Botswana, Cameroon, Guinea (Conakry), Kenya and Mali.

PURDUE UNIVERSITY

Training by Purdue University within the OAU/STRC contract has been limited almost exclusively to degree-related training. Only one participant has received short-term training in computer programming.

TRAINING DURING REMAINING PERIOD OF SAFGRAD I

The first phase of JP 31 SAFGRAD is expected to end on 31 March, 1985. However, in order to enable candidates undergoing long-term training to complete their programme, the training component of SAFGRAD I has been extended till 1987. It is anticipated that during this remaining period SAFGRAD, with the cooperation of the International Institutes and Purdue University, and assistance of member countries, will:

- a) develop criteria of selecting candidates in order to ensure adequate academic preparation, record of scholastic excellence and work experience in agricultural research;
- b) accelerate the nomination and selection of candidates during the next few months in order to take advantage of some of the funds still available for long-term training
- c) maintain complete records on all long-term trainees in order to follow their academic progress, date of return and placement back in the respective SAFGRAD member countries
- d) arrange with universities so that, as much as possible, long-term trainees could conduct their research on SAFGRAD mandate crops in the semi-arid regions of Africa;
- e) improve the quality and expand short-term training facilities in the Sahel, while looking for means of establishing similar facilities in East and Southern Africa;
- f) extend short-term training to include relevant farm activities at the village level for the farming systems programmes;
- g) endeavour to identify other donors so that candidates from other SAFGRAD member countries can participate in short and long-term training.

TABLE I.

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TRAINING OF PARTICIPANTS FROM MEMBER COUNTRIES OF JP 31 SAFGRAD

MEMBER COUNTRY	Degree-Related Training			Non-degree-Related Trng.			Total per Country
	B.Sc	M.Sc	Ph.D	ICRISAT	IITA	PURDUE UNIV.	
BENIN	-	-	-		5		5
BOTSWANA	-	1	1	1	2		5
CAMEROON		-	-	3			3
CAPE VERDE	-	-	-				0
CENTRAL AFRICA	-	-	-				0
CHAD	-	1	-		1		2
ETHIOPIA	-	-	-				0
GAMBIA	-	-	-		3		3
GHANA	-	-	1				1
GUINEA	-	4	-	4	5		13
GUINEA BISSAU	-	-	-				0
IVORY COAST	-	-	-				0
KENYA	-	-	-	1			1
MALI	1	4	1	1	5		12
MAURITANIA	-	-	-		1		1
NIGER	-	-	-				0
NIGERIA	-	-	-				0
SENEGAL	-	2	-		1		3
SIERRA LEONE	-	-	-		1		1
SOMALIA	-	-	-		1		1
SUDAN	-	-	-				0
TANZANIA	-	-	-				0
TOGO	-	2	-				2
UPPER VOLTA	-	2	4		17	4	27
ZAMBIA	-	-	-		1		1
TOTAL	1	16	7	10	43	4	81

* This list includes candidates who have completed as well as those who are still undergoing training as at 30 September, 1983.

COORDINATION OFFICE: ADMINISTRATION AND MANAGEMENT

I. THE MANAGEMENT MECHANISM OF THE PROJECT

The grant agreement (with subsequent amendments) indicated that management guidance of JP 31 SAFGRAD would be provided through the following organizational elements:

- A. The Consultative Committee (CC), comprising representatives of OAU/STRC, SAFGRAD member states, donors and the contractors, was to provide policy and programme guidance as well as to facilitate project implementation and assure sound administrative and technical management.
- B. The Technical Advisory Committee (TAC), represented by Senior African Scientists, OAU/STRC, the donors and the international agricultural research centres, serves as the advisory arm of the CC on research and technical matters. TAC reviews annual research work plans and other relevant technical matters and submits its recommendations to the CC.
- C. The OAU/STRC International Coordinator, located in Ouagadougou, Upper Volta, now assisted by a Director of Research on technical matters, serves as the Chief Administrative Officer of the Project. With guidance from the CC, he facilitates and coordinates SAFGRAD operations and takes charge of the daily running of the Coordination Office in Ouagadougou.

II. THE PRESENT SITUATION

A. Administrative Aspect

1. The CC and TAC: Both the CC and TAC were expected to meet annually and more frequently if deemed necessary. Unfortunately, the CC has met only once (October 1981) and TAC twice (May 1979 and October, 1981). The present meeting of CC is its second since JP 31 SAFGRAD came into operation in 1978.

2. The OAU/STRC Coordination Office, now consists of the International Coordinator, the Director of Research, two Accountants and 16 locally recruited staff. The local staff was reduced in June 1983 from an original number of 18 as recommended by the auditors. (The Office has been requested by the USAID, to reduce again to 14). The Coordination Office is expected to work in close collaboration with the three contracting agencies: ICRISAT, IITA and the Farming System Unit (FSU) of Purdue University (both IITA and FSU are located in Ouagadougou) and assist them in arranging for housing, imports, visas, etc. However, the two units in Ouagadougou have been and are still operating as independent administrative units. Although the new team in the Coordination Office is gradually normalizing the situation, the administrative units have already been set up. These units take up valuable research time to solve labour and other administrative problems some of which could easily be handled by the Coordination Office if it is provided with the appropriate administrative staff support. The relationship between the Coordination Office and the other two regional centres in Samaru (Nigeria) and Bambey (Senegal) has not been as strong as expected. Except for the soil and Water Management Scientist who is based at Kamboinse Station, the rest of the SAFGRAD/ICRISAT researchers are based in Samaru. Arrangements are now in progress to strengthen this vital link with the Coordination Office.

As regards the relationship with member states and national research centres, this has been excellent - particularly through SAFGRAD workshops and training programmes. Although most applications for training have been channelled through the Coordination Office, information on the progress of those participants pursuing graduate training in American Universities was usually sent directly to the USAID Offices in the participants' host countries. The Coordination Office had no notification of the participants' progress, academic programme, date of completion of studies or

that of return except for Voltaic participants. However, the situation is gradually improving.

B. Financial Aspect

Funds for the programmes of the three contractors (ICRISAT, FSU and IITA) are provided directly by the USAID. The same applies to the ACPDs whose programmes are financed by USAID. Except for the case of the Mali ACPD whose budget was prepared in collaboration with the Coordination Office this year and the Togo ACPD (financed by FAC), the Office has not been involved with the budgets of the contractors.

III. PROPOSALS FOR THE FUTURE

A. Adminstration

Although the SAFGRAD project is coordinated by OAU/STRC, its staff and personnel are not strictly OAU. At the moment FSU, IITA and ICRISAT (Upper Volta) apply common personnel regulations which they drew up together. Personnel at the Coordination Office apply OAU regulations. To avoid further discrepancies, it is recommended that common staff rules and internal regulations be drawn up for the Coordination Office, FSU, IITA and ICRISAT. (The Soil and Water Management section of SAFGRAD/ICRISAT is based at Kamboinse Station).

In the past, there have been many labour problems in all the units at Kamboinse. This has resulted in much research time being spent in solving labour problems. It is recommended that the labour grade be managed by the Head of Kamboinse Station in close collaboration with the heads of the different units. With greater involvement of the Coordination Office with the research units, the ACPDs (whose numbers are expected to increase) and national programmes, the services of the Office should be strengthened. There is an urgent need for an administrative assistant who can effectively coordinate matters relating to personnel, conferences, customs, visas, common services, etc.

B. Finance

The draft budgets of the different research units as well as the ACPOs should be discussed with the Coordination Office and USAID before they are approved for implementation. This would ensure a better understanding and appreciation^{of} for any requests for increased funding from the contractors and the ACPOs. The presentation of a general budget for SAFGRAD project is facilitated and one could easily see, for example, how much money or the percentage of total budget that was being devoted to training and whether an increase was justified in the new budget.

For the ACPOs and other units which are located far away from the SAFGRAD headquarters in Ouagadougou, a system could be devised whereby funds are made available to them periodically through arrangements with a local agent who is authorized to do so by the Coordination Office, after verification of their financial returns which are sent regularly to Ouagadougou. This is presently the case with the ACPO in Togo. With this kind of arrangement, regular inspection visits are made by the accountant from the Coordination Office.

C. Relationship with the Contractors

The OAU/STRC is fully aware of the mandates of IITA and ICRISAT and considers this as a positive factor in its relationship with them. The semi-arid region in which SAFGRAD operates in Africa is also part of the world mandate zone of operation of ICRISAT. Full advantage should be taken of the ACPO programmes so that improved crop varieties so far developed through IITA and ICRISAT can be utilized by small farmers to increase food production.

Although different contractual arrangements exist for Purdue University which is responsible for farming systems unit, it is hoped that this will in no way affect the close collaboration which should exist with the Coordination Office and other Contractors.

D. Relationship with USAID

The relationship with USAID has been accomplished primarily through the AID Project Officer who is charged with the management of USAID inputs. He also assists the International Coordinator in solving other management problems. However, with the evolution of the project management now leaning towards greater involvement by the OAU/STRC, the role of the Project Officer is presently under review by the USAID.

STRENGTHENING OF SOME RESEARCH COMPONENTS OF SAFGRAD:
THE NEED FOR MORE DONORS.

SOME RESEARCH COMPONENTS.

At current consumption level, total food production will need to double by the year 2000 in most semi-arid regions of Africa. How to increase production level raises a whole set of questions since the farmer cannot afford to pay ^{for} inputs like fertilizer in order to benefit from improved varieties. The possible alternatives of raising food production are:

Extensive Farming - In some countries there may be enough land to expand farm plots. Again the major bottle neck is the limited labour capacity of farm families unless better farm tools and animal traction are employed. In most semi-arid sub-saharan countries, biological factors such as increased desertification, the spread of tsetse flies, river blindness, malaria and other diseases are limiting the expansion of farm lands.

Intensification of Agriculture - This approach entails investment inputs such as chemical fertilizers, improved seed, cultural practices, etc. Again other resources and farm power could be major constraints to double yields on the same unit of land. The possibility to expand irrigation activities need to be thoroughly investigated.

1. Soil Management and Water Use - Realizing the weakness of the core crop-oriented research programme of SAFGRAD, the first Consultative Committee recommended the need to strengthen research on soil fertility, management, water use efficiency and soil moisture retention. The uneven distribution of rainfall and its erratic pattern from season to season is more critical for crop production than the actual amount of precipitation received in many countries of sub-saharan Africa. Water harvesting technology and improved soil conservation practices should be introduced in order to prevent water loss and soil erosion.

Limited investigations initiated by SAFGRAD/ICRISAT scientists have shown that contour ridges and terraces have improved the moisture retention of soil and also controlled soil erosion as experienced in Upper Volta and some other countries. There are various methods for optimizing water and soil conservation on the farmer's field. For example, there is need using control studies, to evaluate water microcatchment techniques as well as water harvesting technology.

Projects of this nature could increase the amount of water for supplemental irrigation of crops, for livestock and other domestic uses. SAFGRAD intends to strengthen regional research in soil fertility, management, water conservation and harvesting. Supporting national agricultural research and extension programmes in the improvement of soil and water use of few countries requires the participation of more donors.

2. Accelerated Crop Production Officers - At this junction of the SAFGRAD project implementation, ACPOs are assigned only to five countries out of 25 member states. In few countries where the institutional frame-work has been conducive and where there is adequate linkage between agricultural research and extension, the assignment of ACPOs is not needed. In most SAFGRAD member states, research and extension agencies are under different ministries or organizations. The transfer of improved innovations to the farmer, generally, is not easy even when research and extension programmes have good institutional linkages. SAFGRAD intends to negotiate with some member states to start ACPO programmes provided more donors could participate.
3. Training of Personnel - Except for very few countries in West Africa, the indigenous research capability or research infrastructure is extremely weak. Regardless of different sources of aid (multilateral and bilateral), no significant impact on agricultural production can be made unless indigenous research capability is improved. Much remains to be done in training- both middle and high level research and extension personnel in order to improve the research base of various SAFGRAD training programmes so that accelerated institution building of agricultural research and extension can be attained in many of SAFGRAD member states within the next decade.

THE NEED FOR MORE DONORS.

If the SAFGRAD project is expected to expand its coordination activities to more member states including Central, Eastern, and Southern Africa, the participation of more donors to support the programme is of utmost importance.

At present, the bulk of financial support is provided by USAID. The French Aid and Cooperation Fund (FAC) also has financed one ACPO in Togo. Recently the International Fund for Agricultural Development (IFAD) has agreed to finance to strengthen research coordination and to start farming systems research in three sahelian countries.

In order to establish effective network of research teams, the SAFGRAD programme would need to make professional and material input into some national agricultural research centres. This can be done through a broader participation of donors. In order to attract donors, SAFGRAD may need to develop specific projects through TAC and its sub-committees. In 1980, the SAFGRAD Coordination Office approached some donor agencies for assistance but with not much success. With guidance from the Consultative Committee, these contacts should be re-vitalized for more positive results. Some of the donor agencies approached earlier include the following:

1. German Agency for Technical Cooperation (GTZ)
2. The Rockefeller Foundation
3. The European Development Fund
4. Food and Agriculture Organization of the United Nations (FAO)
5. United Nations Development Programme (UNDP)
6. International Development Research Centre (IDRC) and the International Development Agency (CIDA) of Canada.
7. British Ministry for Overseas Development (ODM)

IFAD FUNDED SAFGRAD PROJECT

BACKGROUND INFORMATION

During the last two decades the food supply situation in most semi-arid countries particularly in the sub-saharan region has been deteriorating. Of the 242 million people in 25 SAFGRAD countries 70 to 80 percent are engaged in operating small farm holdings. Concurrently population increase in many of these countries has outstripped what ever food production increases that have been attained. At present, except for a few countries, most SAFGRAD countries are net importers of food. The difficult and challenging task for the agriculture of the semi-arid regions is how to increase crop yields on small farms from the current levels of 300 to 500 kg of grain per hectare.

Concerted effort is being pursued by national agricultural research and extension agencies, international research institutes and donor agencies in many of SAFGRAD countries to curb or to reverse the situation.

Throughout, the last decade experience has shown that most of the technological innovations are not by themselves conducive to increase crop yields of the small farmers.

The mid-review team of the SAFGRAD project recommended that:

- a) The project should place greater emphasis on the coordination of national and regional research efforts and less on direct research at regional level;
- b) Farming Systems Research (FSR) work should develop regional net-works among national research programmes with the objective of contributing to the identification of production constraints and improvement of research design.

The International Fund for Agricultural Development (IFAD) has provided some funds to OAU/STRC to strengthen the above mentioned activities.

In order to initiate the project, a work programme for FSR first would be elaborated by a three-man consultant team of internationally recognized FSR scientists, in consultation with OAU/STRC, cooperating international research institutes, USAID and IFAD in the first three months of the project period. The following initial steps would be taken:

1. Setting up of a Project Management Committee. Under the terms of reference provided by IFAD, OAU/STRC would set up this committee, comprising representatives of the donor agencies to the SAFGRAD project, implementing agencies, representatives from three participating FSR countries and IFAD, as well as SAFGRAD project's International Coordinator and the Director of Research.
2. Identification of three outstanding FSR scientists as consultants to elaborate an institutional framework of selected countries for FSR and develop job descriptions for scientists to be recruited;
3. Meeting of the Project Management Committee;
4. Recruitment of three two-man advisory teams to be placed in three selected countries for farming systems research (Agronomist and Agricultural Economist);
5. Placement of a farming systems research team in each of the three selected countries;
6. Completion of reconnaissance survey to develop similarity of FSR in each selected country and to locate sites for pilot studies;
7. Workshop of research teams and consultants in order to analyze and summarize information gathered for further action as well as to frame a four-year work plan.
8. IFAD funding of one million dollars has been approved in principle for the first year. Depending on the progress of programme implementation, the project period is for three and a half years.

OPENING ADDRESS OF THE MINISTER OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH OF UPPER VOLTA.

- Comrade Ministers,
- The Executive Secretary of the Scientific, Technical and Research Commission of OAU;
- Delegates of International Institutes;
- Donor representatives;
- The International Coordinator of SAFGRAD;
- Ladies and Gentlemen;
- Comrade Researchers;

Allow me, first of all, in the name of the National Revolutionary Council and the Revolutionary Government to welcome all those who have come to Upper Volta for the second meeting of the Consultative Committee of SAFGRAD.

Comrade Minister, Honorable Delegates, I would not like to present a historical account of SAFGRAD at this meeting. However, one cannot remain silent over all the results which have been achieved in research on food crops in the semi-arid regions by this organization of inter-African cooperation.

Indeed, since the creation of SAFGRAD in 1976, encouraging results have been obtained in the following areas:

- Varietal improvement as well as development of maize and cowpea varieties for extension.
- Soil water management for better water availability for plant nutrition.
- Farming systems studies, particularly across several village laboratories.

Mention should also be made of the important role played by accelerated crop production officers who are responsible for getting research results to farmers.

In addition to these aspects of pure or applied research, one must underscore the efforts made by SAFGRAD in the training of national researchers.

.../...

As for the Revolutionary Government of Upper Volta, we appreciate the true value of this contribution of SAFGRAD. We seize this opportunity to thank the International Coordinator of SAFGRAD and his entire team of researchers for all the fruitful efforts made.

Ladies, gentlemen, comrades, this second CC meeting is, without doubt, of great importance since it will take stock of the activities of the project and determine its future orientation. During these two days you will dwell on problems of cooperative research, finance as well as those of strengthening national institutions.

The National Revolutionary Council and the Revolutionary Government of Upper Volta are fully aware of the vital role which agricultural research plays in the process of developing agriculture towards food self-sufficiency in our country; that is why we shall spare no effort in stimulating and promoting the progress of such research. In this regard, we need sufficient institutions, free of all useless obstacles which will kill initiative and discourage our researchers. We shall concentrate our efforts on reorganizing our national institutions to become more appropriate in promoting true national research, free of all imperialistic and neocolonial domination, and geared exclusively towards the fulfilment of the basic needs of our people.

It is within this context that SAFGRAD can and ought to contribute positively to the accomplishment of this objective for each of the member countries, particularly since one of its objectives is to strive to strengthen national research institutions.

Therefore, it is with hope that your deliberations will result in decisions which will reinforce the sub-regional cooperation for the Unity of Africa that I declare open the second meeting of the Consultative Committee of SAFGRAD.

Long live inter-African and international cooperation;
Long live the Organization of African Unity.

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OUAGADOUGOU, UPPER VOLTA
FEBRUARY, 1984.

LIST OF ABBREVIATIONS.

ACPO	Accelerated Crop Production Officer
CC	Consultative Committee
CEAO	Communauté Economique de l'Afrique de l'Ouest
CILSS	Comité Permanent Inter-Etats de Lutte contre la Sécheresse au Sahel
CIMMYT	International Maize and Wheat Improvement Centre
CIP	Cereal Improvement Programme (IITA)
CRSP	Collaborative Research Support Programme
DSA.	Direction des Services Agricoles.
FAC	Fonds d'Aide et de Coopération
FSU	Farming Systems Unit
IAR	Institute for Agriculture Research (Samaru, Nigeria)
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Center
IFAD	International Fund for Agricultural Development
IITA	International Institute for Tropical Agriculture
INTSORMIL	International Sorghum and Millet
INRAN	Institut National de Recherche Agronomique (Niamey, Niger)
INSAH	Institut du Sahel (Bamako, Mali)
IRAT	Institut de Recherche Agronomiques Tropicales et des Cultures Vivrières
OAU/STRC	Organization of African Unity/Scientific, Technical and Research Commission
PIL	Project Implementation Letter
RFTT	Regional Family Testing Trials (IITA)
RUVT	Regional Uniform Variety Trials (IITA)
SADCC	Southern African Development and Coordination Conference
SAFGRAD	Semi-Arid Food Grain Research and Development Project
TAC	Technical Advisory Committee
TRIP	Root and Tuber Improvement Programme (IITA)
GLIP	Grain Legume Improvement Programme (IITA)
USAID	United States Agency for International Development.

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THE SECOND CONSULTATIVE COMMITTEE MEETING ON SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT PROJECT

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