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Final Evaluation
Semi-Arid Food Grains Research and Development (SAFGRAD)

Project 698-0452

Final Report

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EXECUTIVE SUMMARY

The purpose of this evaluation is to examine how and to what extent the support of the SAFGRAD II Project for four Collaborative Agricultural Research Networks for Food Crops and for the OAU/STRC SAFGRAD Coordination Office (SCO) contributed to the increased efficiency and effectiveness of agricultural research and production techniques for sorghum, millet, maize, and cowpeas in semi-arid Africa.

This report has been prepared by R. James Bingen (Agricultural Research Policy Specialist and Team Leader), William Judy (Agricultural Research Management Specialist) and Timothy Schilling (Plant Breeder/Agronomist).

The evaluation took place during April, May and June 1991. In addition to a thorough review of relevant project documentation, and regular discussions with OAU/STRC/SCO and OAR/Burkina management staff, selected site visits were made in order to interview the network coordinators, participating IARC representatives, and research scientists and administrators in participating member countries.

Based on a critical assessment of the information obtained from relevant documentation, site visits, interviews and discussions, the principal finding is that the project has been successful as designed. The project fully achieved most of the planned outputs and the expected End-of-Project conditions as identified in the Project Paper Revised Logical Framework. The evidence suggests that most of the Program Purpose has been accomplished. The currently available data do not permit an appraisal of the Program or Sector Goal.

This evaluation also underscores the contribution of SAFGRAD II to the advancement of African scientific leadership and research professionalism in the agricultural sciences. Mechanisms that will enable national scientists to work as partners with their colleagues in the international research centers have been launched and require continued nurturance.

Monitoring tours, workshops and short-term training, which have contributed to the professional growth and enhancement of African scientists, may be among one of the most significant and lasting accomplishments of the network activities supported by this project.

The SAFGRAD II project confirms that national programs can benefit directly from participation in regional research networks. These networks are an effective mechanism for sharing technology and promoting "spillover" among participating countries. The SAFGRAD networks also have been a practical means for establishing constructive relations between national programs (especially the smaller and weaker) and the international research centers.

Network technology is being used in national on-farm trials and some evidence indicates that "network varieties" have been adopted by farmers.

This process of technology transfer, however, could be monitored more effectively. Drawing upon their research experience and skills, network coordinators exercise a significant influence on the direction of network research programs.

During the period of this project, there has been a growing awareness within the international arena that agricultural research must systematically become more client-driven and deal jointly with linked farm- and policy-level questions. In other words, successful food grain varietal improvement needs to be supported, but ways must be found to evaluate such work in terms of addressing farm-level agronomic practices and constraints, and in terms of governmental policies that affect farm-level decisions.

The SAFGRAD collaborative research networks, with scientific support primarily through IITA and ICRISAT, and administrative and logistic support from the SAFGRAD Coordination Office, have significantly improved the professional capacity and confidence of participating national scientists to carry-out solid varietal research and to examine several regional production constraints. In order to move successfully to more direct farm-level work on these problems, many national researchers, with their limited field experience, need continued senior supervision and opportunities for scientific exchange.

The service capacity of the OAU/STRC/SCO to facilitate the NARS participation in networking, especially through the Oversight Committee and the Council of NARD, has depended principally upon funds available through the AID Grant.

External funding will be required to continue scientific research and other important professional activities through the networks. Similarly, donor funding will be needed to continue administrative and logistic services to the networks. The type and size of the unit required to provide these services and assure relevant scientific guidance will need to be more specifically defined.

SAFGRAD II clearly demonstrates the short-term and readily identifiable payoffs in regional research networking to the performance in the dissemination and use of improved technologies in semi-arid Africa. The long-term reward for such investments will be found in the less easily perceived, but slow and steady professional growth and development of national agricultural research scientists.

Professionally competent and committed research scientists are an important part of the solutions to Africa's enduring agrarian crisis. Research networking through SAFGRAD has proven to be an effective and efficient means for scientists to obtain the technology needed to address this crisis. Equally important, SAFGRAD networking brings together scientists from across the region to advance the development of Africa's scientific community.

For these reasons, the principal recommendation emerging from this evaluation is that AID and other donors and agencies should make at least a 10-year commitment of financial and technical assistance to the SAFGRAD networks, including continued support for an office to assure essential network scientific direction and secretariat support.

The SAFGRAD II project ends in less than 6 months and ways should be found to bridge the period from the end of the project in December through the design and authorization of a SAFGRAD III.

Several options that might build upon both "carry-over funds" and some additional financial resources are available for consideration. All of them are driven by a concern to maintain the viability of the networks and to continue to encourage a measure of professional communication and exchange among African agricultural scientists.

Some of these options include the continuation of a minimum research program that would be build around selected projects and lead center programs. Project "savings" might also be used to carry-out a regional technology impact study. Such a study might be conceived as a test model through the networks for developing an analytic mechanism to evaluate agricultural research.

ACRONYMS

ADB	African Development Bank
ACPO	Accelerated Crop Production Officer
AFR/TR/ANR/FS	Africa Bureau, Technical Resources, Agriculture and Natural Resources, Field Support (U.S. Agency for International Development, Washington, D.C.)
CEAO/ ECOWAS	Economic Community of West Africa States
CILSS	Comité Permanent Interétats de Lutte contre la Secheresse dans le Sahel. (Permanent Interstate Committee for Drought Control in the Sahel)
CIMMYT	International Maize and Wheat Improvement Center
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement. (Center for International Cooperation in Agricultural Research and Development)
CORAF	Conférence des Responsables de Recherche Agronomique Africains. (Conference for Representatives of Agricultural Research in Africa
CRSP	Collaborative Research Support Project
EARSAM	Eastern Africa Regional Sorghum and Millet Network
ECA	Economic Commission for Africa (UN)
FAC	Fonds d'Aide et de Coopération (France)
FAO	Food and Agriculture Organization of the United Nations
FSR	Farming Systems Research
IARC	International Agricultural Research Center

ICRAF	International Council for Research in Agroforestry
ICRAF/SILWA	
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDRC	International Development Research Centre (Canada)
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Center for Africa
INSAH	Institut du Sahel. (Sahel Institute)
ISNAR	International Service for National Agricultural Research
NARD	National Agricultural Research Directors
NARS	National Agricultural Research Systems
OAG	Office of Agriculture, OAR/Burkina
OAR/Burkina	Office of the AID Representative, Burkina Faso
OAU	Organization of African Unity
PAN-EARTH	
PASA	Participating Agency Service Agreement
REDSO/WCA	Regional Economic Development and Support Office, West and Central Africa (U.S. Agency for International Development, Abidjan)
RENACO	West and Central Africa Cowpea Research Network
RIG	Office of the Regional Inspector General (USAID) (RIG/Dakar)
SAARFA	Strengthening African Agricultural Research and Faculties of Agriculture
SACCAR	Southern African Centre for Cooperation in Agricultural Research
SAFGRAD	Semi-Arid Food Grain Research and Development
SCO	SAFGRAD Coordination Office

SPAAR	Special Program for African Agricultural Research (World Bank)
STRC	Scientific, Technical and Research Commission (OAU)
USAID	United States Agency for International Development
WAFSRN/ RESPAO	West African Farming Systems Research Network
WCASRN	West and Central Africa Sorghum Research Network
WECAMAN	West and Central Africa Maize Research Network

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We wish it was possible to thank personally each of the individuals who contributed to the preparation of this report. Our list of persons contacted is a very incomplete acknowledgement of those who gave so openly and constructively of their time and thoughts.

We hope sincerely that the benefit of their time will be seen in the continued advancement and support of agricultural research in sub-Saharan Africa.

This final report benefits from the comments of several people, but we take full responsibility for any errors and misinterpretation. The findings, conclusions and recommendations in this report are those of the authors and do not in any way represent the position of the Office of the AID Representative, Ouagadougou.

INTRODUCTION

In December 1991, the U.S. Agency for International Development will end over 20 continuous years of financial and technical assistance for major semi-arid food grains research in sub-Saharan Africa. Under the auspices of the Scientific, Technical and Research Commission of the Organization of African Unity (OAU/STRC), these AID-funded research programs (JP 26 (1964-1976), JP 31 or SAFGRAD I (1977-1987) and SAFGRAD II (1987-1991) have represented a significant and singular commitment to an Africa-centered organization for agricultural research and development. During this period, USAID has taken the leadership in promoting the professional development of African agricultural scientists.

The USAID-OAU/STRC Joint Project 26 was based at the Institute for Agricultural Research in Samaru, Nigeria. Its objective was to assist regional research efforts in maize, sorghum and millet. By 1976 it was clear that this project had been successful.

In response to the worsening drought situation in Africa during the 1970s, African Heads of State created SAFGRAD in 1977, following a Resolution adopted by the 1976 OAU Council of Ministers in Mauritius. SAFGRAD includes 26 member countries from across the continent: West, East, Central and Southern; Anglo-, Franco- and Lusophone. They are joined in their concern to overcome the constraints on semi-arid agricultural production in their countries.

Following the establishment of SAFGRAD, a second project, JP 31, was designed to coordinate food grain research and development in the semi-arid zones of Africa. Its mandate was to accelerate the development of a productive and sustainable research system which would be compatible with the needs and conditions of small farmers.

By 1978, SAFGRAD I was fully operational in most of the 26 African member states. Project activities included crops research by IITA, ICRISAT, farming systems research and a program for establishing close links between national agricultural research and extension services. These activities were financed principally by USAID with additional support from the International Development and Research Council (IDRC, Canada),

the French Ministry of Cooperation, the International Fund for Agricultural Development (IFAD), and by contributions in cash and in-kind from the OAU and SAFGRAD member states.

Taking over from SAFGRAD I in 1987, SAFGRAD II has focused more on the development of a regional collaborative crop network system. This involves financial and technical assistance for a regional coordination office and the four crop networks:

-the West and Central Africa Maize Network (WECAMAN);
-the West and Central Africa Cowpea Research Network (RENACO);
-the West and Central Africa Sorghum Research Network (WCASRN);
-the East Africa Regional Sorghum and Millet Network (EARSAM).

The AID-funded SAFGRAD II is part of a broader set of research activities that are administered through the SAFGRAD Coordination Office of the OAU/STRC in Ouagadougou. Between 1984 and 1989 SAFGRAD managed a farming systems research project which was conducted in Burkina Faso, Benin and Cameroon with funding from IFAD. Since 1987, the SAFGRAD Coordination Office also provides administrative and financial management services for the West African Farming Systems Research Network (WAFSRN) which is funded by grants from The Ford Foundation, IDRC and the French Ministry of Cooperation. The SCO will furnish some administrative backstopping for the new agroforestry network (ICRAF/SILWA) and discussions continue concerning the most effective role for the SCO in support of the Animal Traction Network (ILCA).

This report presents the findings, conclusions and recommendations based on an evaluation of the SAFGRAD II Project. The scope of this evaluation is specified in Appendix 10. Many of the recommendations seek to respond to a continuing international interest in revitalizing agricultural research in Africa. They also appeal to efforts to forge and encourage more truly Africa-centered modes of collaboration.

For various logistic and administrative reasons (international travel restrictions during late 1990 and early 1991, difficulties in securing evaluation team members and differing definitions from USAID/Burkina and AID/W of the scope of the evaluation) this evaluation took place much closer than planned to the end of the project completion date.

During 3 weeks in April 1991, the breeder/agronomist, T. Schilling, completed an extensive series of interviews and review of technical documentation in Ouagadougou to prepare a draft and partial assessment of the collaborative research networks (at the coordinator level). In mid-May the other team members (the research management specialist, B. Judy, and the team leader, R.J. Bingen) joined the breeder/agronomist in AID/W for a one half-day joint review of the preliminary scope of work. The Burkina AID Representative, W. Thomas, participated in part of

this review.

Following this meeting, the research management specialist began work on May 20 in Ouagadougou, with subsequent visits to Mali, Nigeria, Niger and Guinea-Conakry. The breeder/agronomist started the second phase of his work with travel to Kenya in early June. He then joined the research management specialist for visits in Niger and Guinea-Conakry. The team leader began work in Ouagadougou on June 13. He was joined by the other team members on June 16. All three members of the team were able to work together through June 28.

The first section of this report presents the findings and conclusions concerning the efficiency, effectiveness and management of the collaborative research networks. Issues addressed include the relevance of the network research agendas, technology transfer and research monitoring and evaluation. The discussion of network management deals with leadership and management responsibilities, the flow and effectiveness of network financial resources, the performance of the international research centers, participation and management by national scientists and inter-networking issues.

This section of the report also presents findings related specifically to the role, performance and sustainability of the SAFGRAD Coordination Office and to the performance of USAID/Burkina project management.

The lessons learned and principal recommendations deal largely with the operations and management of collaborative network research activities.

Detailed technical and background reports prepared by the team members are found in the appendices.

Agricultural research networks in sub-Saharan Africa are seen as ready mechanisms to improve communication among scientists who are trying to tackle priority problems and constraints on agricultural production. In many cases these problems are shared across agro-ecological zones. Under these circumstances, networks like SAFGRAD have been seen as key vehicles for organizing a critical mass of scientific expertise across previously inconvenient political and language barriers.

Without question, an investment in agricultural research networking cannot substitute for investments in national research programs. Too often, however, efforts to promote more investment in national level agricultural research overlook the important compliment of regional investments to the national programs. Given the relatively small agricultural areas to be served and the ecological complexity within most semi-arid African countries, continued investment in regional efforts offers

opportunities for national scientists to draw upon basic, strategic and applied research information. Regional programs also offer a significant means for breaking down professional isolation and for advancing the development of a African community of researchers.

* There is a range of difficult agricultural problems in semi-arid Africa that transcend political boundaries and which networks of scientists can most effectively address across an agro-ecological zone. The promotion and encouragement of such affordable investments which also help to strengthen national programs defines SAFGRAD's major challenge.

SAFGRAD NETWORKS

RESEARCH EFFICIENCY AND EFFECTIVENESS

Background

From 1977 through 1986, the SAFGRAD I project relied principally upon the Institute for Tropical Agriculture (IITA) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) for varietal and agronomic research on maize, cowpeas, millet and sorghum in cooperation with scientists from the 26 SAFGRAD countries.

Working with researchers in both Ibadan and Kamboinse (Burkina Faso), IITA contributed to the development of several improved cowpea varieties. The maize program oriented its varietal development activities more toward well-watered, fertile conditions than to the stressful and low-input situation of most small farmers in semi-arid Africa.

ICRISAT stationed a three person team at Samaru (Nigeria) and a soil and water management scientist at Kamboinse. A regional trials coordinator for Eastern and Southern Africa joined the program in late 1982.

The resident research component of the SAFGRAD I project is widely recognized for its progress in testing and screening exotic and indigenous germplasm, and the development of improved cultivation practices for small farmers in semi-arid agriculture. The project also demonstrated that regional commodity networks could help participating countries to develop and strengthen the capabilities of their scientists and to share research findings from many sources.

Building upon these accomplishments, SAFGRAD II was designed to strengthen four research networks as the primary means for improving the efficiency and effectiveness of agricultural research on sorghum, millet, maize and cowpeas in semi-arid areas.

IITA and ICRISAT provide four network coordinators and support all of their network research and administrative activities through grant agreements with USAID. The coordinators develop and

manage the network programs in close collaboration with their respective centers. They are also guided by their elected Network Steering Committees, which meet twice a year to review the network program. These committees represent one of the principal means through which SAFGRAD II has sought to encourage greater national program leadership of the research networks.

This section reports findings on the efficiency and effectiveness of SAFGRAD II network research. Attention is given to the relevance and relation of the network's agendas to participating member national programs and to the scientific quality of the research activities, including test supervision and monitoring, and research evaluation. Observations on the transfer of network technology into national programs and its influence on the agendas of the international centers are also reported.

Findings

Relevance and Relation to National Programs.

The initial research planning and priority setting process in each network, with the exception of West Africa Sorghum, assured the responsiveness of network research to national program priorities. National program researchers listed and ranked the major production constraints in their country or by agro-ecological region and used this list to agree upon a ranked order of priority network research themes.

In some cases the identified, important national research problems did not make it onto the initial network research agenda. Researchers in the West Africa Maize and Sorghum East Networks, for example, ranked soil, water and pest management, intercropping and farming systems issues as research priorities. According to the network coordinators and steering committee members, these themes were too site-specific to use for defining and implementing an effective regional research program. Since 1988, the network coordinators have begun to examine the most effective means to incorporate such national concerns into their region-wide, network programming.

The initial priority setting exercises reflected the biases found in most national programs toward the biological definition of production constraints. The predominance of plant breeders on most Steering Committees during the early years reproduced national program orientations and thereby tended to orient network research to biological problems at the expense of broader agronomic, or even social or economic problems. In other words, network planning did not consider the socio-economic or policy dimensions of the production constraints on crop production.

Network program priorities reflect widely acknowledged problems of semi-arid agriculture, but lack a sense of being grounded in farm-level realities. It is not clear to what extent they respond to farm-level priorities as expressed by small farmers.

Since the initial priority setting exercises, the (increasingly multidisciplinary) network Steering Committees have reviewed the network program priorities and recommended changes when appropriate. Striga and streak, for example, have become important research themes in the Maize Network since the initial priorities were set in 1987.

Several inter-network meetings, especially those between the Maize and Cowpea networks, and the establishment of thematic working groups, as in the West and Central Africa Sorghum Network and the Cowpea Network, have also increased scientists' awareness of broader, agronomic and other issues such as multiple insect, diseases and integrated crop management. Such steps toward multidisciplinary program planning and implementation, however, have not been translated into many field-level research activities.

National Program Benefit.
All the national programs benefit from participating in SAFGRAD network research activities. Research by "lead centers" or those centers with a predominant capability on a specific, regionally important theme, has "spilled-over" into other national programs. In addition, such research, like that for maize streak screening in Togo or on Striga validation with cowpeas in Benin, clearly supplements on-going programs by funding previously non-existent research activities. Similar important and complementary lead center research is found in the sorghum anthracnose research in Burkina Faso and the sorghum head bug work in Mali.

In other cases, such as the Cameroon lead center research on maize and cowpeas, SAFGRAD funding has not been used to change or complement a program. Instead, it adds to already strong research programs and essentially represents the (relatively low) cost for getting some specific national technology into the network for the benefit of other national programs.

SAFGRAD regional trials are a second important way for national programs to benefit from the technology available through the SAFGRAD networks. Regional trials supplement national research programs, and represent a means for national researchers to gain access to germplasm that might otherwise be difficult to obtain. In some cases, like Guinea, the network is its only source of cowpea germplasm.

Until recently, there has been some concern that the international centers have been a dominant source of the technologies in the networks. The available evidence shows that over the 5 year period of the project, there is a clearly noticeable increase in the germplasm contributed between national programs through the network regional trials. In the cowpea network, for example, the IITA contribution has decreased from 60% in 1987 to 30% in 1991 while germplasm of national origin has

jumped from 5% to 20% in the same period.

The EARSAM network reports to have distributed more germplasm among national programs and from ICRISAT to the national programs than the other SAFGRAD networks. Large numbers of elite germplasm lines have been disseminated through regional trials and observational nurseries. This network also maintains close ties with the sorghum and millet CRSP which has enhanced the germplasm pool. There has been, however, limited follow-up by the coordinator to verify the use of the material.

Research Quality
The coordinators in three networks have at least 10 years of experience with regional research activities that are consistent with the goals of research networking. Nevertheless, the quality of the research activities varies widely across the networks.

As indicated earlier, the networks' program objectives and targets are defined principally in technical or biological terms, but they have not adequately reviewed nor identified criteria to evaluate the results of most network research. Most trials lack operationally specific, long-term objectives and short-term targets and they are not analyzed or interpreted over years and location. Finally, researchers have not identified the real world implications or significance of their trial results.

Data from several networks indicate that almost 50% of the regional trial results are not reported back to the network from combined analyses and conclusions. Less than 15% of the maize trials have yielded favorable results. In many cases, the effort by network coordinators to respond to national program requests for a large number of trials has reduced the network trial recovery rate. On the other hand, in 1989, EARSAM had a 60% recovery rate and has found significant advantages in using non-replicated observational nurseries instead of regional trials as in the other networks.

Professional Enhancement and Development.
Participation in network activities has been a significant means for improving the professional performance and growth of national scientists and technicians. Each network has organized at least two monitoring tours for network scientists to visit an international center and to visit other network programs. Without exception, the network coordinators and participating scientists confirm the significant contribution of these visits and other activities such as workshops and group training sessions to the scientists' improved sense of professional confidence and their overall professional growth.

The networks have also been an effective means for establishing and/or strengthening links between national and international agricultural research scientists. In Guinea, a SAFGRAD monitoring

tour represented one of the few times that a national scientist in recent years could meet IITA scientists on a professional basis. Moreover, during the past 10 years, the SAFGRAD maize and cowpea coordinators from IITA, and an IITA cowpea breeder, have been among the few international center scientists to visit Guinea.

Technology Transfer.
Both national researchers and administrators in the participating national programs agree the some of the technologies diffused through the networks merit further testing in both on-station and on-farm trials. There is some evidence, as well, that farmers have adopted network-diffused technology that has been released through national programs.

In Guinea, the SAFGRAD network trial acts as one of the country's screening nurseries. Material is selected based on color, texture, and yield and placed directly from multi-location to on-farm trials. Two SAFGRAD varieties have been selected for on-farm trials. In Niger, where maize is less important, SAFGRAD varieties have entered the national system through the network and at least one variety has been tested on-farm with good yield results. Apparently, farmers, appreciating the variety's resistance to streak, have taken the material from the on-farm trials for their fields.

There has been little attempt by the networks to monitor and evaluate the evolution of their technologies after they enter the national programs. As a result, it is difficult to assess the extent to which the technologies diffused through the networks have contributed to national research or agricultural production programs.

The SAFGRAD networks have played a role in bringing an Africa-focus to some of the international centers. ICRISAT, especially in East and Southern Africa, has started to incorporate more local (African), instead of exotic, germplasm into its sorghum and millet improvement program. Shifts in the research agendas of the international centers in response to "network influence" during the period of the project are difficult to document. There is no established network-wide means for network results to be reviewed and considered as part of international center programming. As in the case of the IITA decision to increase its maize streak resistance program, the IARCs have tended to respond to regional needs. Representatives of the international centers occasionally attend network steering committee meetings, but it is not clear how much information from these meetings directly influences work in the centers.

For example, the maize streak virus increased significantly through semi-arid Africa during the late 1980s. In response, the SAFGRAD maize network funded a special research project to design

better screening techniques for use in national programs. Shortly afterwards, IITA increased its streak resistance program. Similarly, cowpea network research on Striga and multipurpose (grain and forage) cowpeas was followed by more IITA emphasis in these areas.

On the other hand, there is clear evidence that EARSAM research influences the ICRISAT East Africa regional program. The one ICRISAT scientist, who is in the same office building as the coordinator, works closely with the network coordinator and participates in all the network steering committee meetings. Much of his research is defined as a result of his participation in SAFGRAD network meetings.

Conclusions

The SAFGRAD II project has made significant progress in moving toward active research networks that are driven by national program concerns, and which operate in close scientific collaboration with the international research centers. Network steering committee members have exhibited some tendency to defer to international center scientists, but the international center program priorities allow sufficient room for national problems to get on the SAFGRAD network agendas. As a result, the network research programs do reflect national program priorities.

The change in the name of the committees from "advisory" to "steering" clearly signals the leadership role which national scientists perceive themselves exercising through these committees.

With plant breeders in the majority on most network steering committees, there has been a tendency in the networks to emphasize varietal improvement as the primary approach to addressing production constraints. As membership on the steering committees has changed to include more disciplines, network research programs have become broader. Inter-network meetings and the establishment of special working groups have also helped broaden the SAFGRAD research agenda. The networks still need to translate the results of inter-network collaboration into solid field-level research.

Network research is an effective means for funding national research of regional benefit. Network funding for lead center research has increased research efficiency by supplementing and thereby increasing several research activities. Whether such funding is interpreted as supplanting on-going national activities or as strengthening lead center programs, it has proven to be an effective and efficient way to provide technology for use in the networks.

The SAFGRAD lead centers illustrate an important principle of successful agricultural networks: such networks can build upon

strong national programs to the benefit of regional activities, and in doing so complement and reinforce national research.

The SAFGRAD network regional trials complement the participating member programs and represent an important means for national scientists to gain access to germplasm that might otherwise be difficult to obtain.

National programs incorporate the regional variety performance trials depending upon the size of the national program. Smaller programs tend to embrace SAFGRAD activities more closely than the larger programs. For the smaller programs, the networks represent a viable source of research resources. The larger programs, on the other hand, tend to be "network donors" and play a greater role in network management and direction.

The SAFGRAD networks, in collaboration with the international centers, have successfully pooled the research resources of both stronger and weaker national programs in order to address region-wide constraints on agricultural production.

There is strong evidence that the number and proportion of technologies developed by participating national programs have increased in the regional trial activities of the networks. Some programs have developed technologies that merit regional testing and the networks have provided a vehicle for other national programs to capture this "spill-over."

The quality of genetic and other technical material available to national programs could be increased through improved links with other sources such as the CRSPs, regional NGOs and other research programs.

Fostering the professional growth and development of national scientists may be among one of the SAFGRAD networks' most significant and lasting accomplishments. The network training activities and monitoring tours for scientists and for their technicians have directly and measurably contributed to enhanced professional and technical performance.

Research supervision by the network coordinators and through the international centers remains weak. Almost 50% of the regional trial results are not reported back to the network for combined analyses and conclusions. In addition, much of the network research and many of the network trials are not analyzed over years and locations, thereby limiting the possible regional implications to be drawn from such research.

The SAFGRAD networks are effective mechanisms for transferring improved technology into national programs. Network technology is used in national on-farm trials, and there is some evidence that "network varieties" have been adopted by farmers. The networks,

however, have not systematically monitored the process of technology transfer nor is it possible to assess the economic and social impact of network research program findings.

Some of the research themes at ICRISAT and IITA have shifted in line with network priorities. It is difficult, however, to assess if either international center has changed any part of its research agenda in direct response to the findings from SAFGRAD network trials.

NETWORK MANAGEMENT

Background

SAFGRAD is one of the five operational units of the Scientific, Technical and Research Commission of the Organization of African Unity (OAU/STRC). SAFGRAD is not yet a permanent STRC agency or office. It is managerially autonomous within the OAU, yet operates with OAU diplomatic status and under the financial and administrative control of the STRC.

As established by the OAU, the SAFGRAD Coordination Office has primary responsibility to serve, coordinate and facilitate agricultural research networks in semi-arid Africa. In addition to the SCO, the SAFGRAD research management system comprises four major entities.

The **Council of National Agricultural Research Directors (NARD)** meets biennially to advise on SAFGRAD research policy. The SCO serves as its permanent secretariat for organizing its meetings and publishing position papers. The Council operates with funds from the AID Grant to the OAU/STRC.

The **Oversight Committee** was established by the Council of NARD as a small body of seven national scientists and research administrators charged with overseeing network activities and defining policies to assure that network research responds to national program priorities. The committee's decisions are binding on the SCO, but only advisory to the Coordinators of the SAFGRAD networks. The AID Grant to the OAU/STRC also covers the operating costs of this committee.

Each of the SAFGRAD Networks has a **Steering Committee** composed of participating national scientists who are elected by the network membership. These committees directly represent the national programs in network research policy; they annually review the network program progress and deal with network management issues such as the allocation of resources to national programs and the development of the annual workplan. Committee decisions are binding on the network coordinator. The AID Grants to IITA and ICRISAT cover the costs of the Steering Committees.

Two **international agricultural research centers** (IARCs), the International Institute for Tropical Agriculture (IITA) and the International Center for Research in the Semi-Arid Tropics (ICRISAT) constitute the other principal actor(s) in this management system. Under Grant Agreements with AID, these centers provide the technical, logistic and scientific backstopping, and second center scientists as Coordinators to the SAFGRAD Networks.

IITA supported resident programs for maize and cowpea research in Burkina Faso under the SAFGRAD I project. Under SAFGRAD II it supports the West and Central Africa Maize and Cowpea Networks (WECAMAN and RENACO). ICRISAT also carried-out resident research in Burkina Faso on sorghum and millet under the SAFGRAD I project. It now backs the West and Central Africa Sorghum Network (WCASRN) with its coordinator based in Mali and the East Africa Regional Sorghum and Millet Network (EARSAM), which continues a regional program started in 1982 with SAFGRAD.

Findings

Institutional Relationships

The SAFGRAD Coordination Office has the overall responsibility for assuring that SAFGRAD works, but it can only influence, and not direct, the implementation of network research. In this capacity, the SCO (and especially the Director of Research) has taken the initiative to develop several SAFGRAD (pan-network) strategy statements dealing with overall network programs and management. The SCO, through the International Coordinator, has also taken the lead in establishing relationships with the donor community and in broadening its relations with the international research centers.

IITA and ICRISAT exercise responsibility for the implementation of the SAFGRAD research programs through their Coordinators. The centers approve the network workplans and reports. Upon request, they also provide technical backstopping to the networks.
The separate IARC grant agreements give each center a measure of policy independence within the SAFGRAD management system. SAFGRAD Oversight Committee and Network Advisory Committee decisions are only advisory to the network coordinators.

The interests and concerns of the national programs concerning research activities and orientation are expressed through the Council of NARD, the Oversight Committee and most directly through the network Steering Committees. On these committees, the elected representatives of the national programs have been exercising an increasingly directive role in the planning and evaluation of network activities.

Network Coordination

Planning. Each Network Coordinator prepared a regional situation statement concerning their commodity prior to calling together the interested national program and international center

scientists for a planning and priority-setting session. These statements, which are updated annually during Steering Committee reviews, broadly describe the semi-arid ecological conditions and the biological systems for the network's commodity.

The priority problem statements usually define clearly the human and financial resources needed to fulfill the proposed workplans. They do not, however, include socio-economic or policy-relevant information that would allow an assessment on crop production if certain constraints were removed. For example, the statements do not permit an evaluation of the yield increase from eradicating sorghum long smut disease as compared with the benefits of dealing with other constraints such as soil/water management or weed competition.

Program Implementation. Three of the network coordinators devote from 15% to 25% of their time to "resident research" which is an integral part of their overall network's program. Such research maintains the coordinators' professional skills and enhances their professional image in the eyes of network participants and collaborators.

Research materials and funds are supplied to network participants in a timely fashion. Some problems that have arisen due to regional seasonal variations in planting, and that in turn affect the delivery of materials, are being addressed through the networks. For example, in Ghana and Guinea there are two planting seasons in which cowpea can be grown. During the long season, cowpea is exposed to diseases and seed rot. As a result, the cowpea network coordinator recommends that researchers concentrate on cowpea trials during the shorter season followed by cereals during the longer season. National researchers, however, still request seed for longer rainy season trials. When such requests are not filled, there have been some misunderstandings which the network coordinator is trying to deal with through training and seminar sessions.

Lead center research is monitored regularly. Coordinators visit only a few of the regional trials. Moreover, the analysis of regional trials tends to be limited to the results from individual locations.

Not part of PP

Assessments or tracking of the "acceptance" of varieties and network technology by national programs have been limited to estimates of the acceptance of varieties by seed multiplication organizations and "windshield" surveys. The "ownership" of varieties or the relationships between network, national or other varieties are subject to different interpretation. The doubling of maize production in the Cameroon in the last 10 years is attributable to the increased area which is planted almost exclusively with an improved "national" variety which had its origins in a SAFGRAD research program.

Training
Training, especially through monitoring tours and workshops, for national program scientists is an important component of each network's activities.

The networks have conducted 9 training sessions attended by 173 scientists and/or technicians. The subject matter has ranged from computer analysis to a 6-month maize production session for technicians.

Eight monitoring tours for 87 scientists and eight workshops for 343 scientists and/or technicians have been organized. The tours include multi-country visits to lead center and network trial sites. The workshops provide a forum for international and national program scientists to present and discuss research reports. The monitoring tours and workshops have proven to be very important as means for establishing professional contacts between scientists in the international centers and those from national programs.

Network Size and Location
There many shared ecological characteristics and features of semi-arid agriculture throughout sub-Saharan Africa suggest several common benefits to research networking for the SAFGRAD member countries. The countries include a mix of small, medium and large national programs, including technology to be shared among countries with significantly different scientific heritages. All of the countries could benefit from closer association with IITA and ICRISAT.

Many involved in SAFGRAD management feel that the number of SAFGRAD network countries makes it difficult to organize and conduct effective monitoring tours. Moreover, the network coordinators are rarely, if ever, able to visit all of the network countries during the same cropping season. Some question may also be raised about the effective representation of 17 network countries by a five member Steering Committee with little turnover.

Network Costs
Each network assigns responsibility for some part of the network program to lead centers. The 22 lead centers involve 157 scientists; budgeted allocations range from about $900 to almost $6,000 for specified research topics.

Almost one-third (31%) of the IITA grant is earmarked for maize and cowpea network research activities, including the coordinator's research, regional and lead center trials, the Steering Committee, workshops, monitoring tours and training. ICRISAT budgets a similar amount for the sorghum networks.

The budget allocation to national programs for regional trials amounts to about 16% of the budget for network research. SAFGRAD networks do not allocate funds to national scientists on a trial basis. But if the network research budgets for the national programs were to be calculated on this basis, both regional and lead center trials averaged just over $900 per trial ($904/regional trial and $912/lead center trial). Workshops and monitoring tours cost almost $1,300 per participant and training sessions almost $2,000 per participant. The total cost of the Steering Committee meetings has been a little over $7,000.

With approximately 13% of the funds for network research, national research costs about $400/trial while lead center trials in the West and Central Africa Sorghum network run $2,800/trial. Workshops and monitoring tours cost about $2,400 per participant and training sessions were only $1,100 per participant. The activities of the Steering Committee cost only $7,600.

The cost of both regional and lead center trials was significantly greater in the East and Southern Sorghum Network ($1,240 and $5,700 respectively). Steering Committee meetings are also significantly more costly at $12,300. On the other hand, the workshops and monitoring tours cost only $920 per participant.

Conclusions

The SAFGRAD Coordination Office does not direct SAFGRAD. It influences research management through the recognized and accepted professional competence of the Director of Research and the International Coordinator.

The advisory positions in the SAFGRAD research management system held by national scientists and administrators permit the national programs to exercise leadership and influence in the direction of the SAFGRAD networks.

Through the SAFGRAD networks, the international centers have been involved directly with national programs in regional agricultural research.

Differences in network research planning reflect differences in the degree of participation by national program scientists in network research management.

The effectiveness and efficiency of research management through the SAFGRAD networks would be enhanced if the programs' long-term objectives and short-term targets were more explicitly defined in terms of their policy relevance and on-farm implications.

Lead center research is accepted throughout SAFGRAD as an effective and efficient means to generate research of benefit to all participating members.

There is considerable variability in research costs among the networks.

The total funds allocated to national programs is fairly small relative to the network budgets. The proportion of network funds flowing to national programs has increased only in the last two years.

The number of countries and types of national programs in the East African Sorghum and Millet Networks comprise an effective and efficient group for a SAFGRAD network. The number of countries and communication difficulties in the West and Central Africa region make effective implementation, monitoring and evaluation very difficult for the network coordinators.

The professional enhancement of almost 700 national agricultural research scientists and technicians has been achieved at a very low cost per participant.

NARS NETWORK PARTICIPATION AND MANAGEMENT

Findings

Transfer of Network Leadership. Since 1989, SAFGRAD management entities, participant scientists and interested donor agencies have discussed several definitions and options for transferring network coordination and leadership to the national systems. There is widespread agreement "not to rush the transfer" since "most NARS lack qualified and experienced researchers even to sustain an active programme of their own." In addition, if the lead national centers are to serve as the technological base for network coordination, they will "require substantial improvement in managerial capability and institutional flexibility."

Following the sixth meeting (February 1991) of the SAFGRAD Oversight Committee, the SCO Director of Research prepared a medium-term strategy statement based on a step-wise, gradual process for transferring network leadership and management to national scientists.

A proposed 2-3 year transition phase is proposed in which: (1)the management capacity of lead centers would be upgraded; (2)financial and project management training would be provided to NARS participants; and (3)national coordinators would be identified, selected, posted to a lead center, and work with the outgoing coordinators for 4-6 months to ensure a smooth transition.

The proposal recognizes that continued, technical backstopping from the IARCs, plus donor and government support, is crucial to the success of the proposed plan and to "network sustainability in the region."

Broadening the Use of Networks. The process for transferring network leadership to national scientists illustrates one of the ways in which SAFGRAD is taking advantage of the network mechanism to promote a variety of training activities for national scientists, in addition to carrying out commodity research programs. One of the most recent plans involves the promotion of scientific, technical writing skills through the networks.

Conclusions

The phased process adopted in the "Strategy for Transferring Network Coordination..." appears to be a reasonable and well-conceived approach to resolving some of the most obvious constraints on moving national scientists into the network coordinator positions. It reflects the constructive results of an open and broad-based discussion and review among SAFGRAD members.

The strategy hinges on the expectation of continued external funding for the IARC network coordinator positions for the next 2 to 3 years. Additional thought is also needed in order to specify how the national programs will set the agendas for regional network research in collaboration with the IARCs, and to identify how the networks might be able to tap the scientific resources of more than one IARC.

INTER-NETWORK ISSUES

Findings

SAFGRAD Networks

Since the beginning of the SAFGRAD II Project, several additional networks have sought affiliation with SAFGRAD and in particular with the SCO. Since 1987 the SCO has provided financial administration and other support services for the West African Farming Systems Research Network (WAFSRN). The SCO coordinates an African Development Bank project to support on-farm research activities and has recently completed negotiations with ICRAF to provide administrative and financial management services for a new Agroforestry Research Network (SILWA/ICRAF).

The Striga Network, now supported by FAO through the OAU/STRC Inter-Africa Phytosanitary Commission, may be transferred to the SCO. Other networks which may become affiliated with SAFGRAD include: PAN-EARTH, a West Africa Millet Research Network and an Animal Traction Network.

SAFGRAD - CORAF

In March 1987 the Conference for Representatives of Agricultural Research in Africa (CORAF) was created at the Third Franco-African Seminar on Agricultural Research. The CORAF mission is to strengthen national agricultural research programs through information exchange, joint research activities, associative research networks and links with the IARCs.

CORAF has established six associative research networks. The CORAF Maize network includes several national researchers who have also been members of the SAFGRAD Maize network for several years. In the interests of avoiding duplicative research programs and competing and unnecessary demands on the time of researchers, the SAFGRAD Maize Network Steering Committee requested in April 1988 that there should be only one network for maize in West and Central Africa.

In order to identify steps toward bringing the two networks together, a Harmonization Committee of SAFGRAD and CORAF researchers and administrators met in May 1990. This committee agreed: (1)IITA should backstop both networks; (2)each network had separate, but also some common areas of research interest (see Appendix 4); (3)network coordinators should coordinate the respective calendar of network events; and, (4)scientific information should be exchanged between networks.

The Committee recommended: (1)the establishment of one maize network with one steering committee within two years; (2)a meeting of the CORAF and SAFGRAD executive bodies to explore ways for merging the networks; and, (3)several interim actions to improve inter-network dialogue and exchange.
Consistent with the guidance from the SAFGRAD Oversight Committee and the Council of NARD, and the recommendations of the 1990 SAFGRAD-CORAF Maize Network Harmonization Committee meeting, the SAFGRAD International Coordinator has urged CORAF to collaborate in the harmonization of both maize networks. The Coordinator also actively encourages research directors from the SAFGRAD non-francophone member countries to be invited to, and to attend the annual plenary meetings of CORAF, whenever they are invited.

Meanwhile, and considering the political implications involved, the SAFGRAD Oversight Committee has appealed to the OAU Secretary General (through the STRC) to explore a political solution to this problem.

Inter-Network Collaboration
In March 1991 SAFGRAD hosted an Inter-Network Conference in order to assess research progress during SAFGRAD II and identify research needs for the 1990s. In addition to examining many of the organizational issues related to network research activities, the conference agreed on the need for more coordinated or inter-network research on Striga, drought and mixed cropping.

The Maize and Cowpea Networks have held several joint meetings. The SAFGRAD Network Strategy statement also identifies several possibilities for inter-network collaborative relations. Most of these suggestions are based largely on plans for improved information exchange between current and future SAFGRAD networks and with others such as INSAH and the U.S. CRSPs.

Conclusions

The recommendations of the Harmonization Committee, based on a sound technical assessment of the grounds on which to merge the SAFGRAD and CORAF Maize Networks, must confront hard political decisions by interested governments, international agencies and donors. Meanwhile, the efforts by the SAFGRAD International Coordinator to assure the broadest African participation in CORAF annual meetings reflects a significant way for assuring a greater voice for African representatives in these decisions.

The recommendation by the RIG/Dakar to resolve this issue by cutting off AID project support for the SAFGRAD Maize Network is an especially inappropriate approach that would effectively preempt a solution by the concerned African entities.

The identification of specific and priority inter-network research questions and activities is still an outstanding agenda item for the SAFGRAD scientific leadership. The location-specific nature of some issues (soil and water management, fertility) may be difficult to address on a regional basis through commodity-oriented networks. A range of other common problems (cropping systems and on-farm trials) lend themselves to inter-network collaboration. For example, there might be ways to associate the Farming Systems Network with the implementation of the ADB on-farm technology verification project.

SAFGRAD COORDINATION OFFICE (SCO)

Background.
Support for the SAFGRAD Coordination Office under the SAFGRAD II Project initially rested on the assumption and conclusions from SAFGRAD I that scientists need some measure of administrative backstopping and political support which transcends national boundaries if they are to achieve the full potential of networking activities.

The Project Paper identified three major types of activities for the proposed coordination office:

-to overcome political and operational problems that might limit the effectiveness of network programs, including the movement of scientists, germplasm and research supplies among countries, and information exchange;

-to serve as observers on the network steering committees; and

-to work with national programs in order to broaden the funding for policies in support of sorghum, millet, cowpea and maize research.

The SAFGRAD II Project financed the SAFGRAD Coordination Office for only two years as a means of stimulating the SCO to demonstrate the necessity and effectiveness of its administrative and logistic support activities. At the end of this two year period, a USAID mid-term project evaluation assessed the SCO's activities and examined the most appropriate organizational means to carry-out the responsibilities of a network coordination office.

This evaluation determined that "the coordination, management and political support provided by .. the SCO .. was considered critical for effective coordination and support of the four networks." According to the evaluation report, "there are no alternative organizations available in the region to manage the networks."

A SAFGRAD management consultant confirmed this assessment in 1990 with the observation that "it is easy to underestimate .. the

enormous contribution to project success in being able to overcome political problems and facilitate the movement of scientists, germplasm, research supplies and results among countries."

Findings

Role and Performance of the SCO

The SCO has a set of clearly identified administrative, political and scientific activities, but it lacks a statement of mission or standard against which to evaluate its support of the SAFGRAD networks. It was largely at the prompting of USAID, for example, that the SCO finally developed its Strategic Plan in 1990.

Nevertheless, OAU diplomatic status and responsibilities have given the SAFGRAD International Coordinator many opportunities to keep SAFGRAD network research on the political agenda of many national ministerial level officials.

Similarly, the SCO Director of Research participates regularly as an observer in the network's steering committee meetings in order to promote the achievement of SAFGRAD policies and objectives. Travel for participation in such meetings accounts for only 4.5% of the USAID Grant to the SCO, but it has been one of the principal means by which the SCO has successfully promoted its policy to make the networks more NARS-driven.

The SCO Director of Research specifically encouraged the network leadership to accept greater involvement of national scientists in the planning and implementation of network research. In addition, the coordinators were invited to see how more germplasm from participating national programs might help to diversify the germplasm used for regional trials. Network coordinators are also requested to assure that "less resourceful member countries" benefit from network resources and activities.

The minutes of the network steering committees and the gradual increase in network funds to national programs in recent years reflect the success of these SCO efforts.

The West Africa Maize and Cowpea Networks, whose coordinators are located in Ouagadougou, rely more heavily than the East Africa Sorghum and West Africa Millet Networks upon the SCO for basic logistic and administrative services. Such services involve telex, word processing, report printing, photocopying and travel assistance. The SCO assures similar services for the effective operation of the Oversight Committee and the National Agricultural Research Directors Council.

Equally important, such services through the SCO help to assure the smooth operation of the network steering committee meetings, seminars and monitoring tours. These logistic and administrative services through the SCO were also a key factor in the success of

the first Inter-Network Conference. The SCO allocates 12% of the USAID Grant to support such meetings and workshops.

The SCO also regularly helps to overcome network "operational problems" by obtaining laissez passer visas for researchers, and by making special arrangements to permit the rapid distribution and exchange of germplasm through customs and phytosanitary inspections.

At the request of the Oversight Committee (OC) and the Council of National Agricultural Research Directors (NARD), the SCO has expanded its network management responsibilities through negotiated arrangements to manage or service additional networks, like the West African Farming Systems Network (WAFSRN), the new Agroforestry network, and others including Striga, Animal Traction and PAN-EARTH.

The African Development Bank project for technology verification also illustrates how the SCO can help to supplement national agricultural research programs through complementary financial support for specific research activities.

The respective responsibilities of the SCO senior staff, especially the International Coordinator and the Director of Research, are not clearly understood by the Coordinators of the Collaborative Research Networks. In addition, there is a general perception among network scientists and coordinators that the SCO could take more initiative to synthesize the results of SAFGRAD research, to promote a clearly defined vision of SAFGRAD research and to champion a greater appreciation of the contribution of agricultural research to development among regional and international policymakers. (For example, the SCO devotes only 1% (1.3%) of the USAID Grant to publications.) The RIG/Dakar Audit Report (1990) also recorded this observation.

Sustainability of the SCO.
At the end of the IFAD-financed farming systems project, the SCO maintained many of the administrative and support staff associated with this project. Currently, the SCO staff comprises four senior professionals and 18 local hire employees.

The USAID Grant supports the following positions: International Coordinator, Director of Research, Financial Controller, Accountant, Translator, General Services Officer, Documentation/Information Specialist and four local hire employees (two secretary/typists, one driver and one security guard).

The IDRC and Ford Foundation support two professional positions and three local hire employees. The OAU supports 11 local hire employees. Annual staff salaries and allowances under the AID grant are about $350,000.

Almost 56% (55.7%) of the USAID Grant for the SAFGRAD Coordination Office is used for salaries and allowances. Just under 20% (17.9%) of the Grant is used for SCO office operating expenses and equipment.

A larger office staff will be one direct result if the SCO responds to its guidance from the NARD to expand SAFGRAD activities and presence. The "priority positions" currently under discussion include: an East/Southern Africa liaison officer, for a more effective presence in East and Southern Africa, plus positions for project planning, monitoring and evaluation, communications, research/manpower development, an editor and a translator (French to English).

This proposed expansion of the SCO is part of a larger strategy to seek a non-project statutory relationship with the OAU/STRC for the coordination office. This would include an increased OAU financial contribution to SAFGRAD. Such status would give the SCO a sounder institutional basis upon which to solicit additional financial support and for assuming more management responsibilities, especially for planning long-term training for SAFGRAD country agricultural scientists (in response to a recommendation of the Project Mid-Term Evaluation).

In addition, the SCO is in the process of implementing several external consultant recommendations to improve the role and performance of the office. This includes plans to streamline its administrative and financial management operations (Hazlewood, 1990).

There is a serious contradiction between the request by the Council of NARD for the SCO to solicit additional funding to complement the USAID Grant and the USAID/Burkina position that the SCO should "concentrate its activities and consolidate them around the present networks." Furthermore, there is no evidence to substantiate the RIG/Dakar assertion that SCO efforts to establish relations with non-AID project networks has impaired SCO performance under the AID project.

Conclusions

The Strategic Plan and the "Strategy for Transferring Network Coordination and Leadership to NARS" represent important policy statements from the SCO that have been developed in close collaboration with the Council of NARD, the Oversight Committee and the network Steering Committees. Both documents, however, still reflect several operational weaknesses. More precisely defined approaches are needed to improve inter-network coordination, carry-out complementary agronomic research within the commodity networks, and define how network technology is moved to on-farm testing. Moreover, the plan does not offer any plans for assessing the impact of network research on farm-level production, productivity or incomes.

As expressed by the Oversight Committee and reflected in the Plan, the ambitious assumptions and expectations for a significant expansion of the SCO and SAFGRAD activities may not only be unrealistic, but also detract from efforts to continue and consolidate some of the solid professional accomplishments of the networks.

The diplomatic activities and responsibilities of the SCO, and especially the International Coordinator have kept regional agricultural research on some national policy agendas. In addition, it is clear that the SCO has successfully sought additional funds for regional research and it has convinced national administrators to allocate national resources in support of regional research trials. It is not clear if the SCO could effectively lobby for increased national contributions for agricultural research in general, but its diplomatic position could be used more effectively to stimulate more scientific support for SAFGRAD research programs and policies.

The implementation of many of the "management streamlining" recommendations should increase the confidence of donors in the soundness of SCO financial management and thereby help the SCO in soliciting more capital support. Even if the OAU would again triple its financial contribution to the SCO (as it did in 1990 from $30,000 to $100,000), the SCO would annually require an additional $200,000 just to maintain its current level of activity and support for the networks.

More than "management streamlining" will be needed to achieve this goal. The streamlining measures are related to the internal operations of the SCO as an office and not to the role of the SCO vis-a-vis the SAFGRAD networks. Despite the implementation of these management recommendations, the size of the support staff may still be disproportionate to the requirements for effective network coordination.

Without direct and regular administrative and logistic support from the SCO, it is difficult to conclude that the East and West African Sorghum and Millet Networks are less effective than the West Africa Maize and Cowpea Networks.

In order to assure its viability in service to national agricultural researchers through regional collaborative networks, the SCO will have to identify its specific comparative advantage to improving the effectiveness of national agricultural research programs and seek funds to deliver these services to national programs.

The focused attention on the SCO throughout the life of the project, (somewhat disproportionate to its less than 25% share of project funding), has not examined the administrative and management options for effective research networks.

USAID PERFORMANCE

Background

In response to difficulties experienced with a bifurcated project management structure for the SAFGRAD I Project, the SAFGRAD II Project authorization fully delegated AID project management to USAID/Burkina. As needed, REDSO/WA would provide legal and contracting services.

Given the expanded responsibility of USAID/Burkina for project implementation and for financial monitoring and tracking, the project included authority to hire a senior agricultural research officer under a PASA arrangement or contract and the services of a locally hired accountant for project years 1 and 2.

The project paper also included 12 person months of short-term technical assistance to focus on specific skill development needs of the SCO staff in such areas as word processing, publications, editing, office systems and other areas identified to increase staff productivity.

The $11.25 million (originally $9.8 million) project has been funded through three Grant agreements. One with the OAU/STRC ($2,743,000) for facilitating and coordinating project implementation through the SAFGRAD Coordination Office. The other grants, with IITA ($4,080,000) and ICRISAT ($3,130,000), finance administrative and technical support to four collaborative research networks, including the operations of network steering committees, meetings and training for network scientists.

Two project evaluations by individuals not closely involved in project management were scheduled during the life of the project, one at the end of the second year and the other at the end of the fourth year or early in the fifth year.

Findings

USAID Project Management

USAID Project Advisor. In 1987 USAID recruited an experienced agricultural research administrator with skills in networking under a personal services contract in order to help plan and assist in project implementation. The advisor has traveled extensively in fulfilling his responsibilities to consult with

the OAU/STRC, International Agricultural Research Centers, agricultural research and development institutions in SAFGRAD member countries and donors in helping to establish the food grain research networks. The advisor has also provided professional counsel and guidance to OAG/Burkina and to the SAFGRAD Coordination Office (SCO) of OAU/STRC on program content and policy strategies for the collaborative food grain research networks.

In addition the advisor has monitored AID's project inputs and operations and reported to USAID/Burkina on project operations at all levels. Working under the supervision of the OAG/Burkina, the advisor has increasingly undertaken additional duties, especially dealing with AID project management, as directed.

Mid-Term Evaluation. The project mid-term evaluation was carried-out July-August 1988 by three agricultural scientists working with Checchi and Company Consulting, Inc. The purpose of the evaluation was to determine the effectiveness of the research networks and to assess the performance of the SCO. The evaluation team recommended continued support for the SCO and specifically suggested that this office should: prepare a strategy document; develop an inventory of long-term training requirements for national scientists; seek the institutionalization of the SCO within the OAU/STRC; and pursue additional funding for staff expansion.

Some of the team's principal recommendations concerning the international centers and networks included: allowing Network Coordinators to continue their own research (up to 20% of their time) but not assigning them any responsibilities for IARC regional research activities; plans for more direct support from the IARC stations and more regular consultation between IARC management and the SCO; a plan for turning the network coordination positions over to NARS scientists; and, a program for monthly meetings between network coordinators and the SCO.

Building upon these recommendations, a project amendment was approved in March 1989. This amendment included a Revised Logical Framework with a revised project description and the addition of several intermediate outputs and performance indicators.

The project amendment specifically: (1)extended the project assistance completion date through September 1991; (2)added $1.45 million to the project, including support for the operations of the SCO and the salaries and related costs of two international staff members (Director of Research and Financial Controller); (3)stipulated that the SCO "concentrate its activities and consolidate them around the present networks, which include the West African Farming Systems Research Network (WAFSRN).

RIG/Dakar Audit. The Office of the Regional Inspector General for Audit in Dakar audited the SAFGRAD II Project in 1990 in order to evaluate: (1)the project's progress towards improving the efficiency and effectiveness of agricultural research on staple food crops; (2)the effectiveness of AID's coordination of the project activities with similar programs financed by other donors in the same region; and, (3)the adequacy of OAR/Burkina oversight to ensure that project funds were used in accordance with applicable agreements and AID policies and procedures.

Project Reviews. In addition to the RIG Audit, three other AID-funded missions related to the continuation of SAFGRAD II took place during 1990. Only one mission, a REDSO/WA/ADO Implementation Review (August) dealt specifically and directly with the steps to take, and the calendar to follow in order to design a SAFGRAD III project.

The agendas of the two other missions were not specific to SAFGRAD, but they significantly affected the course of discussions and actions dealing with a continuation of the present project. In October an AID/Washington Fact Finding Mission reviewed the SAFGRAD networks as part of an exercise to identify the contribution of US investments in agricultural networking to the achievement of the broader goals of US assistance to sub-Saharan Africa. The team suggested several indicators of research efficiency and effectiveness for use in the evaluation of SAFGRAD II and the design of SAFGRAD III.

In addition the team offered its critical observations of SAFGRAD and suggested that future networks "may change their role and function" and might have to "be designed to be more truly supportive of NARS functions and agendas."

An earlier mission (which included a review of USAID-supported networks in East Africa) in April by two consultants from Management Systems International looked more specifically at the design and management of a SAFGRAD III project and how it might fit into the AID/Washington-managed SAARFA project (Strengthening African Agricultural Research and Faculties of Agriculture). The report of this mission observed that "given the regional nature and the development focus of the project, AFR/TR/ANR/FS feels the need to take responsibility for the design and management of a SAFGRAD III."

International Center Relations

AID financial accounting regulations and procedures largely define OAR/Burkina relations and contacts with IITA and ICRISAT under SAFGRAD II. IITA is aware of AID accounting requirements, yet throughout the life of the project has submitted complete justification of grant expenditures only after repeated requests from OAR/Burkina. The RIG/Dakar Audit identified several problems related to these accounting methods.

ICRISAT pre-finances its expenditures under the grant agreement on the basis of OAR/Burkina approval of a detailed budget. Requests for reimbursement are submitted against this approved budget. During the project ICRISAT has tended to submit its proposed budgets for OAR/Burkina approval several months into the budget period. Moreover, the budget submitted in response to notification of the extension of the project assistance completion date reflected significant increases from the center's spending history in both the level and rate of expected expenses.

X Conclusions.

The use of three separate Grant Agreements to fund the project appears to have been very management intensive, especially in terms of financial accounting, for USAID/Burkina. It has also been the source of some concern and unnecessary misunderstandings on the part of the SAFGRAD project entities (SCO, the Oversight Committee, the Council of NARD) concerning the roles and responsibilities of the IARCs and USAID.

The SCO and Oversight Committee feel that AID mistakenly tends to define "SAFGRAD" as the SCO when most of the project funds flow directly to IITA and ICRISAT.

Located in Ouagadougou, the SCO has been the easiest component of SAFGRAD upon which to focus its oversight. The close proximity of the SAFGRAD and USAID offices has made USAID's requests to improve SCO operations, easier to implement.

The RIG/Dakar Audit was biased and incomplete in its almost singular examination of the SCO management and operations, which represents only about 25% of project funds. It is not clear why IARC management and operations, which account for over 60% of the project funds, were not fully reviewed.

The Senior Project Advisor has been able to work successfully and effectively in the SCO and to contribute to the development and implementation of SAFGRAD policies and programs. The increased time given to USAID project management responsibilities has taken away from time available for advisory activities, but it has also provided some opportunity to keep open channels of communication between the SCO and USAID/Burkina.

The regular and informative project reports from the project advisor might have been improved with the addition of observations concerning USAID program issues and implications arising from advisory activities. This may have provided a more systematic basis for addressing and taking any necessary action on these questions during USAID quarterly project reviews.

USAID has played an important role in stimulating and improving the effectiveness of the SCO. It prompted the development of the Strategic Plan and pushed, as well, for defining an effective

policy to transfer network leadership to national scientists.

The mid-term project evaluation contributed in a timely fashion to the preparation of the project paper amendment.

More effective use could have been made of the project funds for short-term training and consultants.

Several logistic and administrative complications (e.g., international travel restrictions and shared responsibility with Washington for evaluation) seriously delayed the August 1990 REDSO/WCA proposed schedule for project evaluation and design.

SUMMARY CONCLUSIONS AND LESSONS

The project as designed has been successful. Defined in terms of the project components as presented in the Revised Logical Framework, this conclusion can be summarized as follows:

All of the Project Inputs were supplied.

The following project outputs are achieved fully:

- SAFGRAD Oversight Committee meets annually
- Future research activities identified, planned and allocated among participants
- Network priorities are reflected in NARS decision-making
- Opportunities for the future donor support at regional and national levels clarified.

Other project outputs are attained with the following qualifications:

- An effectively functioning African Coordinating Organization will operate only with external donor funding
- Research for networks reviewed and evaluated annually, but results need to be interpreted and evaluated
- In-country research implemented by NARS, but results are frequently not reported or returned to the coordinators
- Varieties released and cultural practices recommended, except for the latter
- Responsive technical backstopping by IITA and ICRISAT has been partial

The conditions to indicate realization of the End-of-Project Status can be clearly identified:

Effectively operating collaborative research networks (West Africa Sorghum, East Africa Sorghum/Millet, Maize and Cowpeas starting in West and Central Africa) which operate by the following criteria:
-establish common goals
-leadership by an apolitical entity with continuity

-policy set by advisory committee of researchers
-conducts at least annual meetings to identify objectives, technical problems, review past research, and plan future research
-effective linkage to Southern Africa Sorghum/Millet Network
-effective functioning service Oversight Committee established
-analyzes and plans for the future
-facilitates information exchange on research (could be improved).

The Project Purpose has been fully attained. It has not been possible to assess the accomplishment of the Program or Sector Goal.

CONCLUSIONS

Program and policy related conclusions are as follows:

Network Research

National program scientists have participated fully in setting the research priorities for the SAFGRAD networks. These priorities generally emphasize major, common biological constraints found in semi-arid Africa. Network trials basically address production constraints on semi-arid agriculture through varietal improvement.

The Office of the Director of Research in the SCO has played an important role in assuring that network research programs respond to national program interests and concerns.

The SAFGRAD networks effectively implement regional variety performance trials, fund regionally oriented research by national programs and provide national scientists with a forum for scientific communication and exchange.

The SAFGRAD networks are an effective means for linking national researchers with the international centers.

In collaboration with the international centers, the SAFGRAD networks are an effective mechanism for pooling the research resources of both stronger and weaker national programs in order to address region-wide constraints on agricultural production.

The quality of genetic and other technical material available to national programs through the networks could be increased through relations with a broader range of sources including the USAID-funded CRSPs, Non-Governmental Organizations, etc.

The national programs value the technologies diffused by the networks and use them in both on-station and on-farm trials. There is some evidence that network diffused technology has been released and adopted by some farmers. There has been no attempt

by the networks, however, to monitor and evaluate the progression of technologies after they enter a national program. As a result, it is difficult to assess the farm-level impact of network research.

There is strong evidence that the number and proportion of technologies developed by national programs have increased in the networks' regional trials. This indicates that some programs have developed technologies which merit regional testing and that the networks offer a vehicle for this "spillover" effect to be captured by other national programs.

The research agendas of the international centers (IITA and ICRISAT) have shifted during the period of the project and parallel the research emphases of the networks. It is difficult to assess whether the IARC shift was in response to network demand or activity.

Network Management

The SAFGRAD Coordination Office, in association with national scientists and administrators, has developed a strategy for the institutional structure, management and operation of regional commodity research networks. Over the period of the project, the SCO has been able to clarify its contribution to network management.

External donor support will be required in order for the SAFGRAD Coordination Office to continue its effective support for the research networks.

Network coordinators work closely with national program scientists and with their IARC in program implementation.

Fostering the professional growth and development of national scientists may be among one of the networks' most significant and lasting accomplishments.

The professional enhancement of almost 700 agricultural scientists and technicians has been achieved at a very low cost per participant.

An assessment of the effectiveness and efficiency of the networks would be improved if the significance and real-world implications of network research objectives and short term targets were clearly identified.

National programs benefit directly from their participation in SAFGRAD network activities. Over the life of the project, and largely at the prompting of USAID and the SCO, the flow of network research resources to national programs has increased.

The positions held by national scientists and administrators in the SAFGRAD research management system permit national programs to exercise leadership and to influence the direction of the SAFGRAD networks.

The concept of "lead center" research and regional trials is an effective and efficient means for generating and diffusing research of benefit to all participating countries.

SAFGRAD is actively pursuing an appropriate way to "harmonize" relations between the SAFGRAD and CORAF maize networks.

LESSONS

This results of this evaluation indicate the following lessons that should be especially useful in planning and designing projects for continued support to SAFGRAD or other agricultural research networks in sub-Saharan Africa.

Agricultural research networking sub-Saharan Africa can effectively generate and diffuse improved technology, but it is also an important means for promoting the growth and development of an African scientific community. Exchange visits among scientists, or monitoring tours, are especially effective.

Investments in agricultural research networks help to strengthen national programs directly by giving access to new technology, supporting the development of improved technology in collaboration with other national programs, and providing a regular and open means for professional communication among national scientists and research administrators.

Both strong and weak national programs can benefit from membership in a research network.

Regional research networks can be an effective mechanism for funding national research activities, but ways are needed to assure the adequate allocation of available financial resources to national programs.

The Organization of African Unity is an appropriate organization and political framework within which to manage agricultural research networks. It may offer the most effective auspices under which to continue truly regional networking that successfully cuts across political boundaries and (crumbling) language barriers, thereby enhancing the capacity of African scientists to confront common research challenges within far-ranging agro-ecological zones.

The successful organization and operation of effective agricultural research networks in sub-Saharan Africa does depend at least upon:

-an identified, shared and common problem by network members

- technical leadership from national scientists collaborating with programs in the international research centers
- interest by scientists and research administrators that fosters collaboration among participants and generates national support for regional research,
- a continuing regional coordinating body operating with accepted regional political and diplomatic status, a standing advisory committee and, with national scientists in leadership roles, and
- effective scientific supervision.

It will take a concerted effort to move beyond the "varietal improvement approach" to overcoming constraints on agricultural production in sub-Saharan Africa. The incorporation of broader agronomic and management considerations, such as integrated pest management or cropping systems research, into a solid, field-level, region-wide program may require special attention to the effective use and comparison of more site-specific results.

The effective transfer of full responsibility of regional networks will require individuals who can exercise several types of leadership:

- technical, based on recognized scientific skills and experience
- organizational, with skills and experience in research planning, implementation and evaluation
- operational, proven experience in carrying-out research activities and in data analysis and interpretation.
- conceptual, with the ability to define a problem and formulate a research program to address it, and
- sponsoring, with experience and aptitude to initiate proposals and to seek funding.

SUMMARY RECOMMENDATIONS

The principal recommendation of this evaluation is for AID and other donors to make a 10-year commitment of financial and technical assistance to the SAFGRAD networks. This commitment should include continued support to the SAFGRAD Coordination Office in order to assure the essential network scientific direction and secretariat support.

Ways should be found to bridge the period from the end of the current project in December 1991 through the design and authorization of a "SAFGRAD III."

Several options appear to be available for consideration:

> The use of "carry-over" funds from any or all of the project grant agreements. Such funds could be used to continue a minimum program of country-based research to be allocated by the steering committees for selected projects and lead center research. The completion of a selected number of technology impact studies by national researchers might be part of this "bridging" research program.
>
> Additional funds from other research projects could be used to complement any SAFGRAD project "savings."
>
> Separate from a minimum program, continued support for the networks could be designed around a regional technology impact study that could be coordinated by the SCO Director of Research.
>
> This type of study, whether integrated into a package of minimum support or designed as a stand alone activity could help to identify how research networking, especially for subsistence, cereals crops, could also be used as a type of analytic mechanism for the periodic evaluation of agricultural research activities.

Continued support to agricultural networks should assure the full participation of both stronger and weaker national programs. In order to assure more effective scientific supervision and

monitoring, it may be useful to divide the 17 West and Central African networks into two two-commodity groups, each managed by one coordinator.

Other, more programmatic recommendations include:

Network strategic plans need to be prepared that are grounded on an assessment of, and relation between the network's research objectives and the socio-economic and policy context in which these objectives are to be achieved.

Network research strategies and programs should be defined independent of estimates of available project funding, but with a view toward seeking research support.

The networks should develop a system for the timely analysis and interpretation of regional research and variety trials with an emphasis on the implications for future regional research and trials.

With support from the SAFGRAD Coordination Office, the networks should pursue the more effective use of research working groups as a means of moving beyond programs that focus on varietal improvement.

More specific mechanisms need to be designed to assure more effective and regular relations between national programs and the international centers through the networks.

It should be possible to reduce the frequency of network steering committee meetings without jeopardizing the scientific quality of the network research programs.

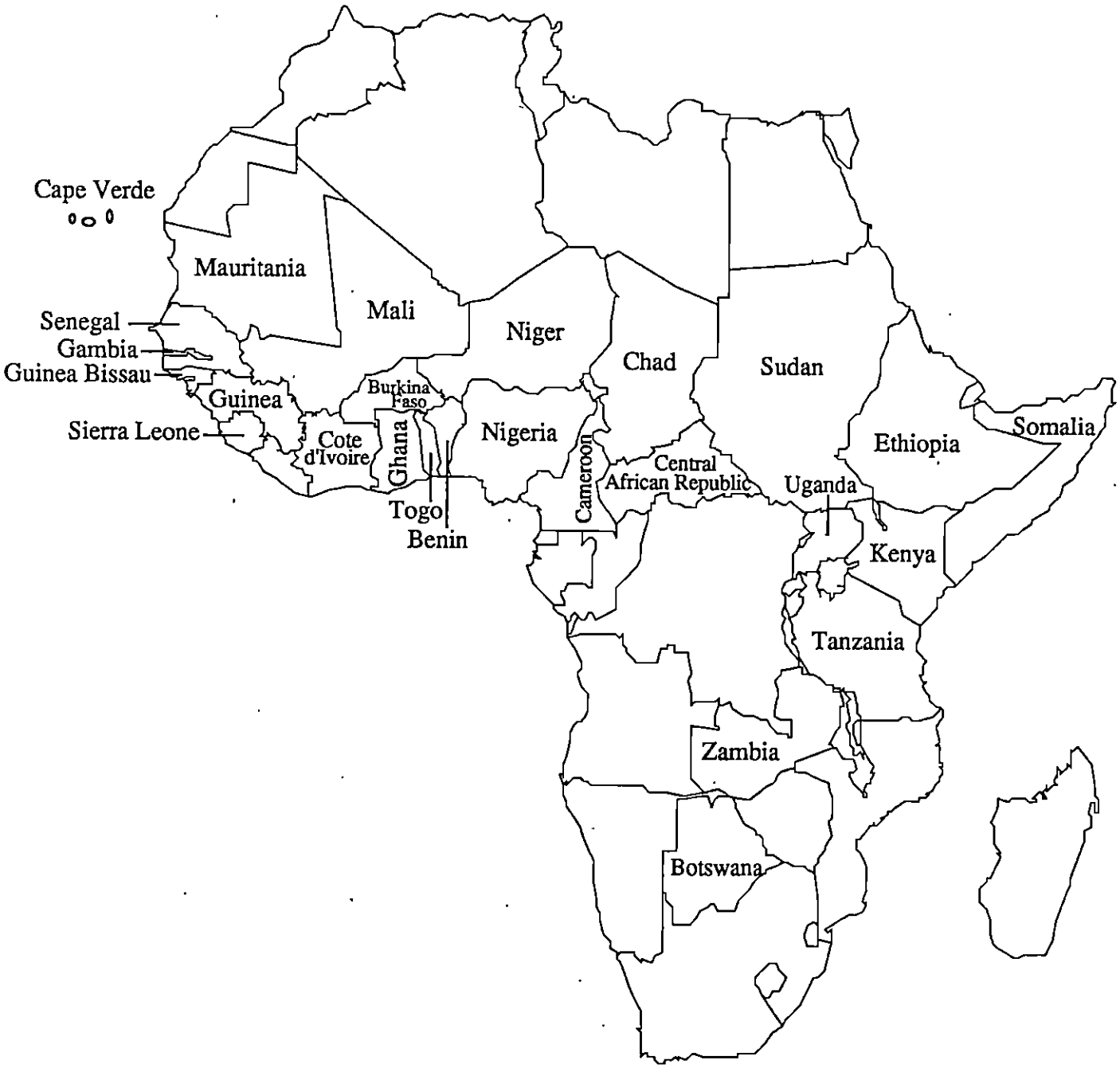
Future support for the SAFGRAD networks will need to redefine the relations between, and responsibilities of different project entities (the donor agency, the SCO, and, if different from the SCO, the agency(ies) responsible for research implementation and for scientific and technical backstopping.

> Some specific concerns include: the staff required to provide the necessary support and backstopping for regional network research; assuring the adequacy and the timely flow of financial resources to national programs; and, a clear definition of the financial management responsibilities between a coordinating unit and national programs.

Appendix 1

MAP

SAFGRAD Member States



SAFGRAD Member States

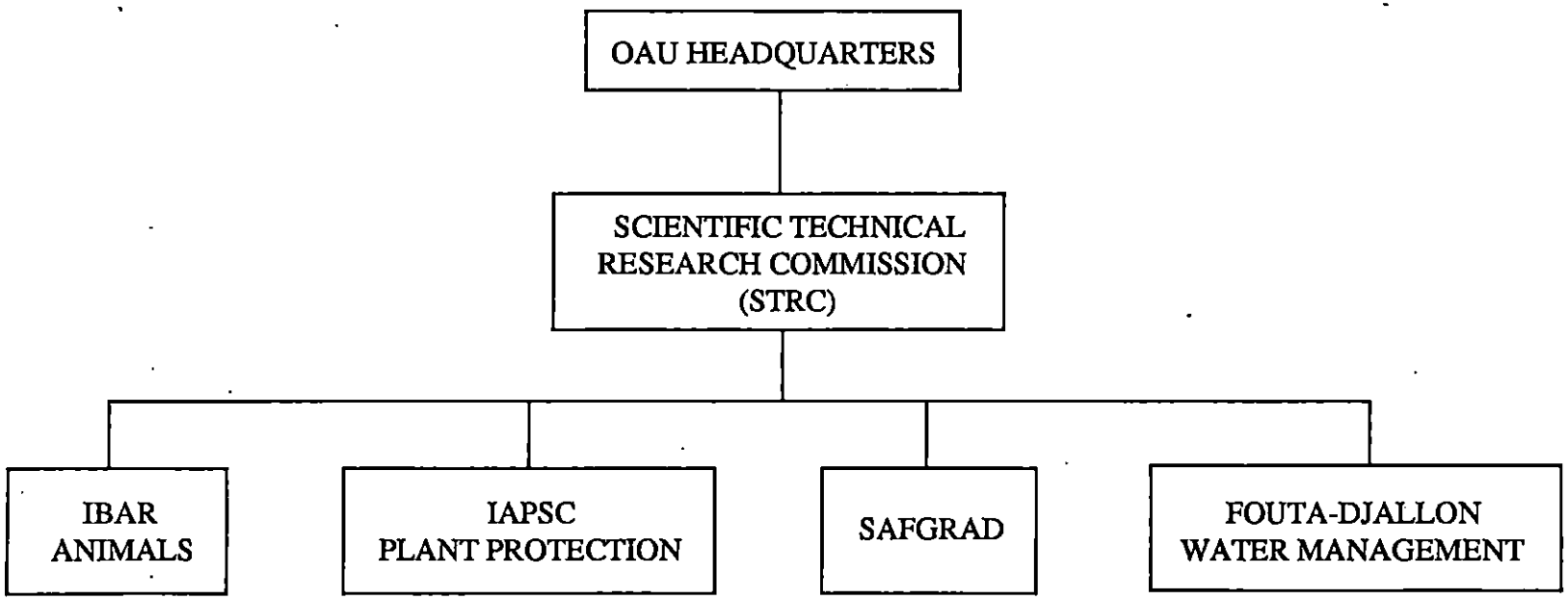
OAU

and

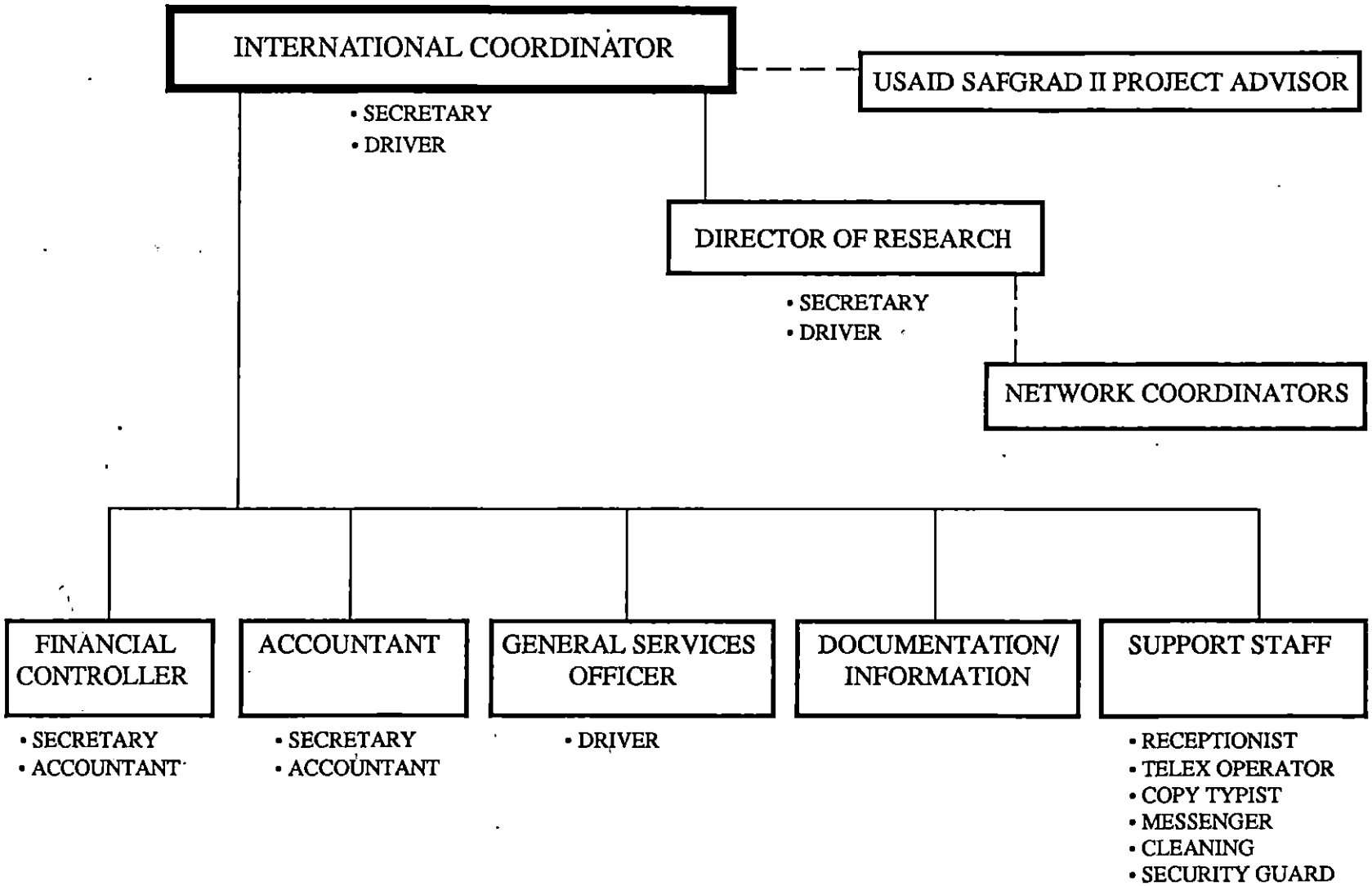
SAFGRAD Coordination Office

Organization Charts

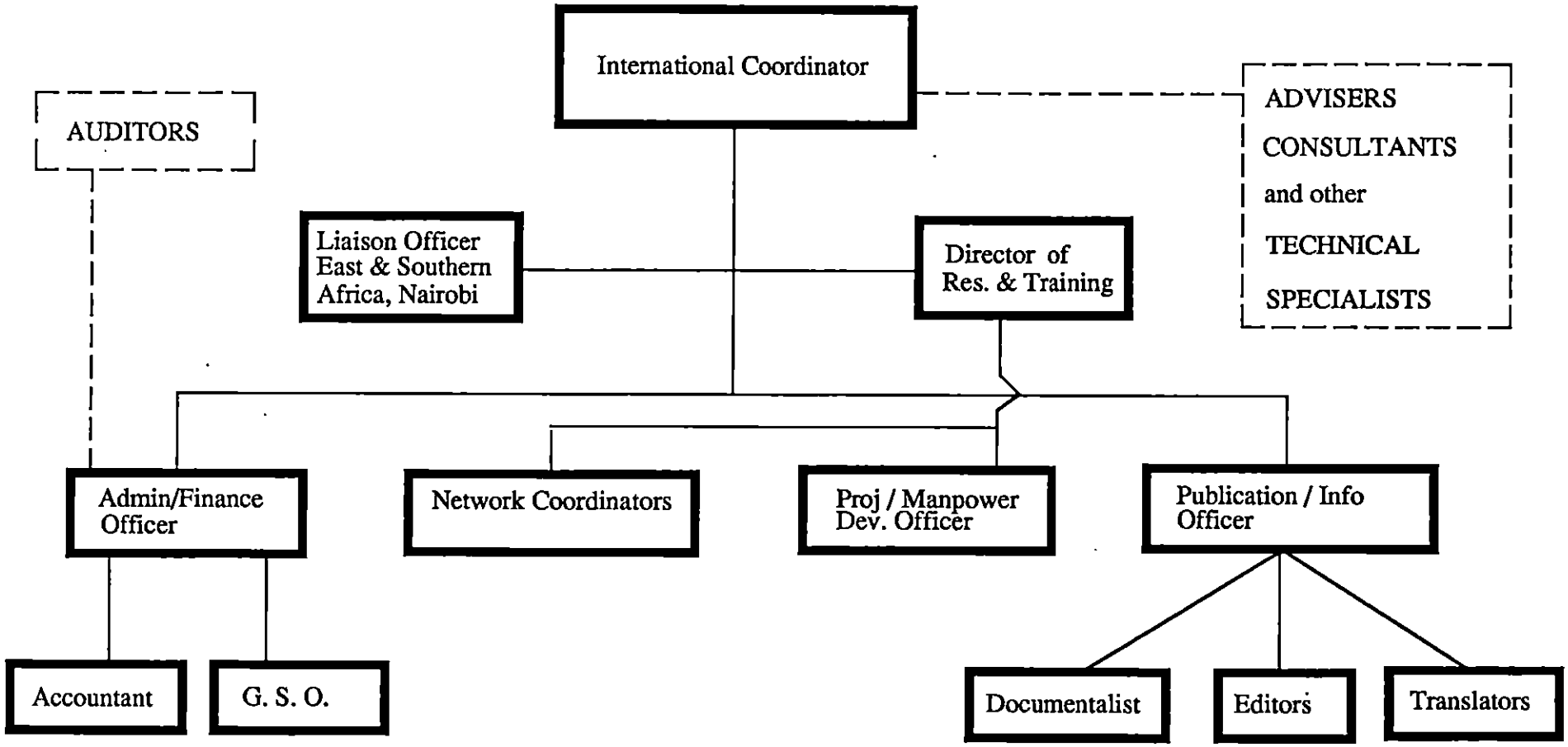
OAU/STRC ORGANIZATION CHART



ORGANIZATION CHART OF THE SAFGRAD COORDINATION OFFICE



PROPOSED ORGANIZATION CHART FOR THE SAFGRAD COORDINATION OFFICE



SAFGRAD Coordination

Office Grant Agreement

Budget

SAFGRAD COORDINATION OFFICE BUDGET

BUDGET ITEM	COST ($)	AS PERCENT OF SCO BUDGET
Staff Salaries and Allowances	1,377,800	55.7
Policy/Management Meetings		
Council of Directors	88,733	3.6
Oversight Committee	129,200	5.2
Network/Representational Activities		7.8
Travel	104,540	
Coordinator Meetings and Network Sr. Staff	5,905	
Networkshop	80,300	
Publications	33,200	1.3
Office Operations and Equipment	444,089	17.9
OAU/STRC Travel and Administration	61,000	2.5
ACPO	85,848	3.5
Contingencies	62,685	2.5
Total	**2,473,300**	**100.0**

Appendix 4

SAFGRAD and CORAF

Maize Network

Mandates

Ecological mandates of CORAF and SAFGRAD Maize Networks and their respective maize production constraints.

	CORAF	SAFGRAD
Mandate	Humid, Sub-humid and irrigated ecologies (Forest, Forest/Savanna transition zones and Southern Guinea Savanna) Irrigated (Rainfall < 400 mm) areas	Semi-arid (Northern Guinea Savana, Sudan Savanna and Sahel (Rainfall not less than 400 mm)
Constraints	Biological * Diseases: Streak, rust, blight, Curvularia, Stalk and ear rots * Pests: Borers, Storage pests, Rodents, Termites * Striga * Weeds Physical * Soil erosion * Low solar radiation * Soil fertility: Acid soil, N, P, S, Zn, & Mg deficiencies * Sandy soil Socio-economic * Consumer preference * Labour * Capital * Inputs * Post harvest technology * Cropping system	Biological * Diseases: Streak, rust, blight, Stalk and ear rots * Pests: Termites, Storage pests, Locusts, Rodents * Striga * Weeds Physical * Soil erosion (wind) * Soil compaction * Poor water infiltration * Drought * Low organic matter * N, P, S, Zn, Mg deficiencies Socio-economic * Consumer preference * Labour * Capital * Inputs * Post harvest technology * Cropping system

Appendix 5

Technical Analysis

by

Timothy Schilling

TECHNICAL ANALYSIS

BY

TIMOTHY SCHILLING

TABLE OF CONTENTS

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Technical Analysis

Introduction

Networking has long been recognized as an effective means to bring multi-disciplinary scientists of the same commodity together in order to increase research efficiency and to organize and implement regional technology performance tests and research activities. USAID funded SAFGRAD activities in 1986 to organize and implement four commodity networks in the 26 SAFGRAD countries. These networks are:

1) WECAMAN-The West and Central Africa Maize Research Network
2) RENACO-The West and Central Africa Cowpea Research Network
3) WCASRN-The West and Central Africa Sorghum Research Network
4) EARSAM-The East Africa Sorghum and Millet Network

Their major objective is to strengthen NARS commodity research programs through networking activities. It is assumed that a strengthened NARS program will result in higher quality research which in turn will generate better technology for increased productivity at the farmer level.

The objective of this report is to assess the effectiveness of the four networks at achieving their objective. More specifically, this analysis will concentrate on the technical merit of network activities and its impact at the NARS level. A detailed Scope of Work (SOW) for the technical evaluation can be found in the appendix.

In order to technically assess the networks at the NARS level, careful review of all network reports and research activities was conducted at the network coordinator level. Findings at the coordinator level were then verified at select NARS through scientist interviews, review of NARS reports, and other relevant documentation. These findings are reported by network and conclusions were drawn from the findings across networks to arrive at specific recommendations.

II. The SAFGRAD II Networks-Major Findings

A. West and Central Africa MAIZE Network (WECAMAN)

1. Structure and Operation:

Phase I of SAFGRAD conducted regionally oriented, technology generating research on Maize. The technology generated from the first Phase filled an important gap in the development of short season, Semi-Arid Tropical (SAT) adapted maize varieties. These varieties were diffused to some extent in Phase I and became the focal point of Phase II networking activities. An important aspect of the Maize network is that the Phase I and II activities blended well into a cohesive 10 year regional effort to develop and disseminate appropriate maize technologies for SAT West and Central Africa.

A network Steering Committee (SC) was formed by election in 1987. The SC is composed of six NARS scientists as official members and appropriate non-official observers from the SAFGRAD Coordination Office (SCO) and IITA. The SC is the driving force of the network and directs the activities of the network. Until 1991, 10 out of the total 17 member countries had participated on the SC (Table 1) which represents a reasonable country balance consisting of both large and small NARS. However, only in two of the five years during the LOP was the SC composed of members representing disciplines other than breeding. This disciplinary imbalance is reflected in the network's general breeding approach to most maize production constraints as opposed to a more comprehensive interdisciplinary systems approach. Future networking projects should carefully consider network objectives in terms of disciplinary balance on the steering committee to avoid disciplinary bias.

2. Constraint identification and priority setting exercises:

Prioritization of regional research topics was conducted in 1987 at the general assembly of NARS maize scientists. The process of constraint identification and prioritization was biologically oriented and did not include economic and/or social impact considerations. Greater impact may be expected from regional research activities when social and economic impact potential is considered together with biological implications. Economists and Social Scientists from the region may be able assist the network commodity scientists in this regard and should be invited as participants to future prioritization activities with a well defined role. Nevertheless, the process did include input from all network member countries and therefore does reflect the NARS research agenda.

Table 1. SAFGRAD Maize Network: NARS Funding, HR strength, Steering Committee membership, and Lead Center Activity

	NARS HR Strength	Lead Center Activity	Funding per year	Funding over 4 years	Steering Committee Member
Benin	xxxx		4,000	15,180	90,91
Burkina Faso	xxxxx	Early,Drought	4,000	16,223	87,88
Cameroon	xxxxxxxxxxxx	Erly,drt,stga,agm	3,000	9,000	87,88,89,90,91
Cape Verde	x		200	1,180	
CAR	x		2,000	5,540	
Cote d'Ivoire	xxxxx	Early,Borer	2,000	5,000	89,90
Gambia	x		1,000	2,000	87,88
Ghana	xxxxxxxxxx	Early,Streak	3,000	6,000	87,88,89,90
Guinea	xxx		2,000	8,037	
Guinea Bissau	x		400	2,180	
Mali	xxx		3,000	10,577	91
Mauritania	x		200	1,000	
Niger	x		200	1,000	
Nigeria	xxxxxxxx	Agronomy	3,000	9,000	87,88,89,91
Senegal	x		3,000	9,180	89,90,91
Tchad	xx		2,000	7,180	
Togo	xxxx	Early,Streak	3,000	8,000	88,89,90,91
Total				117,277	

Funds/year change and the figures in this column reflect the mode

The prioritization process was essentially the same across networks. Maize researchers from all participating countries were asked to list and rank the major production constraints for maize in their country and the coordinator tabulated and averaged the ranks across countries to arrive at a group of regional constraints and priorities (Table 2). There was no further effort to review the regional priorities at a later date by the NARS scientists. As a result, the constraints of Striga and Streak were ranked low for the region in 1987 but the NC and SC later identified them as high priorities.

2.1 Relevance of Network research agenda to NARS agenda: As mentioned earlier, the method of prioritization outlined above allowed the NARS agendas to be fully taken into account. However, as Table 2 shows, activity on soil

management and farming systems were ranked very high by the NARS but no networking activity on these subjects was implemented. This shortfall can be partly explained by the SC breeding discipline bias. The maize network approach to alleviating regional production constraints utilized, almost exclusively, varietal introduction and testing. Although there does exist some merit to this approach (i.e. varieties are easily transferable) there are other technologies including agronomic practices (tied ridging) and seed treatments (marshall) which have proven to be of particular interest in SAT West and Central Africa certainly meriting regional testing.

Table 2. 1987 NARS Maize Research Priorities.

	Cycle	Disease	Insects	Drought	Striga	Streak	Soil Management	FSR/On-farm
Benin		xxxx				xxxx	xxxx	xxxx
Burkina Faso	xxxx	xxxx	xxxx	xxxx			xxxx	
Cameroon				xxxx				xxxx
Cape Verde	xxxx			xxxx			xxxx	
CAR						xxxx		
Cote d'Ivoire	xxxx		xxxx				xxxx	
Gambia	xxxx			xxxx			xxxx	xxxx
Ghana		xxxx	xxxx	xxxx			xxxx	
Guinea	xxxx							
Guinea Bissau	xxxx		xxxx		xxxx	xxxx		
Mali	xxxx			xxxx			xxxx	xxxx
Mauritania	xxxx	xxxx	xxxx	xxxx			xxxx	xxxx
Niger								
Nigeria	xxxx	xxxx	xxxx		xxxx	xxxx	xxxx	xxxx
Senegal	xxxx			xxxx				
Tchad	xxxx	xxxx		xxxx			xxxx	xxxx
Togo	xxxx		xxxx	xxxx			xxxx	xxxx
Total	12	6	7	10	2	4	11	8

2.2 Influence of Network on IITA agenda: IARC research agendas are generally set in their 5 year strategy documents and are the result of input from IARC commodity program leaders, NARS scientists and directors, as well as regional and commodity experts. SAFGRAD per se has not directly participated in the IARC strategy process but has probably affected the agenda in an indirect way.

For example, as maize production increased steadily throughout SAT Africa in the eighties the streak virus became more important. The network SC acknowledged the growing importance of streak in the region and funded a special research project to design better screening techniques for use at the NARS level. Shortly thereafter, IITA increased their own streak resistance program activities. Whether or not the IITA program change was a direct result of 'network' influence is difficult to document. Although no formalized linkage exists through the network for NARS to provide input and feedback to the IARCs, the IARCs have tended to respond to regional needs. A formalized linkage allowing input and feedback from the NARS to the IARCs through the network might enhance IARC, Network, and NARS research agendas by pooling the regional technical expertise.

2.3 Development of Lead Centers: The Lead Center/Special project concept was developed to enhance research activities on priority regional problems at those NARS which have predominant resource capability thus increasing rate of spill-over effects into other NARS. In the Maize network 6 NARS were determined by the SC to be lead centers for specific research activities as listed in Table 1. A comparison of tables 1 and 2 shows that most of the projects were developed based on the regional priority exercise of 1987 (earliness, drought, agronomy, and borers). Striga and streak, however, ranked low in 1987 but soon became two of the most important constraints. The SC therefore decided they merited special regional importance and thus a special project. Although both streak and striga are now well known constraints of maize in SAT Africa, the process by which these two constraints were chosen did not involve participation or input by all member NARS and therefore did not reflect the research agenda of all NARS as did the identification of the other constraints. It might therefore be useful to have all NARS review priorities at the biennial conferences to ensure their importance in other member countries and to have input from the other countries on the direction of research pursued to alleviate the constraint.

Lead center designation in the maize network has no apparent correlation with the amount of funds allocated by the network to the NARS but is highly correlated with the Human Resource (HR) Strength of a NARS as shown in Table 2. HR strength is defined as the number of Ingenieur Agronome

equivalents for each NARS (one **x** equals one Ing. Agr.). This finding suggests that the 'Lead Center' research has been designed to maximize the human and infrastructure resources of the region without overburdening the HR limited, smaller (but competent) NARS.

2.4 Supplementation vs supplantation: The networks have two "research" type activities namely 'Regional Trials' and 'Lead Center' research. The Lead Center activities are sometimes very focused, as in the case of streak screening and borer work, and other times very broad, like agronomy. In addition, in each of the NARS lead centers, it is difficult to tell whether their activity in the research area increased due to their lead center designation or through increased funding supplied by the network. In most cases, the lead center NARS agenda and funding for the activity existed before they became lead centers. For example, the Cameroon maize program had established research activity in striga, cycle, streak, drought, and agronomy before its regional lead center designation. Now, as a lead center, Cameroon receives network funds to continue work in the designated priority areas. There is no indication that activity has increased or took on a different dimension. In fact, the network funds may represent a savings through subsidy to Cameroon in as much as without the network, the research would still have been funded and conducted. As a result, it seems that in some cases, the network is subsidizing existing research rather than supplementing research. Its important to point out however that the quantity of funds is small and the funds do act as a carrot to encourage the 'Stronger' NARS to share their research through the network.

In other cases, like streak screening in Togo, the network is indeed supplementing the NARS agenda through funding a previously non-existent but needed activity on streak.

3. Extent to which network has provided a structured forum for scientific interaction.

3.1 The maize network has conducted two general conferences in its five years. The agenda and related proceedings from these conferences indicate that the conferences allowed scientists to exchange information and results. They also show that the information and results exchanged emphasize Network activity i.e. regional trial results, lead center results, etc. Although 'network trials' are certainly important in terms of regional results, equally important is the sharing of 'non-network' results between and among NARS programs. Exchanges of the latter type allow different scientists to better understand neighboring NARS priorities, activities, and results outside the rubric of "Network" activities. As a result, there seems to exist an imbalance in the conference agenda. The imbalance is accentuated when one considers that

the little time actually given to NARS presentations is not recorded in the proceedings of the meeting. In order to correct the imbalance, more time should be given to a structured NARS overview session. This could accomplish two important networking objectives: 1) increase NARS 'spillover' effects and 2) provide the network with a mechanism to improve NARS scientists skills in communicating scientific results. At the same it would allow the network to monitor the progress of the NARS in terms of enhanced communication skills and scientific professionalism.

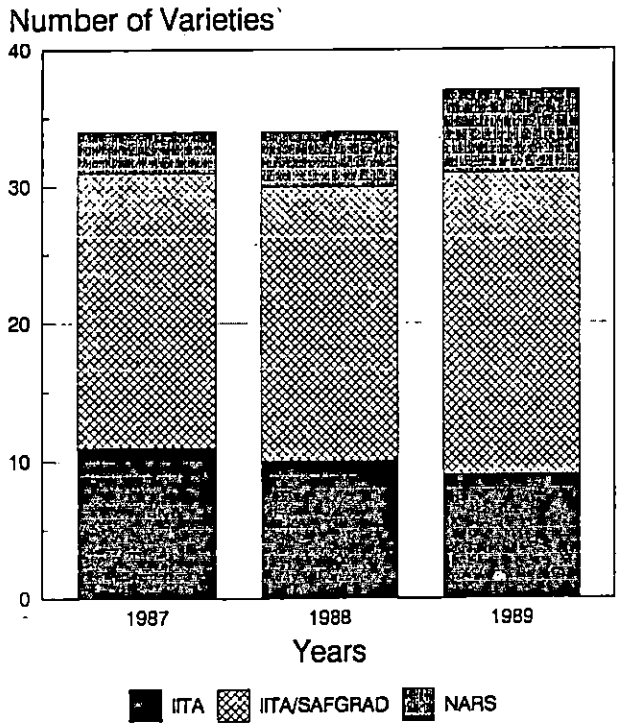
3.2 **Conference participation and political barriers:** Conference participation by network countries is high and there is no apparent bias in participation by scientists from francophone vs anglophone countries. Some of the participants are not bilingual in english and french which does create communication gaps. However, from interviews of both anglophone and francophone NARS scientists, it appears that the language and political barriers are broken through the network which has resulted in some degree of harmony previously missing in the region.

4. Technology diffusion via the Network:

4.1 Size of "technology window" provided by network to NARS: Relevant maize technology for SAFGRAD countries is generated by several sources including IITA, CIMMYT, Universities, and other NARS. A network should provide its participants with access to the available technology without a source bias. In the maize network, Table 3 shows that in terms of germplasm, the source has largely been from IITA/ SAFGRAD I/Burkina Faso (55%) or Ibadan (30%) with a steadily increasing but small portion of the germplasm coming from other NARS over time (10-15%).

No CIMMYT or other germplasm was found in the trials which may reflect a source bias. For example, it is known that CIMMYT has provided trials and germplasm directly to the some of SAFGRAD's member NARS and that these varieties have proven useful. In fact, in Guinea the popular, released national variety 'KILISSI-113' is a composite between CIMMYT and IITA varieties. In yet another case, a SC member visited a member country who showed him the CIMMYT trials which were well maintained and promising but refused to take him to the SAFGRAD trials which were an hour away supposedly because of some "problems". Although these finding do not indicate clear source bias, they do suggest that other sources of germplasm may indeed be available through other agencies that have merit in SAFGRAD member countries. It is a responsibility of the network to screen such material and make it available to interested member NARS.

Table 3. SAFGRAD Maize Network: Source of Germplasm in Regional Trials.



Taken from "Strategy, Acheivements, and Thrusts" by Dr. J. Fajamisin

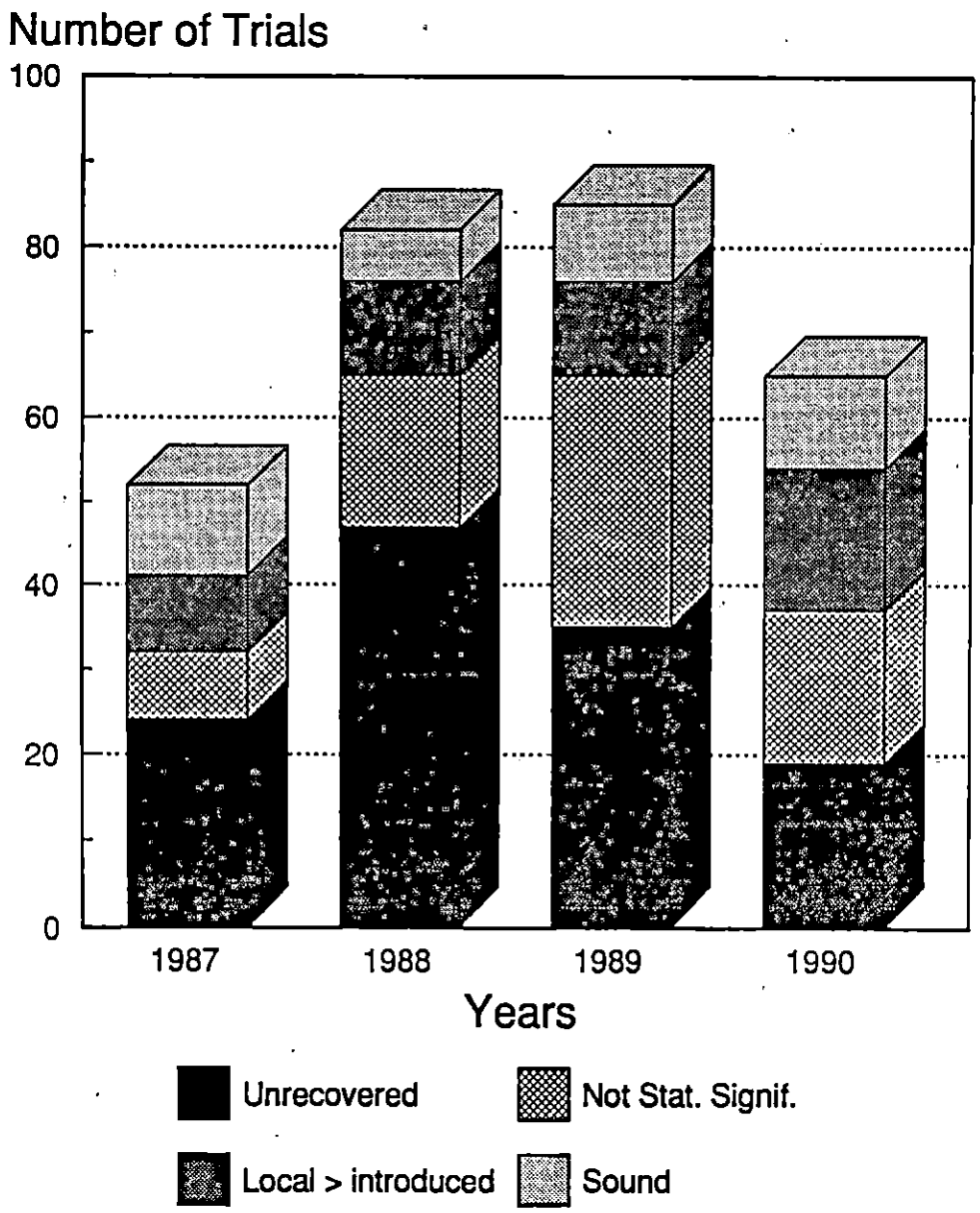
4.2 Appropriateness, quantity, quality, and disciplinary balance of network technology: Table 3 also shows that approximately 35 varieties of maize were diffused annually . Of that, about 40% overlapped from year to year and over 75% was of IITA origin. Table 4 shows that over the span of four years, the maize network disseminated approximately 70 varieties of maize in 246 separate trials in 17 countries. These trials were all variety trials composed of material possessing regionally desirable traits like streak resistance, short cycles, dents and flints and yellows and whites. Specific trials or nurseries for special traits or non-genetic technologies were not conducted in the maize network. As such, disciplinary balance has been narrow in the maize network which can be once again traced back to disciplinary balance on the Steering Committee as pointed out in section 2.1. Special traits and non-genetic activities however have been addressed to some degree through the special projects and workshops.

4.3 Regional trials vs observational nurseries: The maize network has opted for a 'regional trial only' germplasm agenda. Table 4 shows that over four years the regional trials have not met with overwhelming success. Although recovery rate has increased from 1987 to 1990, the proportion of trials yielding favorable results is less than 15%. It further raises concern over the

objective of the regional trials. For example, analyses over locations and years and their regional interpretation have not been conducted nor has this important issue been raised by the SC. A major objective of any regional variety testing program is to determine which varieties produce high and stable yields over a range of varying regional environments. Varieties (and especially hybrids) performing well over years and locations can be 'picked up' by seed companies for increase and dissemination thus opening doors for private sector intervention and greater economic benefit to farmers.

In addition, concern is raised about whether the method of dissemination is both broad and good enough for NARS to reap a meaningful benefit. After all, only 15% of the total 246

Table 4. SAFGRAD Maize Network: Regional Trial Success over Four Years.



trials actually provided data whereby the NARS could have selected a new variety for future testing. Even then, there were no analyses over years to examine stability of performance.

Another alternative to regional trials is the use of 'Observational Nurseries'. Instead of sending out a small replicated number varieties year after year, the network could opt to send out large unreplicated numbers of varieties to be grown out and examined by the NARS for a preliminary screening. This method allows more material coming from various sources to be screened for specific NARS needs. If a variety was of interest, the NARS would test it further among other selections and controls. Some NARS expressed a preference for the 'observational nursery' type trial yet others preferred the packaged trial. In general, NARS with Ph.D. scientists wanted observational nurseries because it allowed them to obtain additional material from other sources without allocating resources for a regional trial whose varieties have already been tested. NARS with younger less experienced scientists seemed to prefer the replicated variety trial because it was prepackaged, easy to implement, and straightforward. In the end, an individual NARS should be able to request either of the above alternatives and the Network should be able to respond.

4.4 Diffusion of germplasm through network to NARS to farmers:
Monitoring the evolution of technologies after they reach the NARS level is essential for good network management and increased impact potential. For the Maize network, Table 5 shows that requests from NARS for the trials is relatively constant over years. Of the varieties dispersed, several have entered the National System despite results which indicate that few of the trials were successful (Table 4). These figures, however, were taken from the network coordinators' final report and do not reflect actual NARS verification by the reviewer. The only cases that were verified were for Niger, Guinea, and Burkina Faso. In those cases, two SAFGRAD varieties coming from regional trials did merit further consideration in national trials and then in on-farm trials. For Guinea and Niger, there was no variety released but in both cases the NARS was considering release after further testing. This seems to be a more likely scenario than the figures in the # released column of table 5 indicate for two reasons: 1) Phase II activities began testing in 1987 which means that for the most part, there was not enough time to adequately test the variety before release [there were only 4 years from which a variety could enter the NARS through regional trial (1) year), be tested in national program (2 years minimum), be tested on-farm (2 years) and be released (1 year)] and (2) the small number of successful trials could not allow as large a number of varieties to enter the national trials.
Unfortunately, time did allow the reviewer to obtain a greater sample of NARS

verification data.

In the case of Guinea the network trial acts as one of the country's screening nurseries (others are received from CIMMYT and CORAF). From the trial, material is selected based on color, texture, and yield. The selections are placed directly in multilocation farmer fields and then to on-farm trials. Two SAFGRAD varieties were selected for on-farm trials from this procedure. It is important to point out however that the varieties were not selected for yield (which was less than local) but for their texture and color.
In Niger, where maize is less important, SAFGRAD varieties entered the national system through the network and one of these varieties has been tested on farm with good yield results. Farmers also appreciate the variety's resistance to streak. According to reliable outside the network scientists working in the Agadez maize region, the SAFGRAD variety has been taken from the on-farm trials by the farmers for their production fields. This was noted by the observer as obvious from the red color of the SAFGRAD's

Table 5. SAFGRAD Maize Network: Regional Trial Diffusion over Years.

	1987	1988	1989	1990	Total	# NARS On-station	# On-farm	# Released
Benin	6	10	9	6	31	5		
Burkina Faso	4	8	7	6	25	5		
Cameroon	2	7	8	6	23	2		
Cape Verde	2	2	1	1	6	1		
CAR	4	4	4	3	15	0		
Cote d'Ivoire	1	6	6	3	16	2		
Gambia	4	4	4	6	18	0		
Ghana	2	2	6	3	13	4		-
Guinea	5	4	8	4	21	2	2	0
Guinea Bissau	1	7	5	2	15	0		
Mali	2	0	3	5	10	3		
Mauritania	0	0	2	2	4	3		
Niger	1	3	3	2	9	3	1	0
Nigeria	3	4	3	5	15	5		
Senegal	5	9	6	5	27	4		
Tchad	3	3	2	4	12	3		
Togo	8	9	6	4	27	2		
Total	52	82	85	65	246			

variety inflorescence which is different than the local and can be seen from a distance. In anycase, these verification visits to the NARS by the reviewer shows the network to be effective at providing useful material to NARS despite poor monitoring and trial results.

4.5 Network Service orientation to NARS: It has already been mentioned that the Maize network has responded favorably to the needs of NARS in terms of offering a regional variety trial, training for technicians, and funding research operations in member countries. These services are well accepted by the NARS. Many of NARS however found that more training of technicians and scientists would be useful. The technician training program of the maize network was highly praised by NARS leaders, scientists, and technicians.

4.6 Supplementation vs supplantation: Generally, germplasm diffusion activities (regional trials) of the maize network were found to supplement current on-going maize research through providing some additional germplasm which has been useful to some NARS. In addition, the funds which are distributed to the NARS for 'trial implementation' are considered by some NARS to be too small to bother with yet essential to maize research for others.

5. Enhancement of NARS capacity to produce quality research:

5.1 The maize network conducted 2 monitoring tours during the five years. All countries had an opportunity to participate in either one or the other. Table 6 shows that only 2 countries have not participated in this activity. Reports from NARS scientists suggest the activity is a very important part of the network and engenders professional enthusiasm among the researchers as well as broadens their professional perspective and depth.

5.2 Only one subject specific workshop was held jointly by the maize and cowpea networks on the subject of agronomy. 12 of 17 countries participated. Proceedings not out yet. No comments from NARS.

5.3 Technical training was conducted by the maize network for a total of 15 technicians. The training includes 5 months of on-the-job training in experiment/trial management....from organizing seed, to planting, to observations, harvesting, compiling data and presenting results. Technical merit of training course was very good and NARS comments are very favorable and suggest that this type training should be increased in future networking activities.

Table 6. SAFGRAD Maize Network: Monitoring Tour NARS Participation.

	1988	1990
Benin	xxxx	
Burkina Faso	xxxx	
Cameroon		xxxx
Cape Verde		
CAR		xxxx
Cote d'Ivoire		xxxx
Gambia		xxxx
Ghana		xxxx
Guinea	xxxx	
Guinea Bissau		
Mali		xxxx
Mauritania		
Niger		xxxx
Nigeria	xxxx	
Senegal	xxxx	
Tchad	xxxx	
Togo	xxxx	

II. SAFGRAD II Networks- Major Findings

B. West and Central African Cowpea Network (RENACO)

1. Structure and evolution:

The Cowpea network, like the Maize, profited from having its Phase II activities be a natural follow-on project to former Phase I activities. As such, both the Maize and Cowpea networks had a regional orientation. The IITA SAFGRAD I program developed cowpea varieties for the region and Phase II activities disseminated these varieties through the network. There was, therefore, very good program continuity in terms of a cohesive 10 year regional effort and in terms of maintaining the same coordinator throughout the Phase II activities. Steering Committee members were elected at general assembly meetings and Table 6 shows that only 8 of the 17 member countries participated on the SC. Although this represents less than half the member NARS, it is somewhat evident from the HR Strength column in Table 6 that 7 of the member NARS have only one researcher whose time may better be spent on the national program than on regional agendas.

Table 7. SAFGRAD Cowpea Network: NARS Funding Allocations over Years, Lead Centers, HR Strength, and SC membership.

	NARS HR Strength	Lead Center Activity	Funding per year	Funding over 4 years	Steering Committee Member
Benin	xxxx		580	2,320	87,88,89,90
Burkina Faso	xxxxx	Brdg&Ento	580	2,320	87,88,89,90,91
Cameroon	xx	Ento	2,000	8,000	87,88,89,90
Cape Verde	x		580	2,320	
CAR	x		580	2,320	
Cote d'Ivoire	x		580	2,320	
Gambia	x		580	2,320	
Ghana	xxxxxxxxx	Brdg&storage>1989	580	2,320	89,90,91
Guinea	x		580	2,320	91
Guinea Bissau	x		580	2,320	
Mali	xxxxxx		580	2,320	
Mauritania	xx		580	2,320	
Niger	xxxxxxxx	Brdg&Agm	2,000	8,000	87,88 91
Nigeria	xxxxxx	Brdg&Agm&Path&Ento	4,000	16,000	87,88,89,90,91
Senegal	xxx	Brdg&Ento	3,000	12,000	91
Tchad	x		580	2,320	
Togo	xxxxx		580	2,320	xxxx
Total			18,540	74,160	

SAFGRAD Funded full-time national scientist for Burkina from 1987-1990 (10,000/yr)

In addition, the cowpea network SC membership was well balanced in terms of discipline representation, usually including agronomists, entomologists, and breeders. As a result and in direct contrast with the maize network, the cowpea network designed and implemented several regional agronomy and entomology trials. Details on disciplinary balance are related later under that topic.

2. Constraint Identification and priority setting:

2.1 Relevance of network activity to NARS research agenda and demand: The Cowpea network used a process similar to maize but some what more detailed and lengthy to identify constraints and prioritize action. The method allowed researchers from the region to rank the importance of a problem within the agoecological zones of the region and therefore was technically more useful. Again, economic and social impact considerations were absent from the prioritization exercise which was based upon researchers' biological assessment of a particular production constraint. In anycase, all NARS cowpea researchers were present and had input into the exercise. Thus, the relevance of network activities to the NARS research agenda was high and fully taken into account.

2.2 Influence on IITA research agenda: Again, like the maize example, the cowpea network identified striga and multipurpose cowpeas as priority areas where special projects might be funded. Later, IITA placed more emphasis in these two areas. Whether IITA responded to network action is difficult to document. As is the case in the maize network, there is no formal linkage between NARS and IITA through the network to discuss research agendas. Future network designs should attempt to provide a mechanism for NARS scientists to input and feedback to relevant IARCs and other technology generating entities.

2.3 Development of lead center concept and action: In 1987 the cowpea network identified lead centers and associate lead centers for enhancing special regionally applicable research areas. The priority chart was used to determine the areas of regional research and then the areas were matched to the NARS with the greatest amount of human and infrastructural resources to conduct the research. No economic analysis for research themes was presented. 29 separate mini-research projects were developed for implementation at 8 NARS (Table 6). Mini-proposals were received for the research from the NARS and reviewed by the SC. All projects were funded and most submitted annual progress reports and an expense accounting. The cowpea network spends approximately 30,000USD per year for these 29 projects which raises the question of whether the management of such a high number of projects is not overburdening the NC and SC.

2.4 Supplementation vs supplantation: The concept of lead center identification is to enhance research activities on regionally important themes in those NARS with predominant capability thus increasing spill-over rates and products to other NARS ultimately increasing research efficiency. Like the situation in maize, there are various gradations of supplementation, supplantation, and subsidization occurring within the network. In Cameroon, for example which has had 10 years of Phd entomology work conducted through a CRSP project was designated as the entomology (post harvest) lead center. Four separate projects were allocated to Cameroon under this activity requiring 4 proposals, 4 reports, and 4 financial justifications for the additional 1500 USD it receives to do this work. Again, the four proposals outline work which is currently being performed in Cameroon under CRSP activities. Since, without SAFGRAD the work would be conducted anyway, this example must be considered subsidization of research by SAFGRAD representing a savings to the National program. However as in the Maize example, it is important to note that the small sum of money may act as a "carrot" to attract greater participation and sharing of results with the network. On the other hand, the funded activity in Benin on striga validation studies is an example of the network supplementing the Benin research program by adding and funding an important regional research activity to their own on-going activities and the addition is complementary to the NARS program. Results from the research will be applicable to the region.

The most important lesson coming from the examination of supplementation vs supplantation is that the networks have demonstrated that they can act as vehicles to fund regionally oriented research at targeted NARS. Research conducted in this way should be complementary to the Lead Center National agenda so that the rate at which a technology is developed is increased thus increasing the rate of spill-over into other NARS and ultimately increasing overall research efficiency.

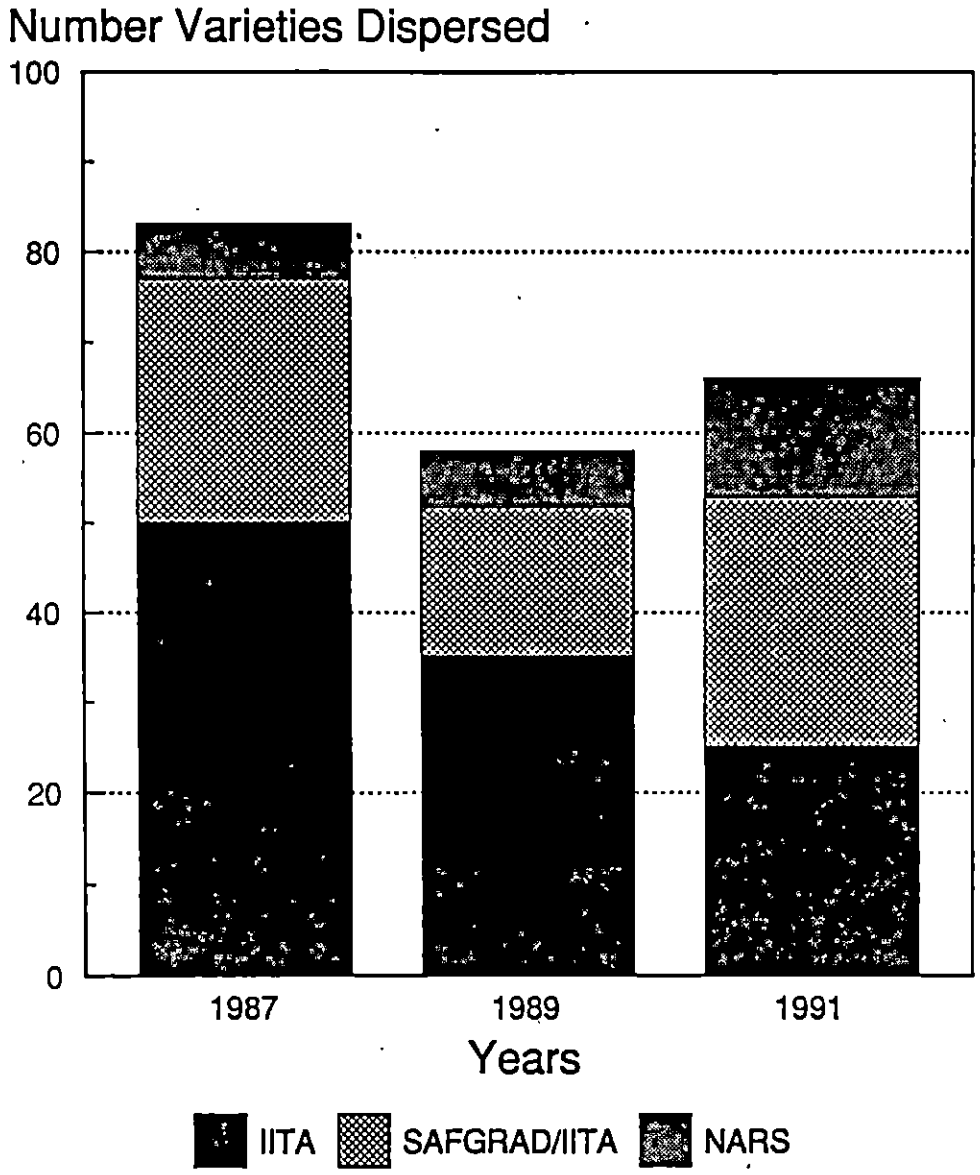
3. Extent to which network has provided structured forum for scientific interaction:

Since the maize and cowpea network headquarters are located in the same area, these two networks have held joint workshops. The joint workshops have focused on common themes shared between the two commodities i.e. intercropping, residual legume N, pests, etc,. The workshops have apparently been helpful in raising the awareness of common agronomic issues but have not yet been translated into a workable research theme where scientists from one network collaborated with scientists from another network on one or several shared experiments or trials.

4. Technology diffusion via Network

4.1 Size of technology window provided by network to NARS: Worldwide research work on cowpeas does not have the breadth and intensity of research work on the cereals or even other well known legumes. As such, there is naturally a smaller pool of available technologies. In terms of germplasm dispersed to NARS by the network Table 7 shows that approximately 200 varieties have been disseminated over the 5yr program. The cowpea network diffused three times the number of varieties than the maize network in half the time. Of these varieties, the IITA/Ibadan contribution has decreased from 60% in 1987 to 30% in 1991 whereas NARS contributions have increased from 5% in 1987 to 20% in 1991.

Table 8. SAFGRAD Cowpea Network: Germplasm Number and Source over Years.



4.2 Technology window size, disciplinary breadth and quality: Table 8 shows that the cowpea network has addressed a broad range of disciplinary and interdisciplinary problems through trial distribution. Trials have been formed to respond to the priority areas identified in 1987. As such, the Cowpea network, unlike the other SAFGRAD networks, has responded to the non-genetic demands of the networks through their regional trial system. Examples are intercropping trials and insecticide treatment trials. In addition, trials composed of elite material screened for striga resistance have been organized and dispersed, again showing that the germplasm or technology dissemination conduit can be used to address a broader array of disciplinary constraints. The special projects are also a means to address greater disciplinary demand and table 9 shows the how the cowpea network has allocated resources to meet those demands.

Table 9. SAFGRAD Cowpea Network: Disciplinary Balance in Regional Trials.

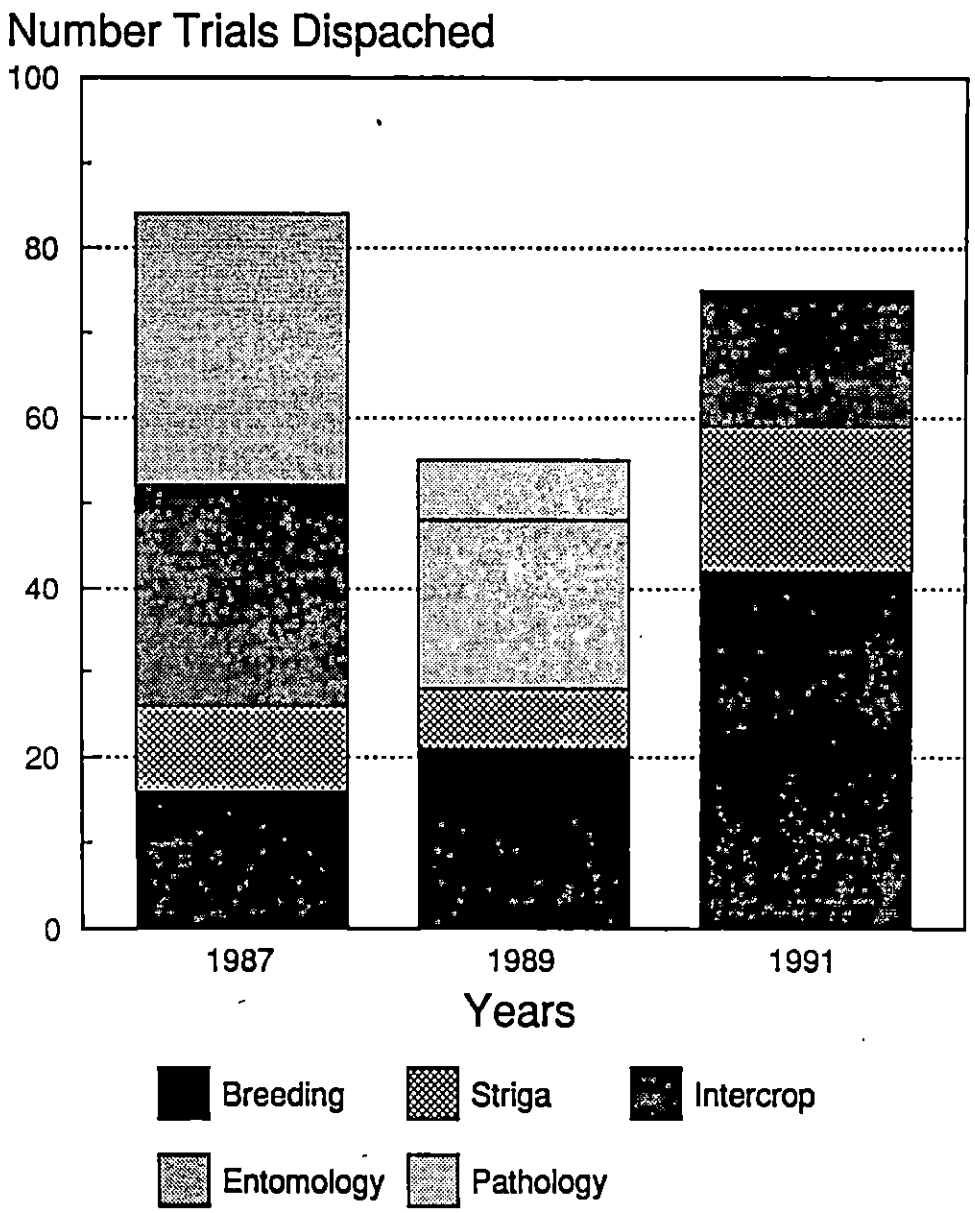
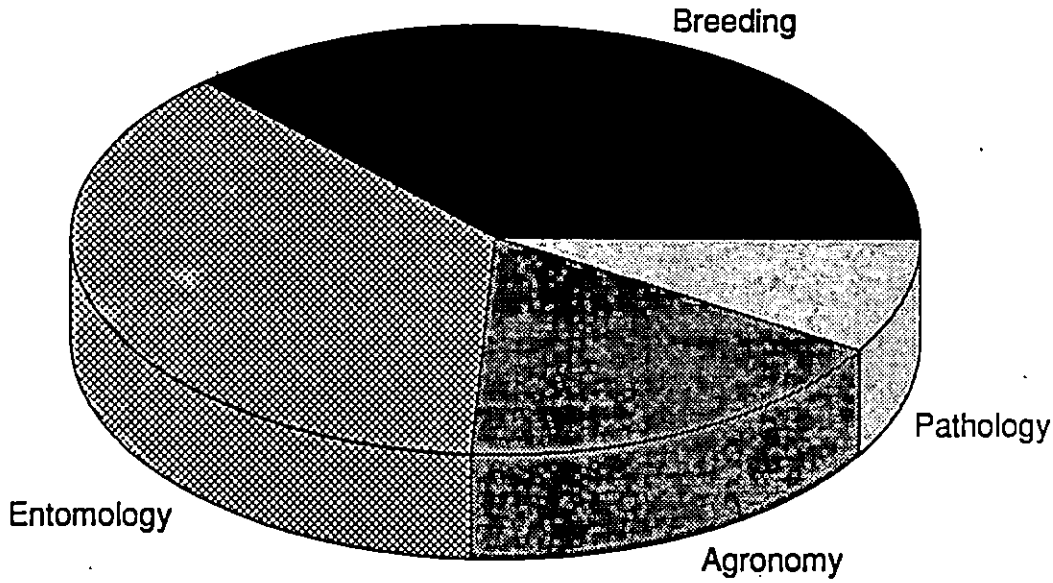


Table 10. SAFGRAD Cowpea Network: Disciplinary Balance in Lead Center Research and Special Projects.



Dollar Amount/Year

4.3 Diffusion of network disseminated technology from source to NARS and from NARS to farmer liaison programs to farmers: The Trial Diffusion Monitoring table, Table 10, shows that over the 5 years, requests from NARS for trials has markedly decreased. The number of technologies or varieties actually absorbed by the NARS into their own cowpea programs is shown in column 7. Note, that in most cases, the NARS have selected some network germplasm for national tests. Also, there is an apparent relation between human resource strength and acceptance of technology. It appears the higher capacity NARS accept more technology than the lesser capacity NARS. The eighth column shows the number of varieties that have entered the system via the network and performed well enough to merit on-farm tests which were verified by this reviewer. There is no evidence to refute coordinator's assertion

that the number of these cases is much higher. This reviewer believes that a greater number of varieties have reached the farm testing stage but time prevented verification at a greater number of NARS. No evidence of variety release was found in the NARS the reviewer visited, however, in both Niger and Guinea, the principal cowpea program leader envisioned release of

Table 11. SAFGRAD Cowpea Network: Regional Trial Diffusion and Monitoring.

	NARS HR Strength	# Trials 1987	# Trials 1989	# Trials 1991	# Trials Total	# On-Station Trials at NARS	# On-farm Trials at NARS	# Released SAFGRAD Technologies
Benin	xxxx	xxxxxx	xx	xx	10	4		
Burkina Faso	xxxxx	xxxxxxxxx	xxxxx	xxxxx	21	6	2	
Cameroon	xx	xxx	xxxx		7	1		
Cape Verde	x	x	xx	xx	5	1		
CAR	x	x		xx	3	0		
Cote d'Ivoire	x	x	x	x	3	0		
Gambia	x	xxxxxx	x	x	9	0		
Ghana	xxxxxxxxx	xxxx	x	xxx	6	2		
Guinea	x	xxxxx	xxxxxxxxxx	xx	18	5	2	0
Guinea Bissau	x	xxx	xxx	xxx	9	5		
Mali	xxxxxx	xxxxxxx	xx	xxxxx	15	2		
Mauritania	xx		xx	x	3	6		
Niger	xxxxxxxx	xxxxxxxxx	xxxx	xxxxx	19	4	2	0
Nigeria	xxxxxxx	xxxxxxxxxxxx	xxxxx	xxxxx	25	2		
Senegal	xxx	xxxxxxx	x		5	0		
Tchad	x	xxxxxxx	xxxxx	x	13	6		
Togo	xxxxx	xxx	xxxxxx	xxxx	13	6		
Total		89	67		189			

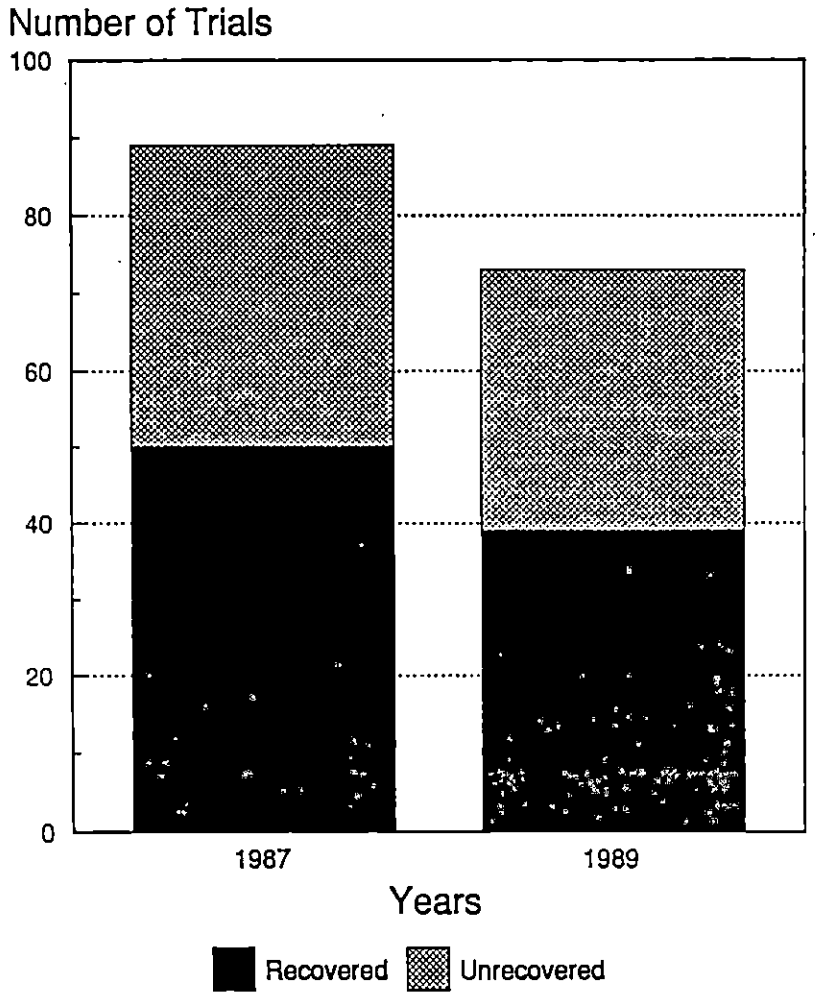
Safgrad network obtained material. Also, the breeder in Niger has used some of the material in Niger's breeding program.

The general assessment of the effectiveness of the cowpea network is very positive. The network has provided adapted, acceptable genetic and non-

genetic material to member NARS and these technologies have merited further testing at the national level. In addition, some of the varieties disseminated by the network have reached the on-farm testing stage in some NARS and are being considered for national release.

Table 11 shows that of the 75-85 trials which were dispatched, approximately 50% were recovered by the coordinator for analysis and interpretation. The cowpea network coordinator did perform some of the combined analyses which are essential for regional interpretation. Many different reasons were given to explain the high rate of unrecovery. Among them are trial failure, trial tardiness, excessive NARS workload, and postal problems. The great percentage of unrecovered trials does seem to suggest that the networks should reconsider their strategy to achieve their network research objectives. It may be more appropriate to utilize the observational nursery approach than the replicated regional trial approach.

Table 12. SAFGRAD Cowpea Network: Regional Trial Success over Years.



4.4 Service orientation of network to NARS: It was stated earlier that the cowpea network appears to have responded very well to a broad array of NARS needs through both the regional trial activity and the special project activity. It is important to note that this may be due to the disciplinary balance of the SC which includes several representatives from various disciplines.

Critical to service capability of networks is the timing of trial dispatch. For example, it was found that in Guinea, that the trials arrived after common planting dates which suggests that the cowpea network may not be as in sync with the regional seasonal variation as it should be. Seed and other trial inputs being disseminated from network headquarters must reach their NARS destinations well in advance of the planting date so that all necessary NARS arrangements can be made for its implementation. If the trial is late, results are confounded with planting date and therefore of little meaning.

4.5 Supplementation vs supplantation: There was no evidence that the regional trial and germplasm dissemination activities of the cowpea network were supplanting a NARS research program. Indeed, these activities were found to supplement the national programs by increasing the quantity and quality of material for their evaluation and use. In other cases, like Guinea, the network remains its only source of cowpea germplasm from which all other national program activities revolve.

5. Enhancement of NARS capacity to produce quality research:

5.1 The cowpea network has had two monitoring tours with participants from 14 countries as table 12 shows. Note that over the 4 year period from 1987 to 1990 only 4 of the 17 member countries have not yet participated in these tours. Discussions with participant scientists reveal that these activities are essential to upgrade scientists on new technologies and methodologies coming from IARCS, CRSPs , or other NARS.

Table 13. SAFGRAD Cowpea Network: NARS participation in Monitoring Tours.

	1987	1988	1989	1990
Benin				
Burkina Faso		xxxx		
Cameroon				xxxx
Cape Verde		xxxx		
CAR				xxxx
Cote d'Ivoire				xxxx
Gambia				xxxx
Ghana				xxxx
Guinea		xxxx		
Guinea Bissau		xxxx		
Mali				xxxx
Mauritania				
Niger		xxxx		xxxx
Nigeria				xxxx
Senegal		xxxx		
Tchad				
Togo				

5.2 The cowpea network jointly conducted the agronomy workshop with the maize network in 1991. No comments from participants and no proceedings to review. They also conducted one on technology transfer in 1989 for 10 participants from 7 countries. No feedback.

5.3 Technical training: Cowpea Network did not conduct special in-house technician training courses.

5.4 Other: No other training was provided by network to member country scientists.

II. The SAFGRAD II Networks–Major Findings

C. The West and Central African Sorghum Network (WCASRN)

1. Structure and Evolution:

Unlike the Maize and Cowpea networks discussed above, the sorghum west network did not have a smooth transfer from SAFGRAD Phase I activities to Phase II activities. Activities funded in Phase I of Safgrad were abruptly terminated in mid project as the ICRISAT program was moved from Ouagadougou to Bamako. As a result, the momentum toward achieving regional orientation from research activities in Phase I to network activities in Phase II was broken. Although structurally similar to the other networks the continuity of longer term effort with regional orientation was missing. In addition, there were concerns that the first network coordinator was not responding well to the needs and requests of the NARS and was later replaced. Evidence of justifiable NARS concern over the first network coordinator includes the presence of a predominately expatriate steering committee for the first two years and network activity that included only trial dissemination.

2. Constraint identification, priority setting, and lead centers:

2.1 Relevance of Network research agenda to NARS agenda: The sorghum west network did not assemble all member country scientists in 1987 to determine regional priorities like the other three networks. The sorghum network apparently used a 1984 exercise conducted at a conference in Burkina Faso to guide the network. Although the ET was unable to obtain a copy of the document, it is well known that the structure of the NARS in terms of trained scientists in sorghum drastically changed from 1984 to 1990. As such, the original research agenda of the sorghum west network probably did not accurately reflect the research agenda of the NARS as much as it reflected the research agenda of ICRISAT and the network coordinator.

2.2 Influence of Network on ICRISAT agenda: There is no hard evidence that the Network has changed the ICRISAT research agenda. Nevertheless, there has been changes in the ICRISAT agenda which run parallel to the network demands from 1989 to 1991. For example, striga (a network priority) work was increased in 1990 at the ICRISAT sahelian center a part time scientist to a full time scientist. Again, it is difficult to determine if ICRISAT responded to the network activity or whether they based their decision on other information. For future networks a formalized mechanism that allows input and feedback from NARS to IARCs would be desirable and could probably be accomplished by holding SC meetings at the regional IARC with a defined

input/feedback agenda.

2.3 Development of Lead Centers: Lead centers were formed in the sorghum west network in 1989 by the Steering Committee. Unlike the other networks, there was no earlier prioritization of research constraints on a regional basis. As a result, the steering committee of 1988 and 1989 decided, based upon their pooled knowledge of the region, which priority themes would be pursued as special projects and which NARS had predominant capability. Table 14 shows the countries, their steering committee relation, their human resource strength, and the designated lead centers for specific research projects.

Table 14. SAFGRAD Sorghum West and Central Africa Network: NARS Funding, SC Participation, and HR strength.

	NARS HR Strength	Lead Center Activity	Funding per year	Funding over 4 years	Steering Committee Member
Benin	xxxxxx				
Burkina Faso	xxxxxxxxxxx	Anthracnose	5,000	11,500	87,88,89,90
Cameroon	xxxxx	Striga	5,000	5,000	88,89,90
Cape Verde	x				
CAR					
Cote d'Ivoire	x				
Gambia	x				
Ghana	xxxxxxx				
Guinea	xx				
Guinea Bissau	xx				
Mali	xxxxxxxx	Head Bugs	5,000	10,000	87,88,89,90
Mauritania	x				
Niger	xxxxxxx	Long Smut	5,000	7,500	88,89,90
Nigeria	xxxxxxxxxxxxxxxx	Comp. Flour	5,000	10,589	87,88,89,90
Senegal	xx				87,88
Tchad	xx				89,90
Togo					
Total					

Table 14 also shows a high degree of correlation between fund allocations, lead center designation, and SC membership. This might suggest an imbalance which favors the larger NARS both in terms of their leadership and in terms of funding. Smaller NARS where sorghum is important and funding is short, like Chad, Togo, and Mauritania should be able to utilize regional funds to maintain research to the minimum level of being able to screen germplasm and test other network disseminated regional technologies.

The choice of research topics pursued by the lead centers appear to cover some relevant regional biological constraints like striga, head bugs, and long smut but there is no evidence that these themes were chosen for their potential economic or social impact. For example, if smut resistant material were released from work on this special project, what could farmers expect in terms of social or economical return. An economic analysis of long smut has never been conducted.

2.4 Supplementation vs supplantation: The sorghum west network became involved in the collaborative research projects and lead center activities in 1989. Prior to 1989, the network emphasized regional variety and hybrid trials and only began work on lead center activity in 1989. The lead center activity is funded annually at approximately $5,000 per year per country-activity. As in other networks, some of the projects appear to subsidize existing work which does engender that country's stronger network participation. Again, the Cameroon striga work was part of the on-going USAID bilateral project. It therefore appears that the SAFGRAD network added an additional $2,500 per year to ensure that the network obtained the results of Cameroon's striga work.

The lead center work in Burkina on anthracnose is clearly a case of supplementation since without the lead center funding concept, the anthracnose work would not have been undertaken at the scientific depth and breadth it is with the additional support of the network. Head bug work in Mali is another case of the network complementing the research agenda of the NARS for the benefit of the region. Mali possesses a good entomologist and their sorghum program has always emphasized the grain quality of local varieties compared to that of the exotic material. Scientists have speculated that head bugs were affecting grain quality but scientific investigations to quantify the nature of damage and design screening techniques to alleviate the constraint have been missing. Through the network, Mali was charged to investigate the head bug problem and collaborates with the sorghum and millet CRSP and ICRISAT. This shows how other agencies and technology donors like the CRSPs can be used to increase the rate of spill-in to the NARS.

3. Extent to which Network has provided a structured forum for scientific interaction:

3.1 Frequency: 2 general sessions in 5 years with 52 participants from 15 countries in 1988 and 31 participants from 15 countries in 1990.

3.2 Francophone vs anglophone harmony: No apparent bias in terms of participation.

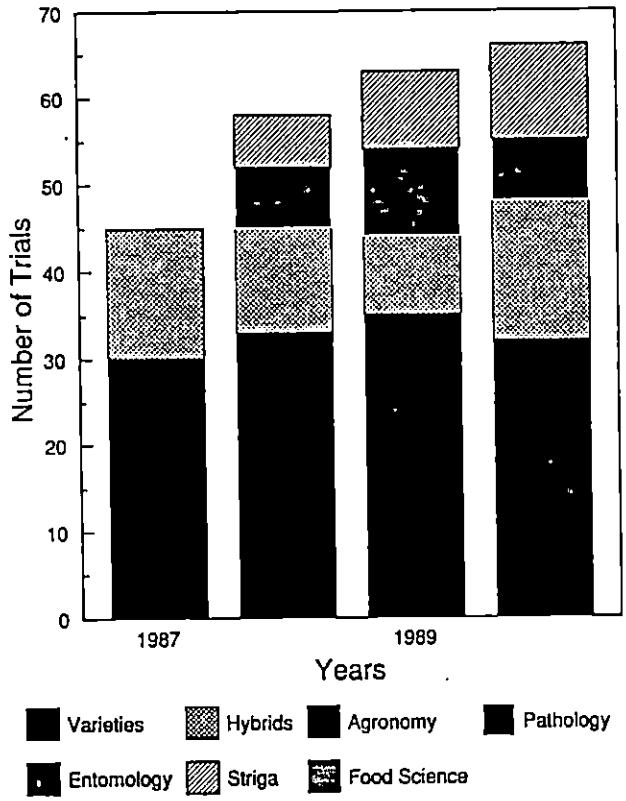
3.3 Scientific exchange: Again, more time is spent on reviewing network trials and activities than is spent on sharing 'non-network' NARS activities and results.

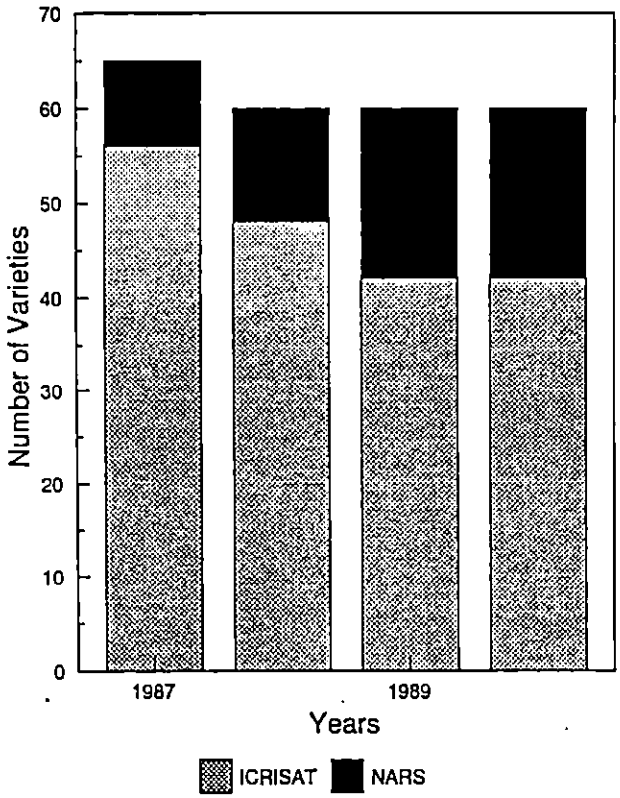
4. Technology diffusion via network activity:

4.1 Size of technology window provided to NARS by network:
Network activity and the size of the technology window increased significantly in 1989 as the direct result of replacing the first coordinator with the current one. Prior to 1989, this network provided a very narrow array of technology to the NARS. This narrowness is reflected in table 15 which demonstrate the difference between 1987 network interests and post 1987. Regional trials were the only activity and yield, earliness, and hybrids were the only themes. Upon the change of coordinator, this network increased activities across disciplines and became more responsive to NARS needs. Evidence is found in steering committee minutes.

Also of relevance is the source of germplasm used in the regional trials. Table 16 shows that from 1987 to 1990 the proportion of NARS developed germplasm increased from 10% to 30%. This shows the rapid pace of varietal development in sorghum that is being forged in west and central Africa.

Table 15 and 16. Disciplinary Balance and Germplasm Source in Regional Sorghum Trials over Years.





4.2. Regional trials: Table 17 shows the number of trials distributed each year and traces the path of certain technologies from the trials into the NARS, to farmer trials, and to eventual release. The number of trials requested by the countries remained relatively constant over years. The percent recovery of regional trial data is higher than the other networks at approximately 65%. The genetic material disseminated through the trials is principally ICRISAT material but the NARS have consistently increased contributions to the trials over time (table Q). Again, like the other networks, the sorghum network has not analyzed nor interpreted the trial results over locations and years which raises serious questions concerning the purpose of the regional trials.

Table 17. Regional Trial Diffusion and Monitoring over Years for the Sorghum West and Central Africa Network.

	# Trials 1987	# Trials 1988	# Trials 1989	# Trials 1990	# Varieties On-station NARS	# Varieties On-farm NARS	# Varieties Released NARS
Benin	1	1	2	2	0	0	0
Burkina Faso	19	7	8	5	9	0	0
Cameroon	3	3	5	6	0	0	0
Cape Verde	0	0	0	0	0	0	0
CAR	0	1	2	1	2	0	0
Cote d'Ivoire	4	4	2	3	2	2	0
Gambia	2	2	2	2	0	0	0
Ghana	2	5	6	5	11	2	0
Guinea	0	1	2	2	0	0	0
Guinea Bissau	0	1	3	3	2	0	0
Mali	4	6	8	9	2	0	0
Mauritania	0	1	1	1	0	0	0
Niger	4	9	6	6	2	1	0
Nigeria	2	8	5	9	2	0	0
Senegal	0	1	2	2	0	0	0
Tchad	0	2	3	2	0	0	0
Togo	2	3	3	2	4	2	0
Total	43	59	63	62	35	7	0

4.3 Technology diffusion from network into NARS to on-farm trials to farmers: Table 17 also shows that 9 countries out of 17 have taken varieties from the network trials and have incorporated them into their own national system. These figures are from the Network coordinator but were confirmed by the reviewer for Niger, Mali, Guinea, and Burkina. The low number of these varieties meriting further testing on-farm and the few countries actually testing them on-farm suggests that either National programs do not have on-farm testing programs or that the varieties are not meeting some criteria (yield, quality, color, taste, etc.) necessary for continued testing. Due to evaluation time constraints the ET was unable to document the apparent low adoption rate.

4.4 Service orientation of sorghum west network: As stated earlier, this network appears to have experienced an abrupt change in its service orientation with the change in coordinators. This is clearly revealed in steering committee minutes, SC membership, and the network activities before and after the coordinator change. As a result, it can probably be stated with a reasonable degree of confidence that choice of network coordinator is critical to the direction of the network. Furthermore, ICRISAT should have been informed of their first network coordinator's shortfalls and should of sought another one more rapidly.

4.5 Supplementation vs supplantation in regional trial activity: The sorghum regional trials have supplemented NARS sorghum programs by increasing their germplasm base. There is no indication that this activity would continue at the NARSs without the network.

5. Enhancement of NARS capacity to produce quality research:

5.1 Monitoring tours: Two conducted. Again, discussions with participants confirm this to be a professional enhancement activity of great merit.

5.2 Subject specific workshops: Two were conducted: One on Striga was held in 1987 for 12 participants from 11 countries. Another was held in 1989 on Agronomy and on-farm testing for 9 participants from 9 countries.

5.3 Technical training: No technical training was provided by network for national program technicians.

5.4 Other training: None

II. The SAFGRAD Networks--Major Findings--
D. The East African Sorghum and Millet Research Network (EARSAM)

1. Structure and evolution:

SAFGRAD Phase I funded sorghum and millet variety development research in Kenya through ICRISAT prior to the Phase II networking activity which began in 1986. The ICRISAT researcher under Phase I was replaced by a coordinator from the ICRISAT Central America program. The coordinator has continued in his position from 1986 to 1991 thus enhancing continuity and cohesiveness of the network. The network is structured like the others with a steering committee composed of members from the eight EARSAM countries. In 1988, it was decided to include one scientist from each of the eight countries on the steering committee allowing all countries equal input and voice into networking activities. Obviously, a major difference between this network and the others is its size which is small and amenable to full NARS participation in the steering committee. Another important difference is in the strength of NARS in the network for these commodities. Sudan, Ethiopia, and Somalia all have very strong NARS in terms of human resources whereas Rwanda, Burundi, are very small and the others are medium sized (Table 18).

Table 18. EARSAM Network: NARS funding, SC membership, and Human Resource Strength.

	Lead Center Activity	Human Resource Strength	1987	1988	1989	1990	1991	Steering Committee Membership
Burundi	None	x	0	0	0	5000	4500	88-89
Ethiopia	Stunge,Erg,Birds	xxxxxxxx	0	144	5000	0	3500	87-90
Kenya	Smut,Borer,Birds	xxxxx	90	0	1300	3500	3500	87-90
Rwanda	Ergot	xx	0	0	0	0	2000	88-90
Somalia	None	xxxxxxxxxxx	0	0	0	8300	0	88-90
Sudan	None	xxxxxxxxxxxxx	0	0	2500	2000	3500	87-90
Uganda	Stem Borer	xxxxxx	0	0	50	4000	2000	87-90
Tanzania	None	xxxxxx	0	0	0	3087	2000	88-90
Total			90	144	8,800	25,900	21,000	

2. Constraint identification and priority setting exercises:

In 1986, scientists from all countries in the network participated in a regional workshop where prioritization of sorghum production constraints was conducted. The procedure to prioritize the constraints was similar to that used by the maize and cowpea networks of IITA. Results of the exercise have been condensed and are presented in table 19. Agroecological zones within the region were taken into account which allowed the network to structure trials and research for the different zones within the region. Again, like the other networks, no economical or social impacts were apparently considered in the prioritization process. The process was biologically oriented.

Table 19. SAFGRAD EARSAM Network: Prioritization of Research Themes.

	Intercrop	Ergot	Breeding	Stem Borer	Soil/Crop Management	Pest Management	Striga	FSR
Burundi	xxxx	xxxx	xxxx		xxxx	xxxx	xxxx	xxxx
Ethiopia			xxxx		xxxx	xxxx	xxxx	xxxx
Kenya	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
Rwanda	xxxx		xxxx		xxxx	xxxx	xxxx	xxxx
Somalia	xxxx		xxxx	xxxx	xxxx	xxxx		xxxx
Sudan	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
Uganda	xxxx	xxxx	xxxx		xxxx	xxxx		xxxx
Tanzania	xxxx		xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
Total	7	4	8	4	8	5	6	8

Condensed from 1987 EARSAM Workshop Proceedings

2.1 Relevance of Network research agenda to NARS agenda: Since the priority exercise allowed each country scientist to rate the importance of known production constraints, the network agenda would be expected to reflect the NARS agenda. In some areas however there appears to be some oversight between the priorities (which reflect the NARS agenda) and the Network activities. For example, table 19 shows soil, crop, and pest management as well as Farming Systems Research and intercropping research to be high priorities, yet the network did not include them in their research or trial agenda. Reasons given by the 1986 4 member Steering Committee were that these themes were too site specific for effective regional research.

2.2 Influence of Network on ICRISAT research agenda: There is definite indication that the Network influences the agenda of ICRISAT's east Africa regional program. First, the ICRISAT regional team is composed of but one scientist who works very closely with the network coordinator. They are housed in the same office building and he participates in all steering committee meetings. In addition, the regional ICRISAT scientist is from the region and bases his activities on the needs of region from his participation in most all network activities including training and monitoring. Therefore, in the EARSAM network, there exists a more formal arrangement between the IARC and the Network to have the network act as a conduit for input and feedback from NARS to the IARC. Similar type arrangements for the other networks would benefit the IARC and the NARS by making the NARS scientists more of an equal partner in regional research activities.

2.3 Development of the Lead Center approach to regional research in the EARSAM network: In 1986, the steering committee designated four countries to be lead centers for 5 activities. A comparison of the priorities with the chosen activities (Tables 18 and 19) suggests that there was some incongruence. For example, the stem borer was esteemed important by only four countries as compared to intercropping research which received full regional support. Despite the NARS agendas, the stem borer work was eventually chosen to be the topic of a Lead Center Activity. Justification was that the intercropping work was too site specific. A working group on intercropping and other potential and desirable topics should be implemented to examine the feasibility of regional research in these areas. For example, the working group could audit the existing technologies that have had success in the region and possibly put a regional trial in place.

2.4 Supplementation vs supplantation: According to the EARSAM budget (reflected in table 18), funds for lead center research were not allocated until 1989, yet research work began (or was continued) in 1986. It therefore

appears that the network began supporting the lead center research in 1989 and increased their support through 1991. Most of the lead center research activity like the borer work in Uganda, the ergot work in Rwanda and the smut work in Kenya are all examples of cases where the network clearly supplemented the research activities of the NARS lead center for the benefit of the region.

3. Extent to which network has provided a forum for scientific interaction:

This network has provided the greatest opportunity for scientific interaction. This is in part due to the low number of participating countries which reduces the logistics and cost of meetings. Also the SC membership provides full NARS participation and representation on regional issues. The opportunities for scientific interaction are enhanced by the network's incorporation of international scientists outside the region who provide expertise in other relevant disciplines and topics like the CRSP scientists.

4. Technology diffusion via the network:

4.1 Size of technology window provided by network to the NARS: The EARSAM network has distributed more germplasm from NARS to NARS and from ICRISAT to NARS than the other SAFGRAD networks. In addition to some regional trial activity, the sorghum and millet east Africa network has disseminated hundreds of elite germplasm lines as observational nurseries for specific desirable traits from ICRISAT (Center and SADCC) and the east african NARS. In addition, this network maintains close ties with the sorghum and millet CRSP which has enhanced the germplasm pool and assisted in efforts to train national scientists. It is important to note also that this network has the responsibility for three crop species: Sorghum, Pearl Millet, and Finger Millet.

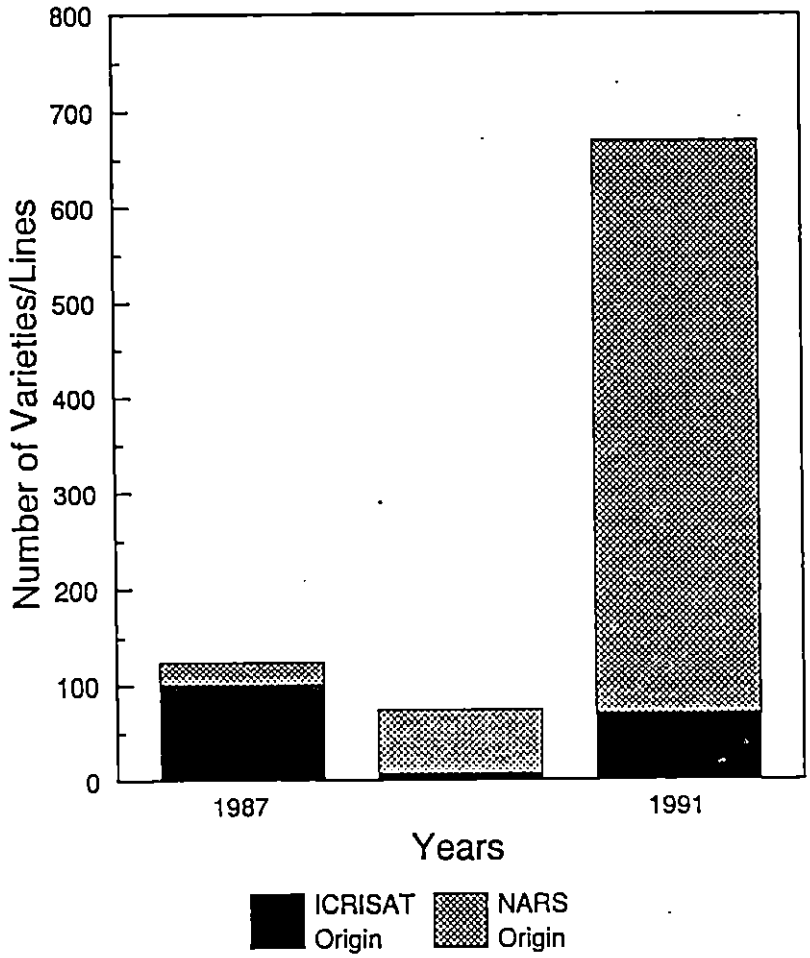
The disciplinary breadth of this network in terms of priorities covered through germplasm dissemination is very good considering the fact that three crops are covered. Some of the priories addressed by this means are drought, maturity cycle, ergot, and head blast.

4.2 Regional Trials vs Observational Nurseries: As stated above, this network uses non-replicated observational nurseries to a greater extent than the other SAFGRAD networks. The advantages of the observational nursery approach is that a greater amount of genetic diversity for a host of production constraints can be screened by the national scientist thus increasing the likelihood that some of the material will be of greater use to the national program. On the downside, NARS with little manpower and/or technical expertise have greater difficulty in terms of time allocation to spend on large

screening nurseries. These NARS generally find the packaged, replicated trial composed of good varieties from around the region more in line with their capacity.

Table 20 shows that the number of varieties or lines distributed to NARS via the network increase dramatically from 1987 to 1991. Also, the proportion of germplasm coming from the NARS has increased enormously in comparison to that of ICRISAT.

Table 20. EARSAM Network: Source of Germplasm in Regional Trials and Observational Networks.



4.3 Technology diffusion from source to NARS and from NARS to farmers via the Network: Table 21 shows that the EARSAM network has only distributed trials in two years, 1987 and 1989. In 1987, none of the trials were recovered by the coordinator and in 1989, approximately 60% were recovered.

The poor performance of the first trials was due to apparent misunderstandings between the network coordinator and the NARS cooperators. Nevertheless, other germplasm was distributed by the network in nursery form.

Some of the technology diffused by the network has merited acceptance into the National programs (Table 21). The reviewer was able to verify this finding through examination of random NARS annual reports found at the EARSAM coordinator office. In addition, some of the material has entered into on-farm trials as was the case for Burundi (Table 21). Finally, most of the network countries have released a network variety. It was found that these released varieties were, by and large, products from the SAFGRAD Phase I activities and had been distributed to NARS as part of Phase I or early Phase II.

Table 21. EARSAM Network: Diffusion and Monitoring of Germplasm via the Network.

	1987	1988	1989	1990	1991	# Varieties On-station NARS	# Varieties On-farm NARS	# Varieties Released
Burundi	2	0	2	0	3	10	2	1
Ethiopia	2	0	3	0	5	11		4
Kenya	2	0	18	0	9	7		4
Rwanda	2	0	3	0	3			0
Somalia	2	0	1	0	2			1
Sudan	2	0	2	0	2			0
Tanzania	2	0	5	0	5			1
Uganda	2	0	5	0	5			0
Total	16	0	44	0	34			

Varieties on-station and on-farm taken from NARS reports
Varieties released are pre-Phase II activity

4.4 Service orientation of the EARSAM network: There was no evidence that trials and other materials were not received on time by the participating NARS. The fact that both high entry observational nurseries, regional variety trials, and several collaborative research projects have been requested by the NARS and implemented by the network indicates that the EARSAM network offers the NARS a wider range of technological material than most of the other networks. In addition, the EARSAM network has provided slightly more training and scientific enhancement activities than the other networks. Much of the additional activity is due to the small number of member countries as compared with the number in the other networks.

5. Enhancement of NARS capacity to produce quality research:

The EARSAM network has provided the NARS with a very diverse array of training and professional enhancement activities.

5.1 Monitoring tours: As the other networks, EARSAM conducts one monitoring tour every other year. However, given the small size of this network and the benefits of these tours, the frequency of the tours could probably be increased.

5.2 Subject specific workshops: The EARSAM network has held three general workshops where most of the sorghum and millet scientists from the region have shared their programs and results. International scientists outside ICRISAT and EARSAM are invited to these workshops to present key papers on broad areas, providing a state-of-the-art snapshot for regional scientists.

5.3 Technical training: EARSAM has provided technical training for technicians from national programs. The themes for these courses are determined by the steering committee and the courses are implemented by the network.

TECHNICAL ANALYSIS

SUMMARY

RESEARCH EFFICIENCY AND EFFECTIVENESS

Relevance of Network Research Agenda to Regional NARS Agenda:

The manner by which the SAFGRAD networks prioritize research themes has involved full participation and input by the NARS scientists but lacks socioeconomic impact orientation. As such, the network research agenda generally reflects the major common biological constraints of the NARS but does not provide a clear regional strategy and plan for achieving impact at the national and farmer level through networking activities. The ET recommends that the priorities of the networks be reviewed in the context of socioeconomic impact and that the networks prepare a strategical plan for achieving their objectives. The plan should include how each network activity has been designed for maximum potential regional impact.

Deviation from the NARS research agenda has occurred to some degree in those networks where the Steering Committee was composed of a single discipline, thus slanting or biasing network activities toward the dominant discipline. In order to avoid such bias and enhance the disciplinary breadth of a network, the ET recommends that Network Steering Committees be composed of members from at least three disciplines.

Supplementation vs Supplantation of NARS research:

The SAFGRAD networks implemented a concept of 'Lead Center' research to enhance research activities on regionally important themes in those NARS with predominant capability thus increasing spill-over technologies to other NARS. There is evidence that this activity has achieved increased research efficiency by (1) supplementing the budget of an on-going NARS research program which increases research output or (2) supporting the cost of research operations for bankrupt NARS, thus allowing research activity and continuity to be possible. On the other hand, there is evidence that the networks have supplanted or subsidized research
thus reducing efficiency by funding NARS research activities that are already adequately funded. These finding indicate that (1) the networks can be utilized as an effective vehicle to fund regionally oriented research thus increasing efficiency and (2) network management should take into account current and future NARS government or donor finances to prevent supplantation or subsidies.

Integration of Network activities into the NARS:

The SAFGRAD networks implement regional variety performance trials, fund regionally oriented NARS research, and provide NARS with a forum for scientific interaction. These activities have all been integrated into national programs to varying degrees. The size of the NARS appears to be the indicator for predicting the degree of integration: The smaller NARS have tended to embrace SAFGRAD activities more closely than larger NARS since the networks represent a viable source of research resources. The larger NARS have tended to be 'Network donors' and play a greater role in the network management and direction. The smaller NARS have been the greatest beneficiaries of the Networks and can be seen as network 'recipients'.

Effectiveness of Network Supervision:

A network should provide its participants with access to the best available technology without source bias. There is evidence that the quality of genetic and other technical material entering the NARS through the network could be increased through increased linkages of networks with other sources of technology i.e. CRSPs, NGOs, NARS, etc. In addition, much of the network research and many of the network trials are not analyzed over years and locations which restricts the possible regional inferences to be drawn from such research. As such, the ET recommends that network regional research and variety trials be properly analyzed and summarized with an emphasis on the implications for future regional research and trials.

Effectiveness Transfer of Technology through Networks:

Technologies or varieties diffused by the networks have been highly valued in some NARS and have entered the national programs both in on-station and on-farm trials. Furthermore, there is some evidence that the network diffused technology has been released by the national program and adopted by some farmers. Unfortunately, there has been no attempt by the networks to monitor and evaluate the evolution of technologies after acceptance by national programs. As a result, it is difficult to assess the extent to which the networks have impacted on the NARS through technology diffusion activities. The ET therefore recommends that the SCO organize an effort to conduct a technology impact study. In addition, in future networking projects, USAID should require the conduct of a technology monitoring and evaluation system similar to that proposed in the technical analysis.

Contribution of Internetworking:

Internetworking has been suggested as a means to bridge interdisciplinary gaps between commodity oriented networks. This is especially relevant when considering the intercropping systems of the SAFGRAD commodities, cowpeas, maize, sorghum and millet. The maize and cowpea networks have held joint workshops with an emphasis on the agronomy of the systems. In addition, the SAFGRAD conference held in 1991 brought the four commodity networks together for increased internetwork exchange. Despite these efforts, there is no evidence that internetworking has translated into field level intercommodity research trials or themes. In fact, there is some evidence that bringing the networks together into a large multidisciplinary and multicommodity group reduced the amount of constructive scientific interaction among scientists of a single network. In addition, the formation of 'working groups' by the networks should result in the most efficacious results concerning 'internetworking'. The ET therefore recommends that the larger multinetworking conferences not be conducted when in direct competition for funding of smaller single networking meetings.

Technology Transfer and NARS contribution:

There is strong evidence that the number and proportion of technologies developed by other NARS have increased in the regional trial activities of the network. This indicates that some NARS have developed technologies which merit regional testing and that the networks have provided a vehicle for this "spill-over" effect to be captured in other national programs.

Influence of Network on the IARC Research Agenda:

IARC research agendas have shifted over the LOP, parallelling to a greater degree the research emphasis of the networks. In many cases it is difficult to determine whether the IARC shift was in response to network demand or activity since no formal linkage for NARS feedback to IARCS via the network exists. The ET therefore recommends that in future networking projects, some of the steering committee meetings be held at the IARCs to allow direct NARS feedback to the IARCs and vice versa.

Extent to which Networks should be involved in On-farm testing:

The SAFGRAD networks have distributed worthy technologies from NARS to NARS and from IARCs to NARS. The NARS within the SAFGRAD system vary greatly in their capacity to transfer technology from on-station trials to the farmer's field. Many national and bilateral donor projects exist wherein the major purpose is to enhance technology

transfer. These projects usually interact strongly with the NARS as their source of technology. If the network has been successful in technology distribution, then the 'technology transfer' unit of the system initiates on-farm tests. SAFGRAD has made a focused effort to enhance network technology transfer through an separate (non-aid) ADB funded 'on-farm technology verification trials' activity. Although such an effort should be applauded, it appears that the SAFGRAD/ADB activity operates outside of the NARS on-farm testing (FSR) unit. As such, the SAFGRAD project may supplant or duplicate the activities of the National programs and create undesirable competition. The ET therefore recommends that SAFGRAD strengthen their linkages with existing NARS FSR programs and projects through their invitation and full participation in network researcher assemblies.

Network Supervision-Number of Regional Trials conducted by NARS

Data from several networks indicate that almost 50% of the regional trial results are not reported back to the network for combined analyses and conclusions. In many cases NARS request seemingly high numbers of trials for their known human and financial resources resulting in the lack of network trial result recovery. The ET recommends that NARS funding for future regional trial activity be contingent upon the return of trial results.

Contribution of SAFGRAD Networks to NARS Research Capability Enhancement:

The SAFGRAD Networks have reached nearly 1000 researchers from over 26 African countries. Most of the 1000 researchers have participated in the network workshops, monitoring tours, regional trials, and regional research. There is strong evidence that these activities have had a profound influence on researchers and technicians in terms of their professional growth and perspective. As such, the SAFGRAD networks have played an important role in the development and evolution of Agricultural Research in Africa.

DETAILED SCOPE OF WORK, OUTPUT AND TIMEFRAME
FOR THE BREEDER/AGRONOMIST ON SAFGRAD FINAL EVALUATION

OBJECTIVE	PRODUCT	TASKS/ACTIVITIES	TIME
1. Assess effectiveness of SAFGRAD in terms of NARS participation in the Management structures of the networks.	For each management structure, a country by participation table will be constructed allowing a detailed analysis of NARS participation over time. Gaps/shortfalls will be shown and discussed.	-SCO documents/files on management structures and country involvement over phase II time span. -Interviews with participating and non-participating NARS directors and scientists.	-1/2 day -combined with other site visit interviews.
2. Assess relevance and priorities of the research agenda pursued by the networks to those of the NARS.	For each network a NARS vs SAFGRAD priority analysis will be conducted. Overlapped areas will be examined to determine achieved efficiency through networking activities.	-Coordinator interviews and documentation of SAFGRAD priorities by network. -NARS commodity program leader interviews and NARS commodity program reports.	-1/2 day with each network coordinator. -combined with other site visits to NARS
3. Assess extent of technology transfer from IARCs to NARS and among NARS through the SAFGRAD vehicle.	Country by stage of technology dissemination table over years with % technologies IARC and NARS. Accompanying analysis and discussion.	-Compilation and summary of all technology disseminated through network and follow-up after reaching NARS level. -Interviews with NARS and SAFRAD research staff.	-2 days/network depending on ease of information availability -1/2 day of final coordinator interviews to verify/fine tune tables
4. Assess extent of disciplinary/theme balance achieved within the SAFGRAD technology dissemination activities.	% level of effort for varying discipline/theme by network. Shift in time, relevance of theme, overall balance will be discussed.	-SCO and coordinator discussions -Network annual reports	-Combined with other interviews -1/2 day in review and compilation
5. Examine and discuss the extent to which SAFGRAD has been able to change or influence the research agenda of IARCs in terms of shifting emphasis to production needs of farmers.	Qualitative analysis and discussion based upon IARC interviews and reviews of their strategy.	-IARC interviews -IARC strategy reviews -Review of IARC/SAFGRAD joint meeting reports	-Combined with other interviews -1/2 day of compiling/ analyzing
6. Examine and discuss the role and possible future need of SAFGRAD to disseminate technology relevant to intercropping improvement.	Qualitative analysis and discussion of relevance of intercropping as a regional theme. Questions answered will be: Are intercropping technologies available for dissemination? Are they extendable? Are they country/area dependent?	-NARS discussions with agronomists -NARS annual commodity reports	-Combined with other interviews on site visits -1 day of reviewing reports and analyzing results
7. Assess effectiveness of NARS in supporting the Networks.	Country by estimated NARS contribution to SAFGRAD table. Variables will be researcher time, experimental space, lab space, and labor. An analysis will be conducted to determine overall efficiency of regional approach vs country approach.	-NARS commodity program leader interviews. -Coordinator interviews	-NARS site visit interviews -2 days compiling and analyzing information
8. Examine role of SAFGRAD in technology transfer. Determine if SAFGRAD should be active at farm level and to what extent.	Qualitative analysis of SAFGRAD activities in technology transfer (regional-farmer). Special attention will be placed on review and interaction of existing NARS and AID bilateral projects with SAFGRAD program.	-Site visit interviews with NARS on-farm researchers, AID bilateral projects and SAFGRAD on-farm implementers.	-NARS site visit interviews -1 day compiling and analyzing data
9. Assess periodicity and frequency of network meetings, workshops, and observation tours.	Construction of 5 year calendar of post priori SAFGRAD events will be performed and analyzed.	-SCO documentation files	-1/2 day with SCO personnel -1/2 day analysis
10. Assess extent to which networks are draining rather than supplementing NARS resources.	Table from objective 7 will be used in conjunction with interviews to present an analysis of this issue.	-Site visit interviews with NARS researchers and directors -Workplan and annual report reviews from NARS and SAFRAD program coordinators	-NARS site visit inter views -2 days in analysis and writing

1. Assess effectiveness of SAFGRAD in terms of NARS participation in the Management structures of the networks.	For each management structure, a country by participation table will be constructed allowing a detailed analysis of NARS participation over time. Gaps/shortfalls will be shown and discussed.	-SCO documents/files on management structures and country involvement over phase II time span. -Interviews with participating and non-participating NARS directors and scientists.	-1/2 day -combined with other site visit interviews.
11. Assess performance of IARCs to backstop NARS research, provide quality coordinators, review research,training, and administrative support to the Network.	Qualitative analysis of IARC performance based on review of relevant information and interviews with IARC personnel and NARS researchers.	-IARC site visits and interviews -Coordinator travel schedule review -Training breadth, type, quality, number	-NARS and IARC site visits -1 day to analyze and write

Appendix 6

Research Management Analysis

by

William H. Judy

RESEARCH MANAGEMENT ANALYSIS OF THE SAFGRAD PROJECT PHASE II (698-0452)

William H. Judy
May-July 1991

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LIST OF TABLES

1. SUMMARY

The effectiveness and efficiency of the system developed for research management by the SAFGRAD Projects was evaluated. The institutional development and functioning was also analyzed.

Regional agricultural research in maize, cowpeas, sorghum, and millet is being planned, implemented, and evaluated through an institutional framework. The Council of Directors of the 26 participating National Agricultural Systems (NARS) advises on policy. An Oversight Committee of elected NARS scientists conducts planning and evaluation studies. Network Coordinators are supplied by two Agricultural Research Centers (IARC), IITA and ICRISAT, to implement the Network programs. Four Networks, one in Eastern Africa and three in West and Central Africa, have been organized to conduct regional food grain production research. Representatives of the National Agricultural Research Systems (NARS) are elected by Network participants to Steering Committees which meet regularly to guide each Network in research planning and evaluation. The IARCs provide backstopping for planning and evaluating Network research.

The Networks used a combination of regional Network trials and enhanced NARS research to address the priority crop production problems. Twenty-two lead centers were selected on the basis of NARS capacity to implement research. A total of 157 scientists have been involved, some in providing technical assistance to smaller NARS. The Steering Committees determine critical crop production constraints and select priority problems for research, and allocate resources for Network trials and lead center research. The effectiveness of the research planning process is reduced by two factors - economic impact is not considered in selecting priority constraints and long term objectives and short term targets are not explicitly defined. Monitoring of Network research is not adequate, perhaps due to the number of countries in West African networks and difficulty in communications.

Commodity research networks have been organized and they have operated effectively to plan, implement, and coordinate food grains research among the NARS and with the IARCs. The capacity of the SAFGRAD Coordination Office has been strengthened in terms of institutional planning and coordination and in facilitating NARS participation in networking between countries and with the IARCs. The system established by this Project for networks research management and linking scientists across national and language boundaries should continue to be supported by donors under an effective regional umbrella.

Network Coordinators and NARS scientists participate in monitoring tours to evaluate lead center research and regional network trials. This activity along with ad hoc training has enhanced the professional skills of NARS scientists participating. Of equal significance is the professional interaction between NARS and IARC scientists and better coordination of research as both IARC and NARS programs have been modified. For many small NARS, the Project has established professional contacts with IARC scientists which did not exist before.

Network research has generated research findings, especially in the areas of sharing and evaluating germplasm. While biologic constraints have been reduced, it is difficult to assess the economic impact and extent of adoption of research results.

The Project has used funds effectively and efficiently to involve NARS in organized planning sessions, workshops and monitoring tours. Of the Network budgets, 16% was budgeted for Network research and the NARS were allocated 86% of that, primarily for enhancing lead center research. Workshops, monitoring tours, and training sessions were conducted at a cost of $1,377 per participant. Every country has participated in at least one of these Network activities with some 1,000 scientist contacts over the five years.

The SAFGRAD Coordination Office (SCO) has prepared position papers and assisted the Council and Oversight Committee in planning and evaluation studies. The SCO coordinates internetworking activities and coordination among the four Networks.

The NARS are involved in leadership and management of Networks. They make decisions about the planning, implementation, and management of research. A NARS scientist could not operate as a Network Coordinator unless he were taken out of his country and NARS and located within the semi-arid area where logistic support could be provided. The Network Coordinator should continue to do some personal research supporting the Network in order to retain the perception of professional competence.

The SAFGRAD Project has demonstrated that regional agricultural research in food crops can be organized and conducted effectively and that it can generate research results which can and will be utilized by National systems.

Regional agricultural research should be continued under a internationally accepted "umbrella" organization. Regional research should utilize a system similar to that developed by the SAFGRAD Project which focuses on coordinated subject matter research by National and IARC organizations with the full participation from the beginning of the planning process by both

National and IARC scientists.

The SAFGRAD Project has demonstrated two other major benefits which should be further strengthened. One benefit is the building of professional relationships between scientists across national and language boundaries; this suggests continued involvement of anglophone, francophone and lusophone countries in any regional research activity. The other major accomplishment is the development of professional relationships between National and IARC scientists which has significantly increased coordination of research programs and improved evaluation of research results. This has been especially beneficial to small NARS. Thus, regional networks should include small, medium, and large NARS, as well as the relevant IARCs.

2. INTRODUCTION

Research management is defined as the system for planning, implementing, and evaluating organized scientific investigation in order to deliver a modified product. The SAFGRAD Project utilizes a research management system to conduct agricultural research in food grain crops of the semi-arid regions of Sub-Saharan Africa. The product of the system is improved crop production techniques which can be utilized by pass-through users (national agricultural research systems) and end-users (the crop farmers in semi-arid areas). This evaluation assesses the effectiveness and efficiency of the SAFGRAD research management system.

3. SAFGRAD RESEARCH MANAGEMENT

Introduction: A research management system includes several basic components. Components for a complete cycle include:

- Statement of the situation
- Definition of goals and beneficiaries
- Involvement of relevant institutions and groups
- Identification of constraints and establishment of priorities
- Development of the workplan and allocation of resources
- Implementation, monitoring, and analysis of results
- Interpretation and application of the results
- Evaluation of accomplishments and initiation of next cycle

The SAFGRAD research management system is the responsibility of the SAFGRAD Coordination Office (SCO), the Network Coordinators and by implication the International Agricultural Research Centers (IARCs) which supply the Coordinators, and representatives of the National Agricultural Research Systems (NARSs) which comprise the various management entities (Council and Committees). This evaluation also assesses the effectiveness

and efficiency of the contribution of each organization and committee to SAFGRAD research management.

3.1. Planning

Introduction: Planning is one of the three major components of research management. Planning consists of a review of the situation, establishing broad goals and short term objectives, examining alternative courses of action, and developing a workplan to solve problems. In the planning phase, the institution involves the relevant groups which can provide assistance in achieving the research objectives and begins to coordinate efforts with allied organizations and relevant groups. Beneficiaries are identified and their characteristics and needs considered. and finally, a workplan is developed which states the problem, long term objectives and short term targets, the methodology to be followed, the human and physical resources needed, and the time required to accomplish the work.

An assessment is made of the research plannning process within the context of the Project as followed by the SCO, the Network Coordinators, and the NARS.

3.1.1. SCO Planning

Analysis: A statement of the situation about food grains production in the semi-arid tropics was included in the technical, economic, and social analysis sections of the SAFGRAD Project Paper-Phase II.

The SCO developed a situation statement and constraints in its 1985 Indicative Master Plan of SAFGRAD. Later, in its 1986 Draft Master Plan for SAFGRAD, the agricultural production and institutional situation were described. Both of these SCO documents contain broad general statements which do not sharply define the biologic and economic situation nor the benefits that might accrue to the beneficiaries should these problems be solved. The method used to identify crop production constraints and select priority areas for research is not evident in these documents. However, these documents do identify small scale farmers as beneficiaries and identify the relevant institutions at international, regional, and national levels. Through participation in Network Steering Committee meetings, the SCO Director of Research has influenced the prioritizing and selection of problems for research and the appropriate design of Network trials and Lead Center research (source - Reports of Steering Committee Meetings). However, it is difficult to determine just how much influence the Director of Research has had in Steering Committee meetings because the decisions are a consensus of the membership. A major contribution is that there is a disinterested party present to provide a consistent and coordinating role for the planning process.

The SCO has developed several strategy papers on the institutional structure of the SCO, networks, and network management. After review by the Council of NARS Directors and the Oversight Committee, the Director of Research advised the Network Coordinators in modifying Steering Committee membership, revising research workplans, and involving NARS scientists more substantively in planning and implementation of Network research.

The SAFGRAD Coordination Office, as an internationally recognized institution of the OAU/STRC, has provided an unbiased organization with the legitimation and prestige to be able to involve Directors of NARS, NARS scientists, and IARC staff in the development of policy, strategy, and research plans which would implement the objectives of the SAFGRAD Project. It has obtained the visas or laissez faire passes so that NARS scientists from all countries can travel to any other country for participation in planning meetings, workshops, training sessions, and monitoring tours.

It also organized the Internetworks Conference, led by the SCO Director of Research and Network Coordinators with participation by representatives of NARSs, for the purpose of improving coordination of research among the four crop-oriented networks and of identifying possible crop management research which could be conducted jointly in Network trials and in the Lead Centers.

The SCO has established relationships with other donor funding sources such as the African Development Bank through the OAU.

Efforts have been made to strengthen coordination with the IARCs, although neither the International Coordinator nor the Director of Research has yet been invited to participate in the IITA or ICRISAT program planning sessions.

Conclusion: In summary, the SCO has facilitated Network research planning by developing policy and strategy through the Council of NARS Directors and Oversight Committee. It has modified the mechanism for planning Network research and promoted greater involvement of NARS in the planning process. It has promoted coordinated research among the crop-oriented networks through the Internetwork Conference, although the pay-off from this Conference has yet to be fully implemented by all Networks.

The SCO International Coordinator and the Director of Research have been effective in technical coordination considering that they cannot direct the activities of the Network Coordinators inasmuch as they are not in control of funds for research and the SCO does not employ the Coordinators. Any influence must then be in terms of their own personal cognizance and in how they can provide assistance to facilitate Network operations. They can participate in policy, strategy, and research planning meetings, workshops , and Monitoring Tours. One example of this influence

is that the make-up of Steering Committees was changed from primarily expatriate and IARC scientists to primarily NARS scientists. Steering Committee records of meetings indicate that the Director of Research influenced the identification of production constraints, the selection of priority problems, and the design of research.

The SCO has been effective in supporting research planning through development of policy and planning papers and by involving NARS Directors and scientists in policy and strategy reviews,and in publication of policy and planning reports and proceedings of Workshops.

The SCO has facilitated Network planning activities by obtaining visas or laissez faire passes for participating NARS scientists, by establishing special arrangements to permit rapid distribution and exchange of germplasm through customs and phytosanitary inspection, and by developing coherent and consistent policy and strategies for Networks.

Thus, the SCO, in conjunction with the NARS representatives, has developed and implemented a strategy for the institutional structure, management, and operation of regional commodity research Networks.

Recommendation: The SCO should be financially supported so that it can continue implementation and monitoring of restructuring and operations of networks for regional food grains research in the semi-arid tropics.

3.1.2. Network Coordinator Planning

Analysis: The broad objectives, purposes, and beneficiaries were fixed by the Project Paper and the Project Paper Amendment. According to the PP, Coordinators were to develop networks of national and international scientists to strengthen research on staple food crops - sorghum, millet, maize, and cowpeas - in the semi-arid tropical areas. Relevant institutions defined were USAID/Ouagadougou, the NARS in semi-arid areas, two IARCs (IITA and ICRISAT), and, of course, the OAU/STRC as the umbrella organization. The beneficiaries of the Project were defined as the NARS which would "accept" the research findings within their systems and the small scale farmers which would "adopt" the varieties released and cultural practices recommended.

The process of establishing the regional Network research system is described in project documents. When the four Network Coordinators were appointed at the start-up of the Project, they each prepared a situation statement and involved NARS and IARC scientists in a process to define constraints and select priorities. The transition from SAFGRAD Project Phase I which emphasized regional on-station research to SAFGRAD Phase II which established regional and national network research was difficult

(see, for example, the 338 page SAFGRAD/IITA report which mixes results of on-station and network research). The maize and cowpea networks accomplished the transition most easily, while it took two years for the West and East Sorghum Networks to fully integrate NARS scientists into regional Network research planning and implementation. All four coordinators followed a similar procedure. The main difference in the planning process between networks was the type and degree of involvement of NARS representatives in the procedure.

The situation statements are found in the Network documents. These basic documents are updated annually in the Steering Committee meetings reports for each Network. They describe the semi-arid ecological conditions and the biologic systems of the target crop. Some production and yield figures were included. Information was not included about the economic and socio-cultural situation and the potential impact on crop production if constraints were removed. This meant that quantifiable and qualifiable long term objectives and short term targets could not be meaningfully established. The combined effect of these two factors prevents evaluation of the justification for selecting priority research problems and determination of the cost/benefit of the research to SAFGRAD and to the production system.

The beneficiaries of the SAFGRAD Project were only indirectly involved in the SCO planning process. It was envisioned that the NARS that would "accept" the research findings of SAFGRAD and pass them on to the "end-users", the small scale farmers. The "pass-through" beneficiaries, i.e., the NARS, were involved in the policy and planning process through the Council of NARS Directors, Oversight Committee, and Network Steering Committees. But very few NARS in Sub-Saharan Africa have actually surveyed the crop and livestock production systems of small scale farmers to determine the biologic and socio-economic constraints. It is not persuasive to suggest that NARS scientists by meeting in an international forum would somehow better know their country's agricultural production and socio-economic systems.

Institutions and groups relevant to the Project goals and activities were identified. Technical staff from IITA and ICRISAT were involved in the Network research planning committees and workshops and in preparation of the workplan. A special effort was made by the maize Coordinator and Steering Committee to develop an agreement with the CIRAD/CORAF maize network to avoid duplication and reduce demand on NARS resources and scientists.

Several significant changes in research programming were brought about during the planning process. One change was that the research programs of the IARCs were modified. Several examples were cited during interviews. Maize streak was elevated in priority by IITA and the Togo NARS became involved as a

cooperator in screening IITA accessions for streak (source: IITA Maize Program Leader and Maize Network Coordinator). The emphasis in the IITA GLIP was changed from grain cowpea varieties to multi-purpose grain-fodder cowpea varieties (source: former GLIP Program Leader, Cowpea Coordinator, NARS cowpea entomologist). National sorghum varieties were included in regional sorghum variety trials (source: Sorghum Network Coordinator, NARS scientist). Another change was that NARS scientists gained confidence in their own competence and in their research program; as a result, they were able to discuss research programming on a equitable professional basis with IARC scientists (source: NARS Directors of Research, NARS scientists). All the Networks followed a similar process for identifying constraints and establishing priorities. The outcome of the process was a listing of priority constraints which were common to all or most all countries. Researchable problems were selected according to the availability and capacity of NARS systems and IARC research available. Then research was allocated to both "Network research trials" and "Lead Center" research at some of the national stations selected on the basis of existing research program and scientist capacity. The Maize and Cowpea Networks each designated six national stations as Lead Centers; the West and East Sorghum Networks designated five Lead Centers each (Table 2). A total of 157 NARS scientists were charged with responsibility for research at these Lead Centers and received supplemental funds for that purpose.

Two factors limited the range of constraints and problems selected. Most of the NARS and IARC representatives were from one biologic discipline - plant breeding, except in the Cowpea Network Steering Committee. Since there was little or no farming system survey data available, there was no advocate for considering interventions other than varietal improvement. However, a much more serious omission was the lack of estimates of the economic and social impact of constraints. For example, what would be the yield increase obtainable by solving long smut disease of sorghum compared to the impact that could be achieved by removing constraints in some other area, say, soil and water management or weed competition? What would be the socio-economic impact of removing some maize production constraint or cowpea insect pest? It is this kind of information that can sell research findings to farmers and the benefits of SAFGRAD and NARS research to funding agencies.

This, in itself, is not to suggest that the constraints and priority problems identified by the Project were "wrong", or that solving them might not yield some net economic gain to beneficiaries. But the research management system would be more effective and efficient in the use of resources if beneficiaries of the crop production systems were surveyed, scientists of varying disciplines were involved in the planning, and the economic, as well as the biologic, impact of constraints and

problems were considered.

Long term quantifiable and qualifiable objectives and short term targets were not explicitly stated for research problems. Without objectives and targets, it is difficult to determine from within (or from outside) the SAFGRAD Project just what progress has been made toward solving problems.

The methodology to be followed, the human and financial resources needed, and the time allocations were well defined in the workplans.

Research was planned and coordinated with relevant institutions and organizations. The most effective and efficient allocation of resources to achieve research objective was found in the maize and cowpea Networks. These two Networks involved the NARS scientists and the IARCs more effectively in the collaborative selection of research problems and in allocation of components of the overall task. The West Africa Sorghum Network established working groups of NARS scientists in the third year of the Project.

Effective workplans were developed and followed but it is difficult to determine progress toward solving problems and removing constraints.

Conclusion: Differences in Network research planning is a result of the degree of NARS participation in Network research management.

Recommendation: NARS should continue in an active role of leadership and management of networks research management.

Conclusion: Network trials have basically addressed production constraints through varietal improvement.

Recommendation: Networks should reevaluate crop production constraints in terms of economic as well as biologic impact and develop network trials which address constraints where the most gain can be realized.

Recommendation: Networks should expand research into areas other than varietal improvement as a means for removing priority constraints; this may require increasing cooperative research by NARS lead centers and IARCs.

Conclusion: There is some duplication of activities by SAFGRAD Networks and networks operated by other donors and IARCs in the semi-arid regions.

Recommendation: SAFGRAD should continue efforts to coordinate regional research activities through joint design and monitoring

of trials; a good example of successful coordination is the harmonization effort between the SAFGRAD and CORAF Maize Networks.

Conclusion: The effectiveness and efficiency of Networks cannot be determined without explicit statements of long term objectives and short term (annual) targets of the research program.

Recommendation: The Networks should develop research programs and workplans which explicitly state the long term quantifiable and qualifiable objectives and short term targets in terms of economic as well as biologic impact.

Conclusion: Progress toward research objectives cannot be determined without an evaluation of the biologic and socio-economic suitability of research findings by the NARS and small scale farmers.

Recommendation: The Networks should obtain empirical data about the acceptance of research findings by NARS and adoption by small scale farmers.

Conclusion: Networks have been effective and efficient in planning regional research but need to strengthen research program statements by describing explicitly the long term objectives and short term targets.

Recommendation: The system of regional research programming established through SAFGRAD networks should be continued by external donor support.

3.2. Implementation

Introduction: The second major component of research management is implementation. Implementation consists in carrying out the research investigation described in the workplan and analyzing the results. Resources are allocated, orientation and training provided, and monitoring used to determine progress and quality. The results of the investigation are analyzed, interpreted, and reported to relevant organizations and groups. The implications of the research findings are fed back into the next cycle of planning and also delivered to the beneficiaries.

One component of implementation includes those activities involved in providing research materials and funds, carrying out the research, technical backstopping for problems, and ad hoc training through workshops, monitoring tours, and organized short courses. This component is considered below as "Implementation, Monitoring, and Analysis".

A second component of implementation includes those activities involved in analyzing and interpreting results and delivering the research findings to the beneficiaries. This component is

considered below as "Interpretation and Application of Research Results".

3.2.1. SCO Implementation
Introduction: In this section, the research management role of the SAFGRAD Coordination Office is analyzed.

3.2.1.1. SCO Conducting, Monitoring, and Analyzing Research
Analysis: The SCO has not been involved in allocating resources, carrying out the research workplan, organizing ad hoc training and monitoring trials, or analyzing results of research trials.

The SCO has facilitated implementation of Network research by providing telex, computer, printing, and assistance with travel and visas or laissez faire passage for the maize and cowpea coordinators (source - SCO Office, Network Coordinators). It has provided photocopying, reproduction, telex, computer, printing, travel, and visa or laissez passer for NARSs scientists which participate in Network Steering Committees, Workshops, and Monitoring Tours. It has organized and conducted meetings of the policy (Council of NARS Directors) and strategy (Oversight) Committee meetings.

The SCO has been effective in these activities. Although IITA and ICRISAT have provided considerable logistic support to the Coordinators, the IARCs could not obtain visas and laissez passer for NARS scientists or facilitate passage of germplasm through customs and phytosanitary inspection as the SCO has done (source- Network Coordinators, NARS scientists, and SCO).

3.2.1.2. SCO Interpreting and Applying Research Results
Analysis: The SCO has not been involved in analyzing and interpreting results of Network trials and Lead Center research.

The SCO has provided some computer, secretarial, translation, and reproduction assistance, particularly for reports of Monitoring Tours and Workshops. It has translated documents into English or French and distributed documents to NARSs, IARCs, and donors.

3.2.1.3. Conclusions and Recommendations about SCO Role in Implementation
Conclusion: In the areas of carrying out the research workplan, monitoring, and analyzing results, the primary role of the SCO have been to provide logistic support for the Network Coordinators and the NARS scientists.

Conclusion: The SCO has not been substantively involved in the analysis and interpretation of research results or in drawing implications about research results.

3.2.2. Network Coordinator Implementation
In this section, the research management role of the Network Coordinators is analyzed.

3.2.2.1. Network Coordinator Conducting, Monitoring, and Analyzing Research
Analysis: Three of the Network Coordinators (Maize, Cowpea, and West Africa Sorghum) devoted 15-25% of their time to research which was a part of the Network research program. While not essential to the role of "Coordinator", conducting meaningful research can be effective and efficient use of Project resources, enhance the professional image and thus the effectiveness of the Coordinator in the eyes of the network participants and collaborators, and strengthen SAFGRAD as an institution with competent scientists. The Coordinators in this Project were all recognized as competent professionals by the NARS and IARC scientists interviewed.

Research materials and funds were supplied to network participants. Lead station research was monitored by Coordinators; few of the NARS Network trials were visited. Monitoring tours provided NARS scientists with the opportunities for professional improvement and for developing professional relationships with scientists across national and language boundaries. A summary of the Workshops, Monitoring Tours, and Training sessions was prepared by the SCO in 1991. Extracted data in Table 2 show that every one of the 26 SAFGRAD countries participated in at least one of these activities. Over the four and one-half years of the Project,these activities involved 613 scientist contacts (duplications not removed). The tours also served to establish direct contacts between NARSs and IARCs. In Guinea/Conakry, for example, the monitoring tour was the first time that the NARS scientist had talked on a professional basis with IITA scientists. During the past 10 years, the only IITA scientist to visit Guinea were the Maize and cowpea Network Coordinators and one visit by the IITA Cowpea Breeder. Perhaps the most significant achievements of the SAFGRAD II Project have been the establishment of research program coordination between the NARS systems and the IARCs, and the establishment of professional linkages of scientists across national and language (francophone, anglophone, and lusophone) boundaries to exchange information and materials.

Several significant changes in research programming were brought about during the implementation process. As one example, NARS scientists during the monitoring tours observed the quality and quantity of research being done by peer scientists in other countries; as a result, many scientists returned home and changed the scope of their research programs (Network Coordinators, NARS scientists, IARC scientists). One scientist was moved to reduce his teaching commitments and to initiate a cowpea entomology research program (source: NARS scientist, Network Coordinators,

NARS Director). As another example, the monitoring tour, which included a visit to the IARCs, was the first time that many NARS scientists had an opportunity to interact with IARC scientists on a peer professional basis; as a result, NARS scientists felt that both the National and IARC research programs were modified and improved from these exchanges (source; Network Coordinators, NARS scientists, IARC Program Leaders).

3.2.2.2. Network Coordinator Interpreting and Applying Results of Research

Introduction: A second component of implementation includes those activities involved in analyzing and interpreting results and delivering the research findings to the beneficiaries.

Analysis: The Coordinators collected the Network trials and analyzed results from individual locations. No analysis across locations or years has been done nor have attempts been made to interpret results and draw implications for future research. One noteworthy exception is the publication by the Maize Coordinator of the origin of maize varieties and hybrids included in Network trials.

In terms of delivering the research finding to the beneficiaries, the Coordinators have tracked "acceptance" of varieties and agronomic findings by the "pass-through" beneficiaries, the NARS. However, the acceptance or suitability of the research product by the "end- user" beneficiaries, the small scale farmers, has not been evaluated by the Coordinators or the NARS. The only measure of acceptance has been acceptance of varieties by seed multiplication organizations and "wind shield" surveys. The evaluator is convinced that some of the research produced by the SAFGRAD Project has been adopted by the small scale farmers. However, the lack of empirical data about the biologic and socio-economic condition of farmers hampers planning an effective and efficient research program at the national and regional level and prevents accurate evaluation of its socio-economic benefits.

3.2.2.3. Conclusions and Recommendations about Network Coordinator Role in Implementation

Conclusion: The concept of lead center research has been accepted by large, medium, and small NARS as an effective and efficient means for generating research of benefit to all countries.

Recommendation: The amount of lead center research should be increased so long as findings are shared among countries, the funding is additive to the NARS and not subsidizing, and programs complement IARC research.

Conclusion: A significant portion of Network funds has been allocated to NARS programs to support regional research activities.

Recommendation: Future regional research projects should build on the successes of the SAFGRAD Project in financing and dissemination of NARS research for the benefit of other countries in the region.

Conclusion: SAFGRAD networking activities have developed professional relationships among scientists across national and language boundaries.

Recommendation: The concept and operating procedures defined by SAFGRAD networks should be supported by African and donor organizations in regional agricultural research programming.

Conclusion: SAFGRAD Networks have been effective and efficient in implementing regional research but need to strengthen interpretation of results and describing their implications for further research and their expected impact on crop production.

3.3. Evaluation

Introduction: The third major component of the research management process is evaluation of the research management system. The effectiveness and efficiency of research planning and implementation is assessed. The quantity and quality of the product of the system (the research findings) is evaluated, as well as the acceptance of the research findings by the beneficiaries. An assessment is made of how well the institution achieved its internal and external goals. From these assessments come modifications in the research management process and adjustments in goals and objectives which produce the research findings.

3.3.1. SCO Evaluation

Analysis: In general, the SAFGRAD Coordination Office has done a great deal to assess the institutional framework and relationships of the SAFGRAD Project operations, but very little to examine the efficiency and effectiveness of the research system or the products of the system.

The SCO sponsored an Internetworks Conference to foster greater coordination of planning, implementation, and evaluation of crop research among the maize, cowpea, and sorghum networks. As a result, the Steering Committees of the Maize, Cowpea, and West & Central Africa Sorghum Networks have established special working groups to develop coordinated crop variety and agronomic research.

The analyses made of the networking system have resulted in strategies for modifications in the structure and management of networks. For example, membership of the Steering Committees has changed from primarily expatriate and IARC scientists to NARS scientists (Steering Committee Reports). Also, the NARS through the Steering Committees have obtained a greater role in directing

the activities of Networks, inclusion of NARS crop varieties in Network trials, and allocation of funds for Network trials and Lead Center research.

The PP proposed that the NARS "take over leadership of the networks". The SCO has developed position and strategy papers and organized the SAFGRAD policy and strategy Committees to debate these issues and recommend a course of action to achieve this objective. Discussions about establishing, managing, and institutionalizing networks revolve around three major issues. One is the Coordinator position itself; the second is management of the network system; and the third is the institutional relationships.

An analysis was made by Hazlewood of the operations and organization of the SCO itself. This analysis concentrated on the functions and staffing of the SCO. The recommendations have not yet been implemented because of insufficient funds and uncertainty about the continuation of the SAFGRAD Phase II Project.

Conclusions: The SCO has facilitated operation of the Networks by organizing policy and strategy reviews of Networks to evaluate the effectiveness and efficiency of the Network structure and organization of Steering Committees. The SCO has been effective in modifying the structure of Networks so that NARS scientists obtained a more effective voice in Network planning of research and distribution of funding of Network trials and Lead Center research. It has been effective in preparing strategy papers and conference reports, in translation of many documents, and in the distribution of documents to NARSs, IARCs, and donors. It has not evaluated the effectiveness of Network output in terms of research results or whether the research results are "accepted" by NARSs or "adopted" by small scale farmers.

Recommendation: The SCO should evaluate the system of research management and the relevance of output to beneficiaries; this evaluation should be a routine annual process involving the SCO, the Oversight Committee, and the Network Coordinators.

3.3.2. Network Coordinator Evaluation

Analysis: Network Coordinators and Steering Committees have done little in terms of self-evaluation of the effectiveness and efficiency of Network planning and implementation nor have they evaluated the acceptance and impact of research findings developed through Network and Lead Center research.

All of the Networks have modified research methodology as increasingly the role of NARS has been expanded through lead center research.

The Networks have brought about increased coordination and sharing of research tasks between the IARC and NARS research programs. Examples of modification of IARC and NARS research agendas include greater emphasis on maize streak research and sharing of responsibility for screening varieties; modification of cowpea variety research to include multi-purpose grain/fodder cowpea varieties; and greater emphasis on Striga screening of cowpea varieties.

The Networks have recognized that most Steering Committees (except for the Cowpea Steering Committee) are dominated by one discipline - plant breeding - and have attempted to change Committee composition to include other disciplines.

Conclusion: The institutional development and relationships in the SAFGRAD Networks has been evaluated; evaluation of the system of research management as followed by the Networks for planning and implementation has not been done.

Recommendation: Evaluation of both the operations and research outputs of the Network should be an annual routine activity of the Network Coordinator with the Steering Committee.

4. SAFGRAD AS AN INSTITUTION

Analysis: The institution responsible for research management in the SAFGRAD Project is the SAFGRAD Coordination Office and the four Network Coordinators who are employed by the IARCs, IITA and ICRISAT. The SAFGRAD Committees of NARS representatives can be considered as a part of the institution insofar as they exercise a participatory role in research management. This evaluation assesses the viability and sustainability of that institution. SAFGRAD is an organized entity in that it has a fixed location for a Coordination Office. There are well defined roles for the SCO, Network Coordinators, the Oversight Committee, the Steering Committees for each of the Networks, and participation by NARS scientists.

The SAFGRAD entity has a defined objective, which is to research food grains production in the semi-arid tropics. The objective of SAFGRAD is not well known outside the institution itself, i.e., outside the actual IARC and NARS participants themselves.

SAFGRAD has human and physical resources such as equipment and vehicles. It has funds from the OAU/STRC and from various donor-funded Projects which it administers.

SAFGRAD can and does produce a product, the research findings for maize, sorghum, cowpea, and millet production in semi-arid areas. It does deliver this product to the NARS of member countries.

The sustainability of SAFGRAD, as it is currently organized, is uncertain because of limited financial support from the political/administrative entity, the OAU Scientific and Technical Research Committee. The preponderance of funds for the SCO comes from external donors, as do all of the funds for technical program staff and their operating costs.

Conclusion: SAFGRAD has established a functioning institution which can administer regional agricultural research. Sustainability of the administrative and program activities depends on funding by the OAU/STRC and external donors. It is unlikely that countries within the semi-arid areas will contribute funds to support SAFGRAD. There are at present no farmer associations or organizations which could provide funding for regional research programs.

Recommendation: The OAU/STRC and donors should consider providing adequate sustained funding for an umbrella institution like SAFGRAD which has a demonstrated capacity to operate regional research networks across national and language boundaries.

5. SAFGRAD TRAINING

Analysis: Training of NARS scientists has been an important past of the network program. Included under the broad rubric of training are monitoring tours and workshops, although they are important techniques for implementation, evaluation, and reporting. A summary of the training, workshops, and monitoring tours, categorized by Network, is shown in Table 3.

The four Networks have conducted nine training sessions with a total of 173 participants (Table 3). Subject matter has ranged from computer analysis to the six-month maize production sessions for maize technicians.

The Networks organized eight monitoring tours with a total of 87 scientist participants. The tours included multi-country visits to evaluate research at lead centers and network trial sites. The Coordinators organized eight workshops with a total attendance of 343 participants. The workshops provided a forum for international and NARS scientists to present reports of research, evaluate progress, and plan. Both monitoring tours and workshops were important in terms of professional contacts established between NARS and IARC scientists. The NARS and IARC scientists interviewed stated that the monitoring tours, along with the workshops, were perhaps the most significant contributions by the Project, because they promoted professional development of NARS scientists and established contacts across national and language boundaries. As a result of these monitoring tours and workshops, many NARS scientists have

maintained contacts for the purpose of exchanging research materials and information.

Training in the Project was frequently cited by NARS and IARC scientists interviewed as one of the most significant contributions to improvement in quality and effectiveness of research. One of the concerns raised by NARS scientists concerned the lack of long term academic training in SAFGRAD Project II. Long term training is perceived as a pressing need if the NARS are to maintain capacity for meaningful research.

Conclusions: NARS scientists have received ad hoc training in areas which promoted effective implementation and analysis of Network research. Monitoring Tours and Workshops have provided opportunities for professional improvement of NARS scientists.

Recommendations: Monitoring Tours, Workshops, and short term training should be an integral part of regional research programming.

6. SIZE AND LOCATION OF NETWORKS

Analysis: There are 26 countries included in the semi-arid areas of Sub-Saharan Africa serviced by SAFGRAD. All eight countries in Eastern Africa are in the sorghum and millet Network. All 18 Countries of West and Central Africa participate in either the maize, cowpea, or sorghum network.

The 26 countries fall into two groups based on long term political associations, development orientation, agro-ecological similarities, and communication linkages.

The Eastern and Southern group of eight countries includes, from the North, Sudan, Ethiopia, and Somalia; continues South through Kenya, Uganda, Tanzania, and Zambia; and ends with the southernmost, Botswana. These eight countries include small, medium, and large NARS. All of the countries except Somalia and Sudan are well linked by telecommunications, roads, and airline routes which facilitates travel and communication. They share a common language.

The West and Central Africa group of 17 countries begins in the Northwest with Senegal, Gambia, and Cape Verde; includes the semi-arid and dry savannah areas of the coastal countries Guinea/Bissau, Guinea/Conakry, Ghana, Ivory Coast, Togo, Benin, Nigeria, and Cameroon; continues North through Central African Republic and Chad; and includes Niger, Burkina Faso, Mali, and Mauritania in the Sahelian area. These 17 countries have NARS ranging in size from small to one of the largest in Africa, Nigeria. Airline routes service most countries regularly. Telecommunications are usually poor and have dissimilar

facilities. There are two common languages - French and English; two countries speak Portuguese. Rail and road routes tend to link groups of countries rather than all countries in the region.

Thus, there are important phases of networking which would be of common benefit. Among these are linkages between the small, medium, and large NARSs. There are large bodies of knowledge in francophone and anglophone countries which could be shared with each other and with lusophone countries. All of the countries would benefit from closer association with IITA and ICRISAT, as well as other IARCs.

Concerning the size of the networks, the only major problem cited by those interviewed in the SCO, Coordinators, IARCs, and NARS, was that there were too many countries for ease of organizing and conducting monitoring tours. However, another problem is that the Coordinators infrequently visited some of the 17 countries which suggests that there are too many countries for adequate monitoring of Network trials. This evaluator would also question whether five Steering Committee members can adequately represent 17 NARSs, especially when the current membership is rotated so infrequently.

Conclusions: The number of countries and types of NARS in the East African Sorghum and Millet Networks comprise an effective and efficient group for the objectives of the Project. The number of countries and communication difficulties in the West and Central Africa area prevent the Coordinator from effectively implementing, monitoring, and evaluating the research program.

Recommendations: The network operations among the 17 West and Central African countries should be divided into two groups such that there would be a mix of small and large NARS and representation of both Anglophone and Francophone countries. One Coordinator could manage two commodity networks among the smaller groupings of countries.

Conclusion: The present system of NARS participation in network planning and evaluation requires too much time out of country for the NARS scientist.

Recommendation: Steering committees should meet annually after the network has been organized and functioning, perhaps in conjunction with other networks or training sessions. Workshops and monitoring tours could be scheduled at the same time on a biennial basis.

7. COST EFFECTIVENESS OF NETWORK OPERATIONS

Analysis: Funds for implementation of the SAFGRAD Phase II Project were budgeted for the SAFGRAD Coordination Office, IITA,

ICRISAT, and an Accelerated Crop Production Officer (see PP Amendment). The two IARCs were responsible for establishing the Coordinators and providing operational funds.

7.1. Expenditures for Lead Centers
Every Network assigned responsibility for some components of Network research to NARS lead centers. A total of 22 lead centers were designated which involved 157 scientists (Table 3). Allocation of funds ranged from $912 to $5,726 per trial (Tables 3-8).

7.2. Expenditures in the Maize and Cowpea Networks
Of the $4,222,148 in the IITA budget for the Maize and Cowpea Networks (Table 4), 69.0% was budgeted for overhead and direct support for the Coordinator's positions and 31.0% for Network activities. The Network activities included the Coordinators' research, Network trials, Lead Center trials, the Steering Committee, Workshops, Monitoring Tours, and Training.

Participating NARS were budgeted 15.7% of the funds for Network research for an average of $904 per Network trial and $912 per lead center trial (Table 5). The two Coordinators were allocated 1.8% each for their Network research.

Each Steering Committee meeting cost $7,289 for the five members to assemble and plan the Network activities.

The Workshops and Monitoring Tours were conducted at an average cost of $31,330 each or $1,264 per participant.

The Training sessions cost $15,604 per session or $1,986 per participant.

7.3. Expenditures in the West and Central Africa Sorghum Network
Of the $1,680,000 in the ICRISAT budget for the West Africa Sorghum Network (Table 6), 69.0% was budgeted for overhead and direct support for the Coordinator's positions and 31.0% for Network activities. The Network activities included the Coordinators' research, Network trials, Lead Center trials, the Steering Committee, Workshops, Monitoring Tours, and Training.

Participating NARS were budgeted 12.9% of the funds for Network research for an average of $396 per Network trial and $2,787 per lead center trial (Table 7). The Coordinator was allocated 1.2% for his Network research.

Each Steering Committee meeting cost $7,599 for the five members to assemble and plan the Network activities.

The Workshops and Monitoring Tours were conducted at an average cost of $99,650 each or $2,402 per participant.

The Training sessions cost $11,942 per session or $1,138 per participant.

7.4. Expenditures in the East Africa Sorghum and Millet Network Of the $1,680,000 in the ICRISAT budget for the East Africa Sorghum and Millet Network (Table 8), 69.9% was budgeted for overhead and direct support for the Coordinator's positions and 30.1% for Network activities. The Network activities included the Coordinators' research, Network trials, Lead Center trials, the Steering Committee, Workshops, Monitoring Tours, and Training.

Participating NARS were budgeted 14.0% of the funds for Network research for an average of $1,240 per Network trial and $5,726 per lead center trial (Table 9). The Coordinator was not allocated any funds for Network research.

Each Steering Committee meeting cost $12,334 for the nine members to assemble and plan the Network activities.

The Workshops and Monitoring Tours were conducted at an average cost of $45,922 each or $919 per participant.

The Training sessions cost $5,470 per session or $244 per participant.

Findings: A significant percentage of Project funds (16%) was allocated for Network research; of these funds, 86% was allocated directly to the NARS.

The Workshops, Monitoring Tours, and Training sessions were conducted at a low cost per participant (average of $1,377).

Only 3.6% of Network funds were allocated to planning/evaluation meetings of the Steering Committees compared to 16% allocated to Network research.

Conclusions: The Project obtained a large amount of research for a small investment.

A large number of NARS scientists - 647 - received professional improvement at a very low cost per scientist.

The Network activities were conducted in an efficient as well as effective manner.

Recommendation: The SAFGRAD Network system of using both Network trials and lead center research should be considered in any future regional agricultural research programming.

8. NARS PARTICIPATION IN MANAGEMENT

Analysis: NARS scientists are involved in SAFGRAD Project management. This involvement is exercised through several committees. These Committees include the Council of NARS Directors, the Oversight Committee, and the Advisory Committees for each of the four Networks. The type and degree of involvement depends on the Committee functions. The Oversight and Network Advisory Committees are directly involved in research management aspects of the SAFGRAD Project. The type and degree of involvement in research management has evolved over the life of the Project.

8.1. Council of NARS Directors

The Council of NARS Directors met biennially to advise on SAFGRAD research policy. The SCO organized the meetings and assisted with preparation and publishing position papers. The budget for these meetings is included in the Project allocation to the SCO (Table 10).

Conclusion: The Council of NARS Directors has performed the role of policy formulation very effectively in biennial meetings.

Recommendation: The Council of Directors should meet every two years to formulate policy and to provide a vehicle for SAFGRAD to maintain effective contact at the highest levels of national research management.

8.2. Oversight Committee

The Oversight Committee involved NARS scientists in SCO studies of SAFGRAD and Network structure and of strategies for involving NARS in research management in the areas of planning, implementation, and evaluation. The effectiveness of the Oversight Committee in guiding SAFGRAD Project policy and planning was measured against the following criteria.

The Oversight Committee discusses and votes on decisions about planning and evaluation of SAFGRAD Project research. The Committee decisions are binding on the SCO and advisory to Network Coordinators.

There is no evidence that the Oversight Committee members do not represent the interests of NARS in the SAFGRAD Project area. NARS Oversight Committee members can be removed by electing someone else to the Committee.

The Committee cannot change the SCO management or Network Coordinators.

Conclusion: The Oversight Committee has been effective in studies of SAFGRAD research planning, implementation, and evaluation activities and in oversight of four semi-independent

research Networks.

The Oversight Committee has effectively performed its role while meeting annually.

Recommendation: The Oversight Committee should continue with its evaluation and advisory role for regional research networks.

The Oversight Committee should not meet more frequently than annually while considering substantive issues.

8.3. Network Steering Committees
Each of the Networks has a Network Steering Committee. The Committee is composed primarily of NARS scientists elected by Network participants. Steering Committee decisions are advisory to the SCO and Network Coordinators. They are implemented within the context of SAFGRAD Project purposes and resources and SCO procedures.

The Steering Committee identifies production constraints and chooses priority problems for Network research. They participate in decisions about objectives, involvement of other institutions and groups, development of the workplan, and allocation of resources. They are involved in implementation, monitoring, and analysis of results, but not in the day-to-day preparation and distribution of trials and results. They are involved only to a limited degree in evaluation of Network accomplishments and their implications for future activities.

Network Committee decisions are binding on Network Coordinators so long as they do not violate SAFGRAD Project purposes and resources, IARC guidelines, and SCO procedures.

All persons interviewed felt that the Network Steering Committees represented the NARSs within the network. There is nothing in Project records and files that would indicate otherwise. NARS members of the Steering Committee can be removed simply by electing someone else to the Committee.

The NARS cannot appoint or remove the Network Coordinators.

Conclusions: Since almost all Steering Committee members are African scientists from NARS, the NARS exercise leadership and management of the Networks. NARS scientists are choosing which research problems will be researched and which institution will do the research. The NARS scientists on Steering Committees are representing other NARS to the extent that they are elected to the Committee and can be replaced in a future election. Steering Committees are apportioning research among regional Network trials and research in NARS lead centers. The SAFGRAD Network system of research management has been effective in involving

NARS scientists in selection of priority crop production constraints and programming resources to regional and national research institutions to conduct effective research on these problems.

Recommendation: The SAFGRAD system of Networking which involves NARS in leadership and management should be supported as an effective and efficient method for regional agricultural research.
The number of Steering Committee meetings should be reduced to one each year after the Networks are organized and functioning.

9. TRANSFERRING LEADERSHIP OF THE NETWORKS TO THE NARS

Analysis: One goal of the SAFGRAD Project is to organize networks of NARS scientists for collaborative research in food grains of the semi-arid tropics (30,35,36). An associated goal is to transfer leadership of the networks to the NARSs.

Five networks have been organized under the leadership of the SCO and the four Network Coordinators. Scientists from the NARS have been involved in this process through two committees - Oversight and Network Steering. Their involvement has been to participate in decisions about research planning implementation, and evaluation.

What types of leadership are required for the NARS to take over leadership of the Networks? Are there any NARS scientists who now have the skills to exercise this leadership? Can the NARS scientists exercise these types of leadership in regional Networks? The principal aspects of leadership of regional research programs is examined below in relation to NARS scientists.

Technical leadership: This type requires the NARS scientist to provide substantive technical subject matter assistance to NARS in other countries. There are now NARS scientists who have the competence and skills to provide technical assistance and they are doing so during monitoring tours, workshops, and arranged visits.

Organizational leadership: This type requires the NARS scientist to plan, implement, and evaluate research. Some NARS scientists are providing the assistance through the policy and Network planning committees

Operational leadership: This type involves operational activities in implementation, monitoring Network trials, and analysis and interpretation of research results. Some NARS scientists are capable of performing these activities, but they do not have the mandate or funding support required to enable

them to devote their time to regional work.

Conceptual leadership: This type involves the ability to analyze the situation and formulate plans for new directions in regional research programming. Some NARS scientists are capable of analyzing and planning as evidenced by their own national program by participation in the SAFGRAD Council of NARS Directors and the Oversight Committee.

Sponsoring leadership: This type requires the ability to initiate, arbitrate, and fund regional research programs. It requires an entity which is recognized and accepted as having the prestige, a disinterested approach, and the ability to obtain funding for programs. None of the NARS have the ability to perform this function within themselves.

Role of the International Agricultural Research Centers: The two IARCs, IITA and ICRISAT followed different approaches in organizing and operating the regional networks in the SAFGRAD Project. For example, the IITA Maize and Cowpea Coordinators involved NARS scientists immediately in Steering Committees which exercised an effective role in guiding the selection of research problems and allocation of responsibility for research, whereas the West African Sorghum Network initially involved primarily expatriate and IARC scientists to endorse regional ICRISAT sorghum varietal trials. All four networks now involve NARS scientists in Steering Committees for planning and implementation of Network trials and lead center research.

IITA, in its ten year strategic plan and in interviews with IITA management at Ibadan, sees a strong role for IITA in international outreach through training, Liaison Scientists and networks. With networks, IITA sees its role as temporary in providing a Coordinator to organize and initially operate a Network; responsibility for the network would be assumed in time by another entity. As described in the Strategic Plan, the objective of the outreach program is to carry out IITA's program. But this is quite rational inasmuch as all the IARCs have an internal program planning process, the TAC, and a Board of Trustees expecting a Center program of work. The Grain Legume Improvement Program at IITA has involved national scientists for several years in its program planning process (source: interviews with Network Coordinators, NARS scientists, and former Director of GLIP).

The ICRISAT Sahelian Center interviews (with the Acting Director and various millet, groundnut, and physiology staff) indicate that ICRISAT would quite willingly assume responsibility for Coordinators for various networks for relevant crops and farming systems. However, prior SAFGRAD experience, the ICRISAT millet network, and interviews suggest that such networks would promulgate ICRISAT's program unless some outside force intervened

to require involvement of NARS scientists throughout the entire research planning and implementation process.

The current SAFGRAD Network Coordinators are employed by IARCs. The two IITA Coordinators for Maize and Cowpeas are housed outside IITA. Both the West and East Africa Sorghum Coordinators are housed in an ICRISAT Sub-Center. What are the advantages and disadvantages of this arrangement? What should the arrangement be if a NARS scientists were selected as Network Coordinator?

The advantages of the Coordinator being employed by the IARC are:
-- Coordinator is considered "international" and not the representative of any one country
-- If located away from the IARC itself, the Coordinator can benefit from the association yet be considered more independent of the IARC
-- Coordinator has greater access to IARC logistic and technical backstopping
-- Greater coordination between IARC and national research programs

The disadvantages of the Coordinator being employed by the IARC are:
-- Coordinator is considered to be subject to some degree to the IARC agenda and research program
-- Research workplans, reports, and finances are delayed by IARC reviews and processing

Conclusions: There are NARS scientists who now have the technical, organizational, operational, and conceptual skills to perform as Network Coordinators. However, a NARS scientist could not perform this role unless employed by an international entity funded independently of the NARS. Such an international entity (OUA/STRC, IARC, INSAH, ECOWAS, SACCAR, etc.) must have a regional agricultural research program mandate and be recognized as having both the prestige and the ability to obtain adequate funding for the purpose.

The Coordinator would have to be recognized for technical competence and perceived as unbiased toward all countries in the Network, whatever the employment affiliation. The Coordinator should be located outside of his Country and NARS. The Coordinator should perform some relevant research with the crops in the semi-arid agro-ecological zone and thus be located in one of the Network countries.

10. INSTITUTIONAL RELATIONSHIPS

Analysis: One of the basic premises of the Project was development of relationships among regional and national institutions.

The SCO developed an organogram to depict the institutional relationships within the SCO and with the Committees and Network Coordinators. After studying the existing relationships in the SAFGRAD Project, a modified organogram was constructed (Table 1) which depicts all of the organizational and institutional entities involved. The management role exercised by each entity is matched with the research management component of the Project which it affects. The institutional relationships within the SAFGRAD Project and associated organizations is analyzed as follows.

The SAFGRAD Coordination Office (SCO) is established by the OAU/STRC which sets policy for the SCO. Funding for the SCO is provided partly by the OAU and USAID. The USAID component includes funds for the participation of NARS representatives on the Council of NARS Directors which sets policy and the Oversight Committee which conducts planning and evaluation studies. The SCO coordinates but does not direct implementation of the Network component of the Project.

Funding for the SAFGRAD is provided from regional AID/Washington funds. The USAID Mission in Burkina Faso has management responsibility for the Project. In that role, the Mission advises on the planning, implementation, and evaluation components of the Project. Because it approves funding, USAID also controls implementation.

The responsibility for implementation of the Networks is assigned to the two International Agricultural Research Centers, IITA in Ibadan and ICRISAT in Hyderabad, India, which employ the four Network Coordinators. The Coordinators are thus responsible for directing Network activities and implementing the workplan. They direct and implement planning and evaluation of all Network research which includes both regional trials and NARS lead center research. The IARCs approve the workplan and reports of the Networks. The IARCs have another role which is advisory, as they provide technical backstopping for Network planning, implementation, and evaluation.

The NARS are also involved through the Steering Committees for each Network. Representatives of the NARSs are elected to the Steering Committee by those NARS scientists which participate in the Network. They exercise a strong advisory, almost directive, role in the planning and evaluation of Network activities.

The NARS participants in the regional trials and lead center research are responsible for implementing research.

Relationships with relevant external organizations are developed and managed both through the SCO and the Coordinators. These include such diverse entities as donors other than USAID, IRAT, the CORAF Maize Network, and other Networks managed by the SCO.

Conclusions: The SAFGRAD coordination Office cannot exercise direction of the SAFGRAD Project; it can exercise influence over research management only to the extent that the Network Coordinators and NARS representatives recognize the professional competence of the Director of Research and the International Coordinator.

The NARS are in a strong position to exercise leadership and influence the direction of the Networks through their advisory capacity on research management.

The IARCs have been involved directly with the NARS in regional agricultural research.

The Network Coordinators are in an excellent position to develop permanent collaborative research and technical support relationships between the IARCs and the NARS.

Recommendations: Any donor project to support regional agricultural research should attempt to simplify the relationship between the donor, the SCO, and the organization responsible for project implementation.

The structured advisory role of the NARS should be retained in future regional agricultural research activities.

Any regional agricultural research activity should include structured involvement of all relevant IARCs.

11. CONCLUSIONS ABOUT PURPOSE AND END OF PROJECT STATUS IN RELATION TO RESEARCH MANAGEMENT

The USAID provided $11.25m in regional funds to support the SAFGRAD Phase II Project. Funds were designated for the SAFGRAD Coordination Office (SCO), Project management and technical assistance, network coordinators, and evaluations.

An effective functioning African coordinating organization has been established which contributes to achieving almost all components in the end of project (EOP) status. However, adequate and continuous financial support for the SAFGRAD institution by the OAU and donors is uncertain.

A SAFGRAD Oversight Committee meets annually to establish goals, analyze the situation, and make plans for the future. Four collaborative research networks (West Africa Sorghum, East Africa Sorghum/Millet, and West Africa maize and cowpeas) are operating. Network research is planned annually, allocated to Network trials and lead centers, and implemented by the Coordinators and NARS. However, explicit long term objectives and short term targets for research problems have not been explicitly stated.

The results from a small percent of the trials are not returned by some NARS. Trials are analyzed but not adequately interpreted nor are the implications for future research and farmer impact assessed. The system of research management has not been periodically evaluated. The network planning meetings are augmented by workshops and monitoring tours which facilitate exchange of research information and materials, increase dialogue between anglophone and francophone scientists, and focus efforts toward common goals. The "lead centers" in the NARS have been established to conduct research on special problems which is additional and complementary to IARC research. Several varieties of all four crops have been accepted by the NARS, and, of those accepted, some have been released to farmers. However, very little crop and soil management research has been conducted. Both IITA and ICRISAT have participated in network planning and provided technical support for training and monitoring tours. However the level of backstopping should be increased especially in the areas of monitoring research and analyzing and interpreting results.

It is not clear that network research priorities are included as priority research in the NARS. What has happened is that the NARS have modified portions of the research agenda of the IARCs toward crop varieties which are more relevant to farmers in the semi-arid zone. The IARCs are providing more effective support for the small NARS research programs in terms of materials and technical backstopping. Effective linkages have been established with the Southern Africa (SADCC) sorghum network. Leadership has been exercised by the SCO and the Cooordinators in an apolitical manner. However, it is unlikely that the SAFGRAD Coordination Office and Network Coordinators will continue without additional OAU and donor support. Strategies have been developed by the SCO for the network system and for the evolving relationships among the NARS, IARCs, and the SCO, but this has not developed into significant diversity of donors or financial support for the SAFGRAD Project and the research Networks either at regional or national levels. The SCO needs to improve subject matter documentation and develop wider contacts to inform those outside SAFGRAD about the achievements.

In terms of achieving the Project Purposes, commodity research networks have been formed and they have operated effectively to plan, implement, and coordinate research among the NARSs and with the IARCs. The service capacity of the SCO has been strengthened in terms of organizational and institutional plannning and in facilitating NARS participation in networking between countries and with the IARCS. While the SCO has generated some additional donor support for other networks, the sustainability of the SCO and the SAFGRAD food grain research Networks appears uncertain.

A system of research management has been established under this Project which is effective and efficient in planning and

1) 232 500

2) 250 518,75

3) 269 933,95

4) 290 853,83

5) 313 395

	3 000 000
232 500	3 232 500
250 518,75	3 483 018,75
269 933,95	3 752 952,7
290 854,83	4 043 806,53
313 395	4 357 201,53

implementing regional food grains research through network trials and national lead center research on special problems. The system has not developed explicit statements of long and short term objectives or estimated the economic impact of research; the interpretation and implications of research results have not been adequately examined. Nonetheless, some improved varieties have been accepted by National Research Systems and adopted by farmers. And professional relationships between scientists across national and language boundaries have been institutionalized. Coordination between IARC and National research programs has also significantly improved.

The SAFGRAD Project has demonstrated that regional agricultural research in food crops can be organized and conducted effectively and that it can generate research results which can and will be utilized by National systems. Regional agricultural research should be continued under a internationally accepted "umbrella" organization. Regional research should utilize a system similar to that developed by the SAFGRAD Project which focuses on coordinated subject matter research by National and IARC organizations with the full participation from the beginning of the planning process by both National and IARC scientists. The SAFGRAD Project has demonstrated two other major benefits which should be further strengthened. One benefit is the building of professional relationships between scientists across national and language boundaries; this suggests continued involvement of anglophone, francophone and lusophone countries in any regional research activity. The other major accomplishment is the development of professional relationships between National and IARC scientists which has significantly increased coordination of research programs and improved evaluation of research results. This has been especially beneficial to small NARS. Thus, regional networks should include small, medium, and large NARS, as well as the relevant IARCs.

Table 1: Description of the Research Management Relationships between Entities Involved in the SAFGRAD Phase II Project

Institutional Component	Role	Component of Research Management
OAU/STRC	Advises	Policy
SCO	Coordinates	Policy/Planning/ Evaluation
	Implements	Policy
USAID	Advises	Policy/Planning/ Evaluation
	Controls/Directs	Implementation & Financial
IARC	Directs	Implementation
NARS-Council of Directors	Advises	Policy
NARS-Oversight Committee	Advises	Planning/Evaluation
NARS-Steering Committee	Advises	Planning/Implementation
Network Coordinator	Directs/Implements	Planning/Workplan/ Evaluation
NARS	Implements	Workplan
IARC	Advises	Technical backstopping -Planning -Workplans -Evaluation

Table 2: Summary of NARS Lead Centers Involved in SAFGRAD Network Research

NETWORK	NUMBER OF NARS LEAD CENTERS	NUMBER OF NARS SCIENTISTS
MAIZE	6	40
COWPEA	6	37
SORGHUM WEST/CENTRAL	5	35
SORGHUM/MILLET EAST/SOUTHERN	5	45
TOTALS	22	157

Source: Highlights of SAFGRAD Network Activities. Mar 1991. Unpublished Paper. SCO. Ouagadougou.

Table 3: Summary of SAFGRAD Network Activities in Workshops, Monitoring Tours, and Training

ACTIVITY	N E T W O R K				
	MAIZE	COWPEAS	SORGHUM WEST/C	SORGHUM/ EAST/S	TOTAL PART.
Workshops					
Participants	73	72	48	150	343
Countries	17	18	48	12	--
Monitoring Tours					
Participants	18	18	34	27	97
Countries	14	15	11	7	--
Training					
Participants	22	44	27	80	173
Countries	10	17	11	80	--
-Total Participants	113	134	109	257	613

Source: Highlights of SAFGRAD Network Activities. Mar 1991. Unpublished Paper. SCO. Ouagadougou.

Table 4: Summary of the Combined Budgets for the Coordinators of the SAFGRAD Maize and Cowpea Networks

BUDGET ITEM	COST (US$)	AS PERCENT OF MAIZE/COWPEA BUDGET	
Coordinator support	2,600,348	61.6	
Overhead	311,346	7.4	
Sub-total	2,911,694		69.0
Steering Committee Meetings	140,915	3.3	
Workshops/Tours	313,299	7.4	
Training	109,232	2.6	
Coordinator Research for Network	75,229	1.8	
Network Lead Country trials	141,286	3.3	
Network trials	530,493	12.6	
Sub-total	1,310,454		31.0
TOTAL	4,222,148		100.0

Table 5: Breakdown of Costs for the Various Activities of the SAFGRAD Maize and Cowpea Networks

STEERING COMMITTEE MEETINGS:
Total cost - $140,915
Percent of total budget - 3.3%
Number conducted - 18 Cost/meeting - $7,289

WORKSHOPS/TOURS:
Total cost - $313,299
Percent of total budget - 7.4%
Number held - 10 Cost/event - $31,330
Number participants - 248 Cost/participant- $1,264

TRAINING:
Total cost - $109,232
Percent of total budget - 2.6%
Number held - 7 Cost/event - $15,604
Number participants - 55 Cost/participant- $1,986

COORDINATORS RESEARCH FOR NETWORKS
Total cost - $75,229
Percent of total budget - 1.8%

WORK SUPPORT FOR LEAD COUNTRY TRIALS:
Total cost - $141,286
Percent of total budget - 3.3%
Number conducted - 155 Cost/trial - $912

SUPPORT FOR NETWORK TRIALS:
Total cost - $530,493
Percent of total budget - 12.6%
Number conducted - 587 Cost/trial - $904

Table 6: Summary of the Budget for the Coordinator of the SAFGRAD West African Sorghum Network

BUDGET ITEM	COST (US$)		AS PERCENT OF SORGHUM BUDGET	
Coordinator support	1,033,810		61.5	
Overhead	125,871		7.5	
Sub-total		1,159,681		69.0
Steering Committee Meetings	60,787		3.6	
Workshops/Tours	199,350		11.9	
Training	109,232		2.6	
Coordinator Research for Network	19,588		1.2	
Network Lead Country trials	101,784		6.1	
Network trials	114,927		6.8	
Sub-total		520,318		31.0
TOTAL		1,680,000		100.0

Table 7: Breakdown of Costs for the Various Activities of the SAFGRAD West African Sorghum Network

STEERING COMMITTEE MEETINGS:
Total cost - $60,787
Percent of total budget - 3.6%
Number conducted - 8 Cost/meeting - $7,599

WORKSHOPS/TOURS:
Total cost - $199,350
Percent of total budget - 11.9%
Number held - 2 Cost/event - $99,650
Number participants - 83 Cost/participant- $2,402

TRAINING:
Total cost - $23,883
Percent of total budget - 1.4%
Number held - 2 Cost/event - $11,942
Number participants - 21 Cost/participant- $1,138

COORDINATORS RESEARCH FOR NETWORKS
Total cost - $97,938
Percent of total budget - 1.2%

NETWORK SUPPORT FOR LEAD COUNTRY TRIALS:
Total cost - $101,784 budgeted; $44,589 expended thru May 7, 1991
Percent of total budget - 6.1%
Number conducted - 16 Cost/trial - $2,787

SUPPORT FOR NETWORK TRIALS:
Total cost - $114,927
Percent of total budget - 6.8%
Number conducted - 290 Cost/trial - $396

Table 8: Summary of the Budget for the Coordinator of the SAFGRAD East African Sorghum and Millet Network

BUDGET ITEM	COST (US$)		AS PERCENT OF SORGHUM BUDGET	
Coordinator support	903,958		62.4	
Overhead	109,000		7.5	
Sub-total		1,012,958		69.9
Steering Committee Meetings	74,000		5.1	
Workshops/Tours	137,764		9.5	
Training	21,880		1.5	
Coordinator Research for Network	-0-		-0-	
Network Lead Country trials	84,416		5.8	
Network trials	118,982		8.2	
Sub-total		437,042		30.1
TOTAL		1,680,000		100.0

Table 9: Breakdown of Costs for the Various Activities of the SAFGRAD East Africa Sorghum and Millet Network

STEERING COMMITTEE MEETINGS:
Total cost - $74,000
Percent of total budget - 5.1%
Number conducted - 6 Cost/meeting - $12,334

WORKSHOPS/TOURS:
Total cost - $137,764
Percent of total budget - 9.5%
Number held - 3 Cost/event - $45,922
Number participants - 150 Cost/participant- $919

TRAINING:
Total cost - $21,880
Percent of total budget - 1.5%
Number held - 4 Cost/event - $5,470
Number participants - 90 Cost/participant- $244

COORDINATORS RESEARCH FOR NETWORKS
Total cost - $0
Percent of total budget - 0%
Number conducted - 0 Cost/trial - $0

NETWORK SUPPORT FOR LEAD COUNTRY TRIALS:
Total cost - $84,416
Percent of total budget - 5.8%
Number conducted - 16 Cost/trial - $5,726

SUPPORT FOR NETWORK TRIALS:
Total cost - $118,982
Percent of total budget - 8.2%
Number conducted - 96 Cost/trial - $1,240

Table 10: Summary of the SAFGRAD Project Budget for the SAFGRAD Coordination Office Budget

BUDGET ITEM	COST (US$)	AS PERCENT OF SCO BUDGET	
Meetings of Council of NARS Directors	133,733	5.2	
Meetings of Oversight Committee	113,525	4.4	
Internetworks Conference	80,300	3.1	
Training & Research Scheme	17,004	0.7	
ACPO Workshop	49,785	1.9	
ACPO Evaluation	36,063	1.4	
Sub-total	430,410		16.7
Other SCO Costs	2,142,890	83.3	
TOTAL	2,573,300		100.0

APPENDIX 1: TRAVEL AND ORGANIZATIONS VISITED DURING THE EVALUATION

DATES	COUNTRY	ORGANIZATIONS
May 15-18	Washington, D.C.	AID/Washington AFR/TR/ANR & S&T/AGR
May 20-25	Ouagadougou, B.F.	USAID/Burkina Faso SAFGRAD Coordination Office SAFGRAD Network Coordinators
May 27-29	Bamako, Mali	SAFGRAD Network Coordinator IER - NARS Director IER - NARS Scientists ICRISAT Research Station USAID/Mali IRAT - ICRISAT Station
May 30-Jun 6	Ouagadougou, B.F.	USAID/Burkina Faso SAFGRAD Project Personnel
June 7-9	Ibadan, Nigeria	IITA Management IITA International Program IITA Maize Program IITA Grain Legume Program IITA Liaison Scientist
June 10	Lagos	USAID/Nigeria OAU/STRC
June 11-12	Niamey, Niger	ICRISAT Sahelian Center USAID/Niger
June 13	Abidjan, I.C.	USAID REDSO/WCA
June 14-15	Conakry, Guinea	IARG - NARS Director IARG - NARS Scientists
June 17-20	Ouagadougou, B.F.	SAFGRAD SCO SAFGRAD Network Coordinators
June 21	Bobo-Diolasso, B.F.	INERA - NARS Scientists
Jun 22-Jul 1	Ouagadougou, B.F.	Prepare Evaluation Report Review with USAID Review with SAFGRAD Project Personnel

APPENDIX 2: ISSUES ASSESSED WITH COORDINATORS OF SAFGRAD NETWORKS, NARS DIRECTORS, NARS MEMBERS OF SAFGRAD OVERSIGHT AND STEERING COMMITTEES, AND NARS NETWORK SCIENTISTS

Concerning SAFGRAD Project-Phase II between 1986 and 1991--

1. How has the method of planning network research changed?

2. How does the network identify the priority researchable problems?

3. How has the role of the NARS scientists changed?

4. How has SAFGRAD affected the method of planning and content of the research program of the NARSs? How would the research program of the NARS be different now if SAFGRAD had not existed?

5. How has SAFGRAD affected the method of planning and content of the research program of the IARCs? How would the research program of the IARCs be different now if SAFGRAD had not existed?

6. Does each network trial include a long term qualifiable and quantifiable objective and an annual target? Are trial results analyzed, interpreted, and reported in a written form with implications for adoption by farmers and for future research?

7. What are technologies which have been accepted by NARSs? Adopted by farmers?

8. How has the content of network trials changed? Have the network trials contained other than variety evaluation?

9. Are variety trials monocrop only or are there any intercrop trials?

10. Where do the entries for the trials come from?

11. How has this network trained NARS researchers? Ad hoc? Short term?

12. What has been the effect of "Lead Centers" in the NARS?

13. Concerning number of countries in the network--
Are there too many? Too few? About right? Why?

Concerning SAFGRAD Project-Phase II between 1986 and 1991--

14. Are the network coordinators located in the proper places in relation to the network countries? To the SCO?

15. Has the SCO been effective in providing technical and

logistic support to the Coordinator?

16. What percent of time does the Coordinator spend on research?

17. Are there any scientists in the NARS who now have the skills to act as network coordinators?

18. Who are five people involved in any part of the network (other than the SCO) who can provide information about this network?

FOR THE IARCs, THE ABOVE 18 POINTS PLUS TWO ADDITIONAL POINTS:

19. How has SAFGRAD coordinated network activities with other relevant networks operated by the IARCs and other donor organizations?

20. What will be the direction and content of regional research programming during the next 5-10 years?

APPENDIX 3: ISSUES ASSESSED WITH USAIDs, THE SAFGRAD COORDINATION OFFICE, AND THE OAU/STRC:

Concerning SAFGRAD Project-Phase II between 1986 and 1991--

1. How has SAFGRAD affected the method of planning and content of the research program of the NARSs? How would the research program of the NARS be different now if SAFGRAD had not existed?

2. How has SAFGRAD affected the method of planning and content of the research program of the IARCs? How would the research program of the IARCs be different now if SAFGRAD had not existed?

3. What are technologies which have been accepted by NARSs? Adopted by farmers?

4. How has the content of network trials changed? Have the network trials contained other than variety evaluation?

5. How has this network trained NARS researchers? Ad hoc? Short term?

6. What has been the effect of "Lead Centers" in the NARS?

7. Concerning number of countries in the network--
Are there too many? Too few? About right? Why?

8. Are the network coordinators located in the proper places in relation to the network countries? To the SCO?

9. Has the SCO been effective in providing technical and logistic support to the Coordinator?

10. Are there any scientists in the NARS who now have the skills to act as network coordinators?

11. Who are five people involved in any part of the network (other than the SCO) who can provide information about this network?

12. How has SAFGRAD coordinated network activities with other relevant networks operated by the IARCs and other donor organizations?

13. What will be the direction and content of regional research programming during the next 5-10 years?

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Appendix 8

Persons and Organizations Contacted

PERSONS AND ORGANIZATIONS CONTACTED

EVALUATION OF SAFGRAD PROJECT - PHASE II

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MENYONGA, Joseph M., International Coordinator

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MULEBA, Nyanguila, West and Central Africa Cowpea Research Network (RENACO), Ouagadougou
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COUNCIL OF NARS DIRECTORS

GOITA, M., Director General, IER, Bamako, Mali
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OVERSIGHT COMMITTEE

DA, SanSan, INERA Cereals Program Leader and Sorghum Breeder, Bobo-Diolasso; member of the WCASRN Steergin Committee
EMECHEBE, A.M., Dean, Ahmadu Bello University and Cowpea Pathologist, IAR, Samaru, Nigeria
MARFO, K.O., Cowpea Breeder, Nyankpala Agricultural Research Station, Tamale, Ghana

Not OC Member

NETWORK STEERING COMMITTEES

EARSAM

KEBEDE, Yilma, Sorghum Breeder and Former Chair, Addis Ababa

RENACO

GUILAVOGUI, National Coordinator for Cowpea Research, Entomologist, Foulaya Agriculture Research Station, Kindia

WCASRN

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CAMEROON

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SOUARE, Kaba, Director of Foulaya Center for Agriculture Research, Kindia

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MATATA, Y. Assistant Director Agricultural Research, KARI, Nairobi
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MALI

COULIBALY, N., Maize Agronomist, IER, Sotuba Research Station, Bamako
DIAMOUTENE, Dotianga, Deputy Director General, IER, Bamako, Formerly on the Council of NARS Directors
DOUMBIA, Yacouba O., Entomologist, IER, Sotuba Research Station, Bamako, Principal Investigator of the WCASRN Project head bugs
NIANGOADO, Oumar, Millet Breeder, IER
TRAORE, Karim, Sorghum Breeder, IER

NIGER

BAWA, Saidou, Director General, INRAN, Niamey
CLARK, John, INRAN, Niamey, Niger
KOLLO, Issafou, Cereals Pathologist, INRAN
MAIGA, S., Cereals Entomologist, INRAN
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INTERNATIONAL AGRICULTURAL RESEARCH INSTITUTES

INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE (IITA)

BRADER, Lucas, Director General
DASHIELL, Ken, Actg. Director, Grain Legume Improvement Program (GLIP)
DEGANUS, Emmanuel, Coordinator for Special Projects, International Cooperation Office
ECKEBIL, J.-P., DDG for International Cooperation
FLORINI, Diane, Plant Pathologist, GLIP
GASSER, Director, Training, International Cooperation Office
MESFIN, Theodros, Entomologist, GLIP
SUH, Joseph B., IITA Liaison Scientist, International Cooperation
WINSLOW, Mark D., Director, Maize Research Program

INTERNATIONAL CENTER FOR RESEARCH IN THE SEMI-ARID TROPICS, (ICRISAT)

ICRISAT Sahelian Center, Sadore, Niamey, Niger
GIBBONS, Ron, Director
NDUNGURU, Bruno J., Team Leader for Agronomy, Groundnut Improvement Program
OKIROR, Shad O., Regional Trial Officer, Regional Millet Breeding, Pearl Millet Improvement Program, Coordinator for the ICRISAT Millet Network
RENARD, C., Acting. Center Director and Team Leader, Resource Management Program
WILLIAMS, J.H., Principal Physiologist, Resource Management Program

ICRISAT Research Center, Samanko, Bamako, Mali
LUCE, Claude, Sorghum Breeder, IRAT Sorghum Team
RATNADASS, Alain, Entomologist, IRAT Sorghum Team
SALEZ, Patrick, Sorghum Agronomist/FSR, Bamako

CIRAD/IRAT/CORAF

CHAREAU, Claude, Director General, IRAT, Nogent-sur-Marnes
DUBREVIL, Pierre, Director, International Organizations, CIRAD, Paris
GUIS, Roland, Director, International Relations, CIRAD, Paris

USAID

ATWOOD, David, ADO, USAID/Bamako
ATWOOD, Tracy, Chief, Agricultural Development Office, USAID/Bamako

DeBOSE, Charles, Chief, Project Develpment Office, USAID/REDSO, Ivory Coast
EDWARDS, Rich, ADO, USAID/REDSO/East, Nairobi
GILBERT, Frederick, Director, USAID/REDSO, Abidjan, Ivory Coast
GINGRICH, James, ADO, USAID/Nairobi
HAYNES, Steve, Deputy, ADO USAID/Niamey
KINGMA, Jerry, SAFGRAD Project Advisor
McCARTHY, Dennis, Agriculture Development Office, OAR/Burkina Faso
MITCHELL, John, ADO, USAID/Niamey
REDDY, S.K., RDO, USAID/Conakry
TADESSE, Kibraei, Agriculture Project Manager, USAID/Bamako
TAYLOR II, George, Chief, Agricultural Development Office, USAID/Niamey

OTHERS

SINGH, S.R., West Africa Department, IBRD, Washington, D.C. (formerly Director of GLIP at IITA)

Appendix 9

SAFGRAD II

Project Paper Amendment

Financial Plan

and

Log Frame

PROJECT PAPER AMENDMENT
REVISED PROJECT FINANCIAL PLAN
SAFGRAD II (698-0452)

COMPONENTS	RES.* YR. 1	NETWK.* YR. 1	NETWK. YR. 2	NETWK. YR. 3	NETWK. YR. 4	NETWK. YR. 5	NETWK. TOTALS	GRAND TOTALS
1. ICRISAT West Africa Sorghum Collaborative Research Network	175,270	267,450	315,100	283,811	315,503	307,681	1,489,545	1,664,815
East Africa Sorghum/Millet Collaborative Research Network	157,270	266,650	240,560	248,807	271,570	275,069	1,302,656	1,459,926
ICRISAT SUB-TOTAL	332,540	534,100	555,660	532,618	587,073	582,750	2,792,201	3,124,741
2. IITA Cowpea Collaborative Research Network	325,676	306,500	332,198	292,627	321,086	311,541	1,563,952	1,889,628
Maize Collaborative Research Network	563,514	302,750	339,014	317,677	326,746	338,471	1,624,658	2,188,172
IITA SUB-TOTAL	889,190	609,250	671,212	610,304	647,832	650,012	3,188,610	4,077,800
3. Safgrad Coordiation Office (SCO)	-	361,572	374,208	360,000	432,300	456,700	1,984,780	1,984,780
Safgrad, Dir. Res and Financial Controller	-	-	-	67,000	150,000	164,000	381,000	381,000
SCO SUB-TOTAL	-	361,572	374,208	427,000	582,300	620,700	2,365,780	2,365,780
4. Project Management Requirements	-	230,000	220,000	220,000	175,000	155,000	1,000,000	1,000,000
5. Evaluation and Audit	-	-	100,000	-	-	130,000	230,000	230,000
6. Accelerated Crop Production Officer Program (ACPO)	-	275,000	75,000	-	-	-	350,000	350,000
7. Inflation/Contingency	-	-	-	-	-	101,678	101,678	101,678
GRAND TOTALS	1,221,730	2,009,922	1,996,080	1,789,922	1,992,205	2,240,140	10,028,269	11,250,000

* RES. = RESEARCH
NETWK. = NETWORKS

SA[illegible]RL [illegible] (698-0[illegible]2)

REVISED LOGICAL FRAMEWORK MATRIX

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
PROGRAM OR SECTOR GOAL: To increase the productivity and production of maize, sorghum, millet, and cowpeas among small scale producers in the SAFGRAD member and cooperating countries.	MEASURES OF GOAL ACHIEVEMENTS: • Increased yields • Increased production • Increased adoption of improved technologies.	• Government statistics	• Increased allocation of national resources to research and extension; • Availability of needed inputs and credit; • Incentive price policies.
PROGRAM PURPOSE: To increase the efficiency and effectiveness of agricultural research on identified staple food crops in the SAFGRAD region by: • Strengthening commodity to plan, broaden their base of support and make productive use of resources; and • Strengthening the service capacity of the OAU/STRC/ SCO to facilitate the NARSs participation in networking and obtain internal and external support for national research programs to accomplish this purpose.	EOP STATUS: CONDITIONS TO INDICATE ACHIEVEMENT: Effectively operating collaborative research networks (West Africa sorghum, East Africa sorghum/ millet, maize and cowpeas starting in West and Central Africa) which operate by the following criteria: • Establish common goals; • Leadership by an apolitical entity with continunity; • Policy set by advisory committee of researchers; • Conducts at least annual meetings to identify objectives, technical problems, review past research, and plan future research; • Effective linkage to Southern Africa sorghum/millet network • Effective functioning Service • Oversight Committee established; • Analyzes and plans for the future • Facilitates information exchange on research.	• Annual Reports • Attendance at oversight meetings; • Attendance at network meetings; • Reports from country missions; • Information from SCO, networks and NARSs.	• All interested parties willing and able to participate; • NARSs actively participating and eventually willing and able to assume leadership; • IARCs willing to assume leadership roles and operate networks in participating manner; • Improved prioritizations of research work by NARCs through participation in the networks.

SAFGRAD 11 (698-0452)
REVISED LOGICAL FRAMEWORK MATRIX

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
INPUTS: USAID SCO • Salaries and allowances; • Technical assistance; • Operations; • Capital.	LEVEL OF EXPENDITURE: $2,365,781	• Reports by SCO and Oversight Committee	• IITA and ICRISAT to be willing to coordinate • NARSs continue to support project an provide for national program resources.
• Project Management and Long-Term Technical Assistance.	$1,000,000	• Reports by IITA, ICRISAT and others.	
• Evaluation and Audit.	$230,000	• Evaluations • Final reports	• AID funding available
NETWORKS for sorghum, millet, maize and cowpeas: • Salaries and allowances; • Operations; • Overhead; • Capital.	$7,202,541		
Accelerated Crop Production Officer.	$350,000		
Inflation and Contingency.	$101,678		
TOTAL	$11,250,000		
COUNTRY INPUTS: National Program Expenses OTHER DONOR INPUTS: • IFAD			

SAFGRAD II (698-0452)
REVISED LOGICAL FRAMEWORK MATRIX

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
OUTPUTS: • An effectively functioning African Coordinating Organization; • SAFGRAD Oversight committee meets annually; • Research for network reviewed and evaluated annually; • Future research activities identified, planned and allocated among participants; • In-country research implemented by NARSs; • Varieties released and cultural practices recommended; • Responsive technical backstopping by IITA and ICRISAT; Network priorities are reflected in NARS decision-making; • Opportunities for the future donor support at regional and national levels clarified.	MAGNITUDE OF OUTPUTS: • Annual Meetings of Oversight Committee provides guidance for IARCs; • Annual meetings of scientists, monitoring tours and advisory committee meetings; • Network planned agronomic trials; • Relevant varieties released in each commodity crop, based upon thorough testing and cultural practices.	• Reports by SCO, ITTA, and ICRISAT. • Monitoring of SAFGRAD and network meetings. • Visits to and data from NARSs; • Visits to and data SCO, IITA, and ICRISAT.	• Able leadership in Africa Regional Coordination and coordinators; • NARSs willing to review plan, and allocate research responsibilities; • NARSs will fund in-country research costs; • IARCs, CRSPs, and AID directly-managed centrally funded projects will interact responsibly with NARSs; • Technologies will be developed, involving improved multi-disciplinary participation

Appendix 10

SAFGRAD II

Final Project Evaluation

Scope of Work

Final Project Evaluation
of the
Semi-Arid Food Grains Research and Development Project
(SAFGRAD)
Project No. 698-0452.

Scope of Work

OBJECTIVE

To provide an Evaluation of the Semi-Arid Food Grain Research and Development (SAFGRAD) Project No. 698-0452. Its purpose is to examine how and to what extent the delivery of project inputs are leading to the achievement of desired outputs, and whether the outputs are contributing to the progressive attainment of the project's goals and purposes. The objective of this evaluation is to determine if the project has met it's objectives as stated in the Project Paper and Amendments and if there is a need for a follow-on Phase and, if so, what the follow-on Phase objectives might be.

STATEMENT OF WORK

Team Composition.

The Evaluation Team will be comprised of three external evaluators and a resource person. The external evaluators, to be supplied under contract, will include an Agricultural Research Management Specialist, a Plant Breeder/Agronomist and a Team Leader. The resource person, knowledgeable about the project and acquainted with the West and Central African NARS, will be supplied by REDSO/WCA, and will assist the evaluation team in addressing the critical issues of the evaluation especially those pertaining to the follow-on phase. Qualifications of external evaluators and summary Scopes of Work follow.

Qualifications.

Team Leader - M.Sc. degree required, Ph.D. preferred, in an agriculture-related field. A minimum of ten years of experience in managing a public or private agricultural research institution. Sub-Saharan Africa experience strongly desired. Prior experience as Team Leader for evaluations of USAID agricultural research projects preferable. French language proficiency required at S3-R3 level.

Specific Tasks.

The Team Leader will be responsible for analyzing and reporting on the issues outlined in Section III(see also Reporting Requirements - Section E). He/she also will be responsible for identifying any major constraints which impeded project implementation and precluded attainment of project objectives, distinguishing between those which were critical to successful achievement and those which were not. He/she will also make recommendations for the proposed follow-on project (Phase III) in light of information identified during this evaluation. He/she

will be responsible for allocating specific tasks and issues to be evaluated to the Plant Breeder/Agronomist and Agricultural Research Management Specialist.

In addition, the Team Leader will be required to look into the economic sustainability of the operations of SCO and the cost effectiveness of network research operations, and assess the institutional aspects of implementation of the research under the networks. He/she will pay special attention to the project strategy, activities and outputs, and the future of agricultural research in the absence of external funding.

Evaluation Methodology and Procedures.
The Evaluation Team will report to the USAID Director or his nominee and will be under the technical guidance of the Chief of the Agricultural Development Division, USAID/Burkina. The Team Leader will serve as the spokesperson for the team.

A. This evaluation is expected to take up to six six-day weeks. Any changes deemed necessary in the scope of work will be made at the time of finalization of work plans. Following a thorough eview of the project documents, the team will meet with the three network coordinators and OAU/SAFGRAD officials. The proposed work plan and travel itinerary will be developed during the first three days of the team's arrival in consultation with the network coordinators and the SAFGRAD coordinator, and will be approved by USAID/Burkina. The first week will be devoted to developing work plans, travel itinerary, discussions with coordinators, SCO and USAID, and study of relevant documents.

B. The evaluation will be based on the following:

1. Review of documents and progress reports pertaining to the four research networks and their management structures.
2. Discussions with network coordinators, participating IARC representatives (IITA, SAFGRAD), USAID management, and OAU/SAFGRAD coordinator.
3. Site visits to selected NARS, meetings and discussions with national researchers especially those involved in the network management structures, e.g., Steering Committees, Oversight Committee and Council of Directors of Agricultural Research.
4. The team will identify not more than five (5) NARS (excluding Burkina Faso) for site visits, including two from the East African sorghum and millet network. In consultation with USAID and SCO, the five NARS will be selected for site visits based on the magnitude of their involvement in network activities, strength of the national research system and the limitations of available time. During the visits to NARS, the team should make every effort to contact the FSR units or their equivalent to make a windshield assessment of the extent to which research under the networks is linked with on-farm testing and technology transfer.

Specific Issues to be Addressed.
As stated in Article II (Objective) the main purpose of this final evaluation is to determine if the project has met it's objectives as stated in the Project Paper and Amendments and if there is a need for a follow-on Phase. Design features and ideas of a possible follow-on phase must emerge from a thorough and critical analysis and evaluation of the main elements of the present project. These elements include project purpose and activities, effectiveness of implementation, delivery of project inputs, achievement of desired outputs, and whether the project activities and resulting outputs have contributed to the progressive attainment of the project goal and purposes.

Therefore, proceeding from (a)an analysis of the stated goal, purpose, activities undertaken, inputs provided, and outputs achieved to date, and (b)information gathered in the course of discussions with beneficiaries (National Research and Extension Systems and farmers' groups), the Evaluation Team will provide an objective assessment of the project's significant achievements or lack of achievements, and will make specific recommendations and guidance regarding the need for a follow-on phase to the project.

The Evaluation Team will address the following specific issues and any other issues the team considers relevant to fulfilling the Scope of Work.

1. To what extent network activities have achieved the project purpose to (a)increase the efficiency and effectiveness of agricultural research and production techniques for sorghum, millet, maize, and cowpeas in semi-arid Africa, and (b)improve the service capacity of regional and national institutions to assist with the efforts.

2. Assess the extent to which planned outputs (refer to Project Logical Framework) have been achieved and identify the reasons for any shortfall in the achievement of outputs.

3. Assess the effectiveness of the operation of research networks in terms of:

(a)participation by NARS in the management structures of networks;

(b)relevance of research agenda pursued by the networks to the crop production systems in the participating countries;

(c)extent of technology transfer from IARCs to NARS and among the NARS themselves, facilitated by networks and the extent to which networks are relying exclusively on technologies/varieties coming out of IARCs and their collaborating entities;

(d)the extent to which networks have promoted a balanced approach to development and transfer of improved germplasm and agronomic/crop management techniques (including soil-water management aspects);

(e)the extent to which networks have succeeded in improving

the relevance of the research agenda of participating IARCs to make the technology development more responsive to on-farm production needs.

4. An important concern of USAID management has been the extent of inter- and intra-network coordination. While the networks have been organized on a commodity basis, small farmer production systems in Africa continue to be highly mixed cropped and inter-cropped. Almost all the varietal improvement programs are predicated on the productivity of mono-cropping systems under a high level of management. Therefore, an assessment is needed of the extent to which various issues pertaining to the improvement of inter-cropping have been addressed through inter-network coordination.

5. Role of SCO: Critically assess the role of SCO in facilitating the operation of networks in terms of:

(a) administrative, logistical support and liaison with NARS;

(b) effectiveness of SCO (and the Director of Research) in technical coordination and contributions to better conceptualization of production problems, needed research, and testing;

6. Sustainability of SCO: Assess the sustainability of SCO operations in terms of:

(a) financial sustainability of SCO operations in view of the continuing dependence of SCO on project funds to sustain its operations; and

(b) the extent of SCO operations/activities not related to the operations of networks, and thus the potential use of project-provided resources for activities unrelated to networks.

In view of 5. and 6. above, make recommendations as to the (a) future role of SCO in facilitating network operations; (b) basis of project support, if any, to be provided to SCO (including arrangements such as cost sharing with OAU/STRC, fixed fee or actual costs plus a predetermined overhead, etc.; and (c) alternate arrangements, if any, for facilitating network operations.

7. Location of Networks: Assess the issue of location of West African network coordinators (maize and cowpeas in Ouagadougou and sorghum in Bamako) and their effectiveness or lack of it in communicating and coordinating with participating NARS. Are there any significant differences in their effectiveness since two of them are located at the same place as SCO thus receiving greater support, while the third, located in Bamako away from SCO, and the fourth, located in Nairobi, apparently receiving marginal support either from SCO or OAU/STRC's regional office in Nairobi. This assessment is critical in view of the ultimate transfer of network management to NARS which would mean dispersal of network coordinators away from the location of SCO. Similarly, if the

sorghum network, located in Bamako and overseen by the ICRISAT Sorghum Regional Center and a NARS strong in the relevant commodity, is as effective as the other two networks facilitated by SCO, can this serve as a future model to locate networks either at IARC regional centers or in relatively strong NARS?

8. Size of Network Operations: Assess the current size and complexity of network operations over a wide geographical area (17 countries) in terms of the following and recommend criteria which could be employed in determining the size of network operations in future:

(a) effectiveness of research supervision and coordination;
(b) cost effectiveness of operations;
(c) diversity of research concerns; and
(d) spread of research resources.

9. Effectiveness of NARS in Supporting Research Networks: Assess the effectiveness of NARS' participation in the network activities in terms of:

(a) allocation of personnel on a full-time basis to network activities (number and quality of personnel) and other resources;
(b) integration of network-sponsored research into the national research program; and
(c) effectiveness of supervision of tests and quality of results.

Based on the above, recommend ways in which performance of NARS could be improved and also recommend criteria for the inclusion of NARS in the research networks in the follow-on project. It is strongly felt in some quarters that NARS must demonstrate their commitment to participate in the networks by concrete means.

10. Technology Transfer: Assess the extent to which networks at the level of national programs are working with FSR or on-farm testing units to test the technologies (improved cultivars and other practices) under farm conditions. Based on the assessment, recommend steps to improve the network linkages with on-farm testing through FSR/on-farm testing units in participating countries. It is felt that networks are excessively concentrating their testing on research stations/sub-stations/research sites although several of the cultivars, before their introduction into the network, might have already undergone testing at several research stations/sub-stations/sites within a participating country. A quantitative assessment of the number of on-station (including sub-station and research site) tests compared to the number of on-farm tests (both researcher-managed and farmer-managed) will be required for each network.

11. Evaluate the flow of network resources (magnitudes, timeliness, etc.) to the NARS vis-a-vis IARCs and SCO, and suggest ways and means of increasing the resource flows to the NARS within the limitation of project funds likely to be

available in the follow-on project. In the same context, examine the periodicity and frequency of network meetings, workshops and observation tours, and assess to what extent they could be curtailed and/or combined with other network meetings and workshops.

12. Assess the extent to which the networks are supplanting rather than supplementing the national research resources for increasing the quality and quantity of research on priority problems. A related issue is the extent to which network-sponsored tests are coordinated with national program-sponsored tests to avoid duplication and/or expansion of programs into less critical geographic regions. Based on the above, suggest ways and means of: (a)rationalizing the number of tests allocated to NARS, and (b)improving coordination between testing programs sponsored by networks and the on-going programs annually implemented by NARS.

13. Review the progress made in the management of research networks by African national scientists, and assess the extent to which NARS are ready to take over the leadership. Key questions the team should consider are: (a)availability of a qualified and experienced individual to lead the network; (b)capacity of NARS to house the network and provide minimal support; and (c)the management and decision-making style of the NARS in general. (Rigid and centralized management structures lacking flexibility are not considered to be conducive to network types of operations.) The team should propose criteria by which one can determine if the NARS scientists' are playing management leadership roles. This is especially important since past evaluations, reports and participating entities have interpreted the notion of "network management and leadership" in different ways. Based on the above, recommend steps for the increased role of NARS in the management and leadership of network research programs.

14. Network leadership and management responsibilities are currently shared by three entities: IARCs (technical coordination and backstopping), NARS (leadership of network management structures, i.e.,Steering Committees, Oversight Committee, decision-making relating to programs and budgets), and SCO (facilitating, coordination of meetings including logistics/administrative support and research coordination). Assess the extent to which present arrangements are satisfactory and recommend steps, if any, required to realign and streamline the responsibilities and roles of the three entities with a view to increasing the effectiveness of research and increasing the cost effectiveness of research.

15. Monitoring and Evaluation (M&E) of Network Research: Assess the effectiveness of methods and procedures in place for: (a)reception and screening of technologies for inclusion in the

network programs; (b)monitoring the implementation of research programs; (c)evaluation of research results and relevance of technologies tested; and (d)assessing the impact of network activities and inputs on the NARS and the production systems in general. A fundamental concern of the Agency is the extent to which network investments and activities are having an impact on the end-users of technologies, i.e., farmers. Also, evaluate the means employed to feed-back the results of monitoring and evaluation activities to the management of NARS, USAID and other interested parties.

16. Performance of IARCs:

(a)Critically assess the performance of IITA and ICRISAT in (1)providing qualified coordinators; (2)technical backstopping of network research programs including their role in planning of research and review/evaluation of research results; (3)technical coordination of research; (4)training; and (5)effectiveness of logistical and administrative support to the coordinators.

(b)Assess to what extent research coordination (as distinguished from coordination of logistics, reporting, planning and organization of network meetings) is duplicated and/or dispersed between participating IARCs (network coordinators) and SCO (principally through the Director of Research).

(c)Specifically, assess the financial and operational efficiencies resulting from a merger of the CORAF and SAFGRAD maize networks, identifying areas of duplicative activities and operating costs which could be eliminated.

Based on an assessment of (a), (b) and (c) above, recommend steps, if any, required to improve the performance of IARCs [especially with regard to item 16(a), (1) and (2) and 16(c)] and to avoid duplication of research coordination if it exists.

17. Performance of SCO: Critically assess the overall performance of SCO: (a)in facilitating the operation of networks in the region; (b)effectiveness of its role in sensitizing participating governments to the need for increased budgetary support for priority national research programs; and (c) inter-network coordination. (Issues relating to SCO noted under 5, 6 and 17 may be discussed together in the report.)

18. Performance of USAID: Assess the performance of USAID management in terms of: (a)timeliness of release of funds; (b) provision of inputs; (c)timeliness of management decisions; and (d)feed-back on project implementation progress, issues and problems.

REPORTS

The Team Leader will have overall responsibility for preparing the Evaluation Report, which will include a synthesis of the reports prepared by the other members, documenting the salient issues, progress and constraints identified during the course of

this evaluation, as outlined in this Scope of Work. Detailed reports prepared by the team members will be provided as annexes. Any dissenting recommendations will be noted in the text and details given in the annexes.

The Team Leader will submit ten copies of the draft report to USAID's Evaluation Officer five days prior to the end of his contract. This report will include the following: (1)an Executive Summary of three pages in length (including the purpose of the evaluation and the methodology used, findings, conclusions, lessons learned, and recommendations); (2)body of the report of no more than 30-35 pages (including a discussion of the purpose of the evaluation, the study questions and the significance of the resulting recommendations); and (3)Appendices (including technical and management issues raised during the evaluation requiring greater elaboration, a copy of the evaluation Scope of Work, a brief annotated bibliography of the documents and reports consulted, and a list of the persons and agencies contacted).

Following the submission of the draft report, a preliminary working session will be held with the Evaluation Team, USAID and project entities to discuss findings and recommendations. The Team Leader will then incorporate in the final draft version of the report the subsequent consideration of any questions or issues raised during this initial review meeting. The Team Leader will submit ten copies of the final draft report two days prior to his departure. This final version will be reviewed in a meeting with the Mission Director, the Evaluation Team and other interested USAID staff.

RELATIONSHIPS AND RESPONSIBILITIES

The contractor will work within the OAR/Burkina Office of Agriculture based in Ouagadougou under the technical direction of the USAID/Burkina Agricultural Development Officer. General policy guidance will be provided by the USAID Representative.

The contractor will work in coordination with all participating bodies and organizations within the Semi-Arid Food Grain Research and Development Project (SAFGRAD).

1991-07

Final Evaluation Semi-Arid Food Grains Research and Development (SAFGRAD)

Bingen, R. James

AU-SAFGRAD