

# DRAFT REPORT

## Evaluation of the USAID-Funded Collaborative Agricultural Research Networks in West and Central Africa

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MUL

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January 23, 1997


Dr. Taye Bezuneh  
International Coordinator  
SAFGRAD  
B.P. 1495  
Ouagadougou, Burkina Faso

Dear Dr. Taye,

Thank you for sending me a copy of "An Overview of the SAFGRAD Project". I am passing it on to Dr. Moussie to hold for referral. Hopefully, there will be a design exercise for an activity to support agricultural networks in West Africa. It is my hope that this exercise would afford the opportunity to review SAFGRAD's role in supporting Networks in West Africa.

It's my pleasure to send you a copy of the final draft evaluation report of the West African Agricultural Research Networks. Please provide us your input by January 29. This will permit us to reflect your comments in the presentation that we're making to AID. The final report is scheduled to be released in March. Thank you once again for your support for the Evaluation team when we were in Ouagadougou. Please accept all my best wishes for the New Year.

Sincerely,

  
John H. Mullenax  
Agricultural Consultant

BUREAU DE COORDINATION DE L'OUA/CSTR. <i>JHL</i>	
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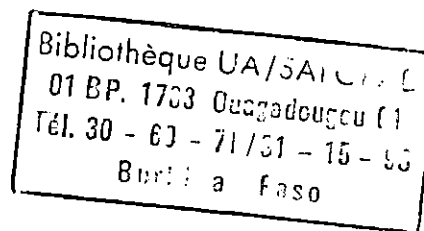
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# Executive Summary

For more than ten years, USAID has been supporting the International Agricultural Research Centers (IARCs) to initiate and implement Agricultural Research Network projects in Africa in collaboration with the National Agricultural Research Systems (NARS). The purposes assigned to the Networks were to: (a) develop, test, and put into place mechanisms which will enable participating NARS in Africa to progressively assume greater responsibility for management, funding and monitoring of regional agricultural research; and (b) increase the development, adaptation and utilization of sustainable agricultural technology.

The Networks are one of a group of activities being implemented under the Policy, Analysis, Research and Technical Support (PARTS) Project by the Africa Bureau, Office of Sustainable Development. They are funded via a buy-in into the Global Bureau's grant to the CGIAR. This evaluation covers the four USAID funded Networks operating in West and Central Africa in support of regional research on sorghum, rice, cowpeas and maize. The objective of the evaluation is to assess whether the anticipated results and targets of these four Networks have been achieved with regard to capacity building, success in influencing the availability, access and use of technology, and related people-level impacts. The evaluation covers the period from October 1993 through September 1996. The budget for the Networks for that period was \$4,985,000.

Network activities are governed by Network Steering Committees composed of scientists from the National Agricultural Research Systems (NARS) in the region. Network Coordinators, responsible for the implementation of the Networks agenda, are chosen by these Steering Committees. The Coordinators are posted at the International Research Centers, (ICRISAT, WARDA, and IITA) which are responsible for management of Network funds, and providing administrative and technical support to the Network Coordinators. Major USAID-funded inputs for the Networks are salary and expenses for the Coordinators and funds for small research grants, short term training, and monitoring tours.

The Evaluation was carried out from November 1, 1996 through January 31, 1997. It included both document reviews and site visits in five of the participating African countries. The Evaluation Team concluded that the Networks have achieved the planned outputs, and significant progress has been made toward achieving the Project's two main purposes.

The NARS have developed an increased capacity to manage regional research Networks via their operation of the Steering Committees. The Networks in turn have increased the capacity of the NARS to plan and conduct research via short-term training, monitoring tours, and research planning exercises. The capacity of the NARS to assume responsibility for funding the Networks remains limited.

Increased farmer access to sustainable technologies has been achieved. Numerous improved varieties of sorghum, rice, cowpeas and maize have been released and are in use by farmers in the region. The Networks lack the monitoring capacity to quantify adoption and economic impact, but the anecdotal evidence available has convinced the Team that the relatively modest investment in the Networks is providing a high rate of return. The Maize Network has made available 16 extra-early and 24 early varieties in the Savannah zone. These varieties are being widely grown and are important not only for production, but for improved nutrition as they provide food in the hungry season prior to the harvest of other crops. Farmers in Mali have obtained production increases of 52 percent with an improved sorghum variety. Rice varieties released during the period being evaluated provided yields of 15 to 55 percent higher than the varieties currently in use. *A major recommendation of the evaluation is that the Networks create a permanent monitoring capacity both for the purposes of documenting success and providing a feedback mechanism.*

In spite of these successes, the Networks could improve their capacity for creating economic impact by shifting from subsistence production research to research that targets increased value added via processing and regional trade. In order to achieve this shift, *the Evaluation Team recommends: that any future phases be predicated on a more rigorous and focused project design; that thorough strategic plans be developed for each Network; and that socio-economic criteria be more systematically applied to the selection of Network research activities.* To the extent that resources are available, additional Networks organized around processing and export crops could have a high impact. Some savings could be achieved by merging some of the USAID funded Networks with other existing Networks.

More impact can also be achieved by improving the technology release and transfer process. *It is recommended that the Networks improve the NARS capacity to produce information for potential users of the newly developed technologies.*

The Evaluation Team was requested to consider other management arrangements and the potential of regional organizations and/or NARS to take over management of the Networks. The Team found that the current management structure supported by the IARCs is productive, cost effective, and presents the best alternative at this point. This arrangement could be enhanced by reviewing the IARCs' programs for the purpose of achieving greater complementarity between the IARCs, the Networks and the NARS. Financial management procedures need to be improved, and the Networks would benefit from a financial audit.

With respect to USAID management of the Networks, funding commitments by USAID to the Networks should be made on a reliable, long-term, timely basis. USAID management structure was found to be fragmented. Network Coordinators have difficulty determining what Bureau is responsible for what decision or action. Future designs should clarify the roles and responsibilities of the USAID Bureaus, offices and management staff.

Overall, the Team has found the Networks to be a highly effective mechanism for improving agricultural research and the nutritional status of target populations and for promoting economic growth. *It is recommended that USAID, via a thorough design exercise, continue support to the Networks for a minimum of five years and that funding be increased for the specific purposes identified in the evaluation report.*

# Acknowledgements

Due to time limitations, representatives of only five of the eighteen participating countries were visited for the evaluation of the USAID-funded Collaborative Agricultural Research Networks in West and Central Africa. These countries are Côte d'Ivoire, Burkina Faso, Mali, Ghana, and Benin. The Evaluation Team expresses its sincere thanks to the policy makers, research directors and administrators, scientists and national commodity coordinators of these countries and others who participated in the various briefing sessions and synthesis meetings.

Special thanks are due to Dr. Badu-Apraku, Maize Network Coordinator, and guide to the Team; Drs. I. Akintayo and S. K. Debrah, Sorghum Network Coordinator and ICRISAT Country Representative in Mali, respectively; Dr. Peter Matlan, Director of Research of WARDA; and the Rice Task Force Coordinators for their excellent briefing documents and technical report highlighting the achievements and management of their respective activities made available to the Evaluation Team. The Team has made full use of these documents in assessing Network progress.

The Team also expresses its gratitude to the Directors General and scientific and administrative staff of IITA, ICRISAT and WARDA for their logistic, administrative and technical support.

The Team is indebted to Dr. Taye Bezuneh, Director of Research of OAU/STRC/SCO for providing valuable background information on previous SAFGRAD Project and Network coordination activities.

Special thanks are due to USAID/REDSO/WCA and the USAID Missions in the countries visited for their valuable contribution regarding the governance, research issues and achievements of the USAID-funded Networks.

This evaluation would not have been possible without the guidance and financial, logistical and administrative support provided by the USAID/Africa Bureau/Office of Sustainable Development/Productive Sector Growth and the Environment Division as well as the Global Bureau.

Our list of persons contacted is dedicated as an acknowledgment of those who gave so openly and constructively of their time and views.

Though this evaluation report benefits from the comments of several people, we take full responsibility for any errors or misrepresentations.



# Acronyms

ADB	African Development Bank
AFR	Africa Bureau/USAID
API	Assessment Program Impact
CARI	Liberian Agricultural Research Institute
CFA	Communité Financière Africaine (African Financial Community)
CG	Consultative Group
CGIAR	Consultative Group for International Agricultural Research
CILLS	Comité Permanent Interetats du Lutte Contre la Secheresse dans le Sahel (Permanent Interstate Committee for Drought Control in the Sahel)
CIMMYT	Centro Internacional de Mejoramiento de Maize y Trigo (International Maize and Wheat Improvement Center)
CIP	Centro Internacional de la Papa (International Potato Center)
CIRAD	Centre de Cooperation Internationale en Recherche Agronomique pour el Development (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)
CRI	Crop Research Institute
CRSP	Cooperative Reserach Support Project
CSIR	Council for Scientific and Industrial Research
EARSM	East African Regional Sorghum and Millet Network
EU	European Union
F <sub>3</sub>	3rd Filial Generation
FCFA	Franc Communité Financière Africaine (French African Financial Community)
G/EG/AFS	Global/Economic Growth/Agricultural Food Security
GENSTAT	General Statistical Software
GIS	Geographic Information System
IARCs	International Agricultural Research Centers
ICRISAT	International Crop Reserach Institute for the Semi-Arid Tropics
ICSH	ICRISAT Sorghum Hybrid
ICTG	Inter-Center Training Group
IDESA	Institute des Savanes (Savana Institute)
IDRC	International Development Research Center
IER	Institut d'Economic Rurale (Institute of Rural Economy)
IITA	International Institute of Tropical Agriculture
INRAB	Institut National des Recherches Agricole du Benin (National Agricultural Research Institute of Benin)
INSAH	Institut du Sahel (Sahel Institute)
IPM	Integreted Pest Management
ISNAR	International Service for National Agricultural Research
MTP	Medium Term Plan
NARS	National Agricultural Research Systems
NGO	Non-Governmental Organization
OAU/STR	Organization of African Unity/Scientific, Technical and Reserach Commission
PEDUNE	Integrated Pest Management (IPM) Cowpea Project

PRAPACE	Programme Régional d'Amélioration de la Pomme de Terre et de la Patate Douce en Afrique Centrale et de l'est (East and Central African Regional Potato and Sweet Potato Improvement Program)
QPM	Quality Protein Maize
REDSO/WCA	Regional Economic Development Service Office/West and Central Africa
RENACO	Réseau Niébe l'Afrique Centrale et Occidentale (West and Central African Cowpea Research Network)
ROCAFREMI	Millet Network
RRPMC	Regional Maize and Cassava Project
RYMV	Rice Yellow Mottle Virus
RUVTs	Regional Uniform Variety Trials
S <sub>5</sub>	5th generation of Selfing
SACCAR	Southern Africa Coordinating Center for Agricultural Research
SAFGRAD	Semi-Arid Food Grains Research and Development
SARI	Savanna Agricultural Research Institute
SCO	SAFGRAD Coordinating Office
SD	Sustainable Development
SHAZAM	Software for economic analysis
SPAAR	Special Program for African Agricultural Research
t/yr	tons per year
TOR	Terms of Reference
USAID	United States Agency for International
USAID/AFR/OSD/PSGE	United States Agency for International Development/Africa Bureau/Office of Sustainable Development/Productive Sector Growth and the Environment
WARDA	West Africa Rice Development Association
WCA	West and Central Africa
WECAMAN	West and Central African Maize Network
WECASRN	West and Central Africa Sorghum Collaborative Research Network

# 1. Summary of Findings and Recommendations

As with all evaluations, this one tends to focus on issues, problems and the need for change. This unfortunately leaves a negative impression of the activity being evaluated. To dispel this impression, it is important to stress that the overall findings of the Team were positive. The Networks have achieved most of the outputs contained in the Grant proposals, and these outputs are leading to tangible economic results. The findings and conclusions of this report should be considered, for the most part, as prescriptions for greater success in future phases as opposed to failings of the current phase.

Substantial progress has been made in technology development and transfer. Some striking examples are the work on using legumes to combat Striga in cereals, the continued progress in the development and spread of early and extra-early maize varieties, and the release of improved varieties by all of the Networks. Another impressive feature was the new willingness of NARS to tackle processing technologies. There were numerous examples of potential products that could generate small industries which would favor consumption of locally produced cereals. It was not within the scope of this evaluation to measure economic impact, but it can be posited that Network generated technologies continue to produce increased farmer income.

The Network activities are relatively low cost and a cost effective way of fostering change in African agricultural research. They also provide a mechanism by which previous bilateral investments in research can continue to yield further benefits. The Networks cannot supplant investment in National programs, but they are an effective mechanism for obtaining increased value added from the investment made at the National level and in the International Centers. Network sponsored research is highly cost effective and seems to benefit from more rigor and discipline than some programs carried out with greater funding levels. The mechanism for providing neutral peer input and oversight into research carried out by the Networks seems to be an important factor in this respect. Finally, the Team was impressed by the ability of the Networks to create their own mechanisms of governance and their ability to set an agenda and implement it.

*It is recommended that USAID continue financial support to the Networks for a minimum of five years as detailed in the following sections.*

## ***Project Design***

The Networks are funded via a grant mechanism. This offers many administrative advantages but this is offset by the absence of a thorough design process which would have resulted in more explicit project proposals and a more thorough understanding of the strengths and weaknesses of the implementing institutions. It is only via the Terms of Reference (TOR) that the Evaluation Team was cognizant of USAID's expectations for the Networks. The Evaluation's TOR portend results which were neither designed for nor fully communicated to the participating institutions.

### *Recommendation #:1*

*It is recommended that any future phases of funding for the Networks be based upon a thorough design exercise. This should include an examination of the SD/AFR strategy and the role that the Networks are expected to play in its implementation. It should match Network (and NARS) capabilities to USAID goals and determine what aspects of the strategy can be implemented by the research Networks and what aspects require partnerships with*

*other entities. It should also be used to determine the feasibility of shifting Network management to the NARS and to provide a plan for making the shift, if this is in fact feasible.*

A design process would be the opportunity to develop and share a common vision between USAID and the various partners involved in the Networks. At this point, there is little awareness in the field of what USAID's overall strategy is and what the Agency's expectations of the Networks are with respect to this strategy. The African researchers perceive the Networks as a funding resource for carrying out more or less traditional production research. USAID perceives the Networks as important vehicles for achieving economic growth. USAID needs to be more assertive in communicating its expectations to Network leaders, both informally as well as via a design exercise. This communication process will also stimulate the Networks and the NARS to reflect upon potential changes to their own agendas.

The Networks work in complementary fashion with both the NARS and the IARCs. Future designs should clearly elicit the program orientations of these partners. It should also explore the feasibility of creating new partnerships with other research institutions and the private sector.

The precepts of USAID's results-oriented reengineering should be adhered to in any new design effort. These are important because they can produce a clearer definition of results, accountability and manageable interest.

### *Strategic Plan for Networks*

The report stresses the necessity of the Networks' carrying out a strategic planning exercise. This recommendation was made in the evaluation of the previous phase and was not fully adhered to. Without a clear strategy and clear goals, the Networks tend to stagnate and continue working on the same lines of production oriented research with no clear definition of expected results nor a timetable for achieving them. This planning exercise is also an important corollary to matching the Networks' strategies to USAID's strategy for the region.

Changing the emphasis from farm-level production to a subsector approach to research (or even rejecting a subsector approach) requires a conscious decision by policy makers in the member countries. A strategic planning exercise can catalyze the decision making process on key research issues. It will also articulate expected results and define benchmarks for achieving them. This in turn will help the Networks in screening research proposals and targeting research more precisely toward a specific result.

The effectiveness of a strategic plan depends on ownership by those who are responsible for its implementation. The plan should be developed with the full support and participation of the Network Steering Committees and its members.

### *Recommendation #2*

*The Evaluation Team recommends that each Network conduct an assessment of current research activities and develop a five-year strategic plan. This assessment should evaluate current lines of research and their potential for producing sustainable technologies. The strategic plan should clearly identify targets in terms of the problems to be resolved and should contain strategies for achieving these targets, as well as annual benchmarks and projected impacts and mechanisms for monitoring.*

## *Resource Issues*

The Networks as they currently operate are quite efficient. One of the impressive features of this program is the amount of work achieved at a relatively low cost. The total budget for the four Networks for 1993-96 was \$4,985,000. The average annual budget for each Network is in the range of \$400,000 (RENACO operated on less than \$100,000.).

There are dangers to increasing funding. The Networks are not and should not become just another donor. They should be wary of being pulled into financing investment and training costs. Increased funding without significant increases in output will reduce the attractiveness and cost effectiveness of the Networks.

This being said, it was the opinion of the Team that increased funding to the Networks was well warranted. To maintain cost effectiveness, any additional levels should be tied to a specific result. There are several areas which could benefit from specific additional funding. The first is product tests carried out jointly by Network members and private sector processors. This would be done on a specific grant basis and would require the signature of the participating processor. Additional funds for the production of outreach information should be budgeted, not only to cover the costs of producing badly needed information but to motivate researchers to turn their results into useable information. Additional funds should be budgeted to create a capacity for impact evaluation. Additional funds for the traditional research activities are probably warranted, but the best approach to defining the level and justification for increased funding is via a comprehensive strategic plan.

### *Recommendation #3*

*The Evaluation Team recommends that, contingent upon an acceptable strategic plan, funding to the Networks be substantially increased but targeted to four main areas:*

1. *grants for linking research to processors that would help share the risks in developing and testing new products and processes;*
2. *grants for producing outreach information and working on resolving policy constraints to extension;*
3. *funds for carrying out a research assessment and developing a strategic plan ; and*
4. *funds for creating an impact monitoring capacity.*

## *Technology Development, Dissemination and Transfer*

### *Technology Release Process*

Generally, there is a lack of clarity in the Networks' process of technology transfer and dissemination. Research is attempting to carry out outreach activities via on-farm trials and testing programs. At the same time, the technologies that are being promoted via tests have not been clearly marked as ready for extension by any form of information release that would permit other agencies to pick up the technology and go forward with promotion.

The varietal release process does not function well in many of the member countries, and this further inhibits a clear approach to seed multiplication and extension. The Networks should foster examination of this issue by the IARCs and the NARS, and encourage member NARS to put a priority on preparing technologies for others to adopt and/or disseminate. On-farm tests inevitably result in some technology transfer, but the process in many countries condemns many promising technologies to promotion by this somewhat restricted means.

Related to this issue is the lack of publications and other forms of information. Producing user information is an extremely important need, not only for the sake of informing producers but also because the information production process itself imposes a formal assessment and description of research results.

The Networks need to adopt an economic perspective and integrate socio-economic factors into their proposal for screening and research monitoring processes. They need to create a permanent capacity to do impact monitoring. This change cannot come about by simply assigning specific tasks to social scientists. It requires that Network scientists take responsibility for producing economically useful results and integrating the skills needed into their planning and monitoring processes. Impact monitoring is important to the research process and should not be perceived simply as a donor requirement for justifying investments.

Ex-ante socio-economic evaluation of the current work would have very likely eliminated a part of the Networks' current research agenda and led to a more cost effective program. Some of the ongoing work will not lead to useable technologies, and this could have been determined before the work began. Socio-economic pre-screening of research proposals will not only help avoid doing nonproductive research, but it will force the pace of moving from a production approach to a subsector approach.

#### *Recommendation #4*

*The Evaluation Team recommends that the Networks assist member countries to develop sound technology transfer models, to implement efficient varietal release procedures, and to develop outreach information by targeting funds specifically to these ends. Further, the Team recommends that Networks include socio-economic criteria and analysis in developing and approving their research programs and activities.*

The Sorghum Network program contains too much overlap between the NARS and ICRISAT. The relation between ICRISAT and the NARS needs to be redefined, and ICRISAT's potential to enhance the sorghum subsector needs to be fully exploited.

WARDA needs to manage toward diminishing the size and numbers of the Task Forces. Suggested ways for achieving this are to reduce the number of breeding Task Forces from four to one and phasing out the emphasis on the Mangrove system.

In the immediate future, the NARS need to pay greater attention to integrating Task Force members at the National level and being more selective in choosing the Task Force activities.

#### ***Capacity Building***

During the evaluation, most of the discussion related to capacity building focussed on training. It was found that the Networks' short-term training programs were effective and were valuable to the NARS. There was much discussion on the need for long-term training. The Team recognized the need but did not find it appropriate that the Networks be used to fund long-term degree training. However, the Networks could facilitate training by providing oversight to thesis research and fellowships and facilitating access to scholarships from other donors.

### *Recommendation #5*

*Specifically, it is recommended that the Networks, via their respective IARCs, facilitate NARS' linkage to the Inter-Center Training Group (ICTG), to obtain support from the European Union for long-term training.*

The Networks have had their greatest impact on capacity building by creating and implementing sound planning and monitoring processes. The proposal screening processes and the monitoring tours were cited as being highly productive exercises for increasing NARS capacity.

If the Networks are to play an increased role in NARS capacity building, this needs to be more specifically designed in the proposals. This is also the case for transferring more responsibility to the NARS for Network management. The NARS could assume more responsibility for fostering information and germplasm exchange, but there needs to be a plan for bringing them to do so.

### *Network Administration and Management*

#### *Sustainability*

There are two facets to this issue - financial sustainability and institutional sustainability. If they were motivated to do so, NARS could take the lead in maintaining the information exchange aspect of the Networks. Therefore, at an initial level of activity, the Networks could be sustainable if the NARS wanted to exercise the initiative necessary to making this happen. However, financial sustainability at the current level of activity does not appear feasible. This should not prejudice support to the project. The Networks have a strong potential for generating economic growth. The return on the investment in the Networks is very likely quite high. Like most public service schemes, the Networks are confronted with the difficult problem of capturing a portion of the revenues that they generate.

Information exchange and germplasm exchange could and should become a natural facet of NARS operations, with little outside assistance. These are not expensive functions, so institutionally the Networks could become more sustainable by making these functions an inherent function of the NARS. The Networks could assist with the organizational arrangements to facilitate this, but its achievement depends primarily on the NARS' initiatives. The Networks, i.e., the Coordinators and the Steering Committees, as well as any future design efforts, need to be more devoted to institutionalizing exchange mechanisms among the NARS.

### *Recommendation #6*

*The institutionalization of e-mail is crucial to NARS and Network sustainability, and the Evaluation Team strongly recommends that the Networks promote greater reliance on e-mail for sharing of information.*

Nominally, the major function of the Networks is to facilitate exchange of germplasm and information. In reality however, they play more important functions such as creating planning models, training, and bridging to International Agricultural Research Centers. There is a high payoff to these functions, but there is no easy way to make them financially sustainable.

There are no attractive alternatives to the current management arrangements for the Networks. These arrangements could be made more productive by acknowledging that the Networks are only one part of a tripartite scheme to promote agricultural research in the region. The other components are the NARS and the IARCs. Future design needs to be done from a more holistic approach that reviews the functions, programs and capacities of each of these partners and defines the complementarity between the Networks, the NARS, and the IARCs. It should also go beyond this to identify other international and private sector partners. The relationship between the NARS and the IARCs is still sensitive, and this diminishes the potential of this relationship. A design effort that approaches regional research as a partnership between the NARS and IARCs could be an effective means of airing issues, examining roles and agendas, and in general improving the IARCs/NARS relationship.

It is naturally desirable that the Networks find a regional political body to house, plan and coordinate regional research and commodity sector development activities. The Evaluation Team gave consideration to the potential of CORAF, INSAH and SAFGRAD for fulfilling these functions. CORAF may or may not evolve into such an organization. For the time being, it is heavily dependent on donors for both funding and initiative and is still challenged by closing the breach between Anglophone and Francophone institutions and scientists. INSAH is limited geographically and also donor-dependent, with no guaranteed prospects of sustainability. SAFGRAD is an OAU institution and has received sufficient OAU funding to keep the Coordination Office in Burkina Faso open. For whatever reasons, however, it is not perceived by the NARS as being politically empowered to play the coordination role. Nevertheless, the potential of the SAFGRAD Coordination Office should be examined to determine what functions it might perform. For the time being, the USAID funded Networks are the most operational and effective in the region, and this should not be compromised by forcing new institutional arrangements nor should resources be diverted in an attempt to create political institutions to coordinate research.

Mergers of existing Networks and the creation of additional Networks hold potential for cost effectiveness and increased economic impact. With respect to the former, the potential for merging the Sorghum Network with the Millet Network and merging the Cowpea Network with other Grain Legume Networks is discussed in the main body of the report. With respect to the latter, the creation of Networks that promote processing and value added could be of greater value to cereals than the traditional production research Networks. Beyond this, there is much to be gained in the area of regional Networks for horticultural products. If USAID has the resources, these could be prime opportunities for promoting regional economic growth.

### *USAID Management*

USAID management is too diffused. Decision making is spread over too many offices, there is too little field presence, and there is no documented rationale for major decisions. Overall, the process appears to lack coherence. REDSO provides monitoring services, but these are not formally utilized by SD/AFR nor the Global Bureau. The Sahel Office also plays a role that is relevant to the Networks, and here again there is insufficient liaison with AFR/SD.

#### *Recommendation #7*

*It is recommended that USAID review this situation and clarify management and monitoring roles and responsibilities.*



## *Funding and Financial Management*

Funding commitments are year-to-year, uncertain, and provided on an untimely basis. This needs to be rectified to allow the Networks to plan and operate in an efficient manner. With respect to financial management, the process for local cost accounting is overly burdensome and should be modified. The sums that are placed at the disposal of the NARS for research are minimal, and the accounting procedures for advances made to the NARS are poorly defined and lack standardization. The IARCs need formal agreements with the NARS for accounting for advances. This would improve the current process, but this process, even if improved, is extremely burdensome and is probably not cost effective for the level of funding involved. It is recommended that USAID explore other accounting mechanisms for advances to the NARS such as a fixed fee arrangement for research conducted by the NARS on behalf of the Networks.

### *Recommendation #8*

*The Grant Agreement Amendments for the Networks contain requirements for financial audits of funds provided to the Networks. The Evaluation Team recommends that the Networks benefit from a financial audit.*

If NARS are to be cultivated in order to assume more responsibility for Network management, they will need to improve their financial management capacity. But this won't happen until there is a systematic evaluation of their strengths and weaknesses and clear guidelines are given on the standards that must be met to receive grants.

## 2. Introduction

Under the auspices of the Scientific, Technical and Research Commission of the Organization of African Unity (OAU/STRC), the U.S. Agency for International Development (USAID), in concert with other donors and International Research Centers, established a program for the support and development of agricultural research in 26 African States. USAID (along with other donors) provided funding for this program via the SAFGRAD I (1977-1987) and SAFGRAD II (1987-1991) projects. Project activities included crops research, farming systems research, and a program for establishing close links between national agricultural research and extension services. A project Coordination Unit was created in Ouagadougou, Burkina Faso.

During the second phase of the project, USAID support targeted the development of four regional collaborative crop Network systems:

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

These Networks, composed of countries having roughly similar ecologies, linked the NARS of these countries together with the IARCs, to define major constraints to crop production and develop collaborative research programs to provide new varieties and production practices for resolving them.

In 1991-92, a series of evaluations were completed for regional research supported under the SAFGRAD Project. The SAFGRAD II evaluation concluded that the project had been successful and recommended that USAID and other donors make an additional 10 year commitment to these Networks. The SAFGRAD II evaluation focused on the institutional growth of the Networks and the technologies generated but was not designed to include an assessment of production and economic impact. An impact evaluation was carried out in 1993 which found that there had been a transfer of some Network generated technologies to producers and that there was significant production and economic impact.<sup>1</sup>

In 1992 the Africa Bureau consolidated its support for collaborative regional research Networks in East and West Africa and incorporated them into the Policy Analysis, Research and Technical Support (PARTS) Project. The Networks covered by this evaluation were chosen for a subsequent funding phase under the PARTS Project. At that time, USAID project management was transferred to G/EG/AFS. In order to create a closer working relationship between the Networks and the IARCs and to reduce administrative costs, the Networks are funded using the grant mechanism with the CGIAR for funding the International Centers for Agricultural Research. Coordination and funding of the Sorghum Network was placed with ICRISAT, and the Network Coordinator was located at the ICRISAT station in Mali. Coordination and funding of the Maize Network was placed with IITA, but the Coordinator was placed at the WARDA station in Bouake, Ivory Coast which provides some logistic and administrative support. The Cowpea Network did not receive sufficient funding to maintain a Coordinator. It has received some funds for research work. These funds are administered by IITA in Ibadan, and Network coordination, to the extent that it is done, is shared on an ad hoc basis between IITA core staff and the Cowpea

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<sup>1</sup>Impact Assessment of the SAFGRAD Networks, 1993 by John H. Sanders, Taye Bezuneh and Alan C. Schroeder.

Network Steering Committee Chairman who is a scientist at the Nigerian Research Center in Ibadan. In addition to the Networks created under the SAFGRAD project, the WARDA Rice Task Forces (which are considered to constitute a Rice Network), previously supported by the SAARFA Project and Managed by REDSO/WCA, were included in the group of Networks included under the PARTS Project.

This evaluation covers the four Networks mentioned above. EARSAM is part of the East African Networks. The documentation that defines the basis for evaluation is found in the proposals elaborated by the Network Coordinators and submitted by the collaborating IARCs' directors. These proposals are reflected in the grants agreement amendments done with the CGIAR. The Cowpea Network did not submit a full proposal, funding has been provided on the basis of a work plan developed in 1994 and revised on a yearly basis.

The purposes assigned to the Networks were to: (a) develop, test and put in place mechanisms which will enable participating NARS in Africa to progressively assume greater responsibility for management, funding, and monitoring of regional agricultural research; and (b) increase the development, adaptation and utilization of sustainable agricultural technology.

The current evaluation assesses Network progress since the last evaluation and achievements in four areas: (1) technology development, exchange and dissemination; (2) capacity building; (3) Network administration and management; and (4) financial management for the purpose of providing input into donor decisions regarding future Network support. The Terms of Reference (TOR) are attached in Appendix I. The period evaluated is October 1, 1993 through September 30, 1996.

## METHODOLOGY

The methodology for the assessment was based on the review of proposals, grant agreement amendments, previous evaluation reports and documents produced by the Networks and interviews with IARCs' staff and scientists and NARS scientists in Ivory Coast, Burkina Faso, Mali, Ghana and Benin. The Financial Management Specialist interviewed financial managers in both the IARCs and the NARS.

The Team was composed of: John Mullenax, agronomist, and Dr. Bantayehu Gelaw, crop breeder, chosen by USAIDW; Dr. Joseph Sedgo, soils scientist, who was recruited to provide the Team a member who had extensive experience with NARS; Dr. Suh, an entomologist provided by IITA to provide information on the IARCs programs; Salif Camara, a financial management specialist; Jerry Brown, Private Sector Development Specialist of SD/AFR/USAIDW, who joined the Team, with a special interest in the linkage of the research Networks to producers and processors.

The Team was accompanied by the Coordinator of the Maize Network, Dr. Badu-Apraku, who participated in many of the Team interviews and discussions. The Team was also joined, in Mali and Burkina Faso, by Dr. Ola Smith of IDRC, posted in Dakar, Senegal as an observer and by Dr. Harry Palmier of SPAAR, in Ghana and Benin. Dr. Koffi Goli of IDESA in Ivory Coast was to have joined us as an observer for the CORAF Networks, but was detained at the last moment.

The Team met in Abidjan and traveled to Bouake on November 2. November 3 and 4 were devoted to a Team building exercise, and the following day was devoted to document review. The schedule of visits and the persons contacted is found in Appendix IIA and IIB. National research institutions were visited in Ivory Coast, Burkina Faso, Mali, Ghana, and Benin. The visit to Ghana included visits to the CRI in Kumasi, SARI in Tamale, the Ministry of Agriculture, and the National Research Council in Accra.

The guidance provided to the Team was to review Network proposals, to become acquainted with the logframes and the projected outputs of each Network, and then in the light of the Terms of Reference, draw upon

the documentation provided to develop initial findings. The document review provided a basis for interviews which were used to verify information contained in the documents, get qualitative assessments and get NARS scientists input on potential changes they would recommend for any subsequent phases.

The composition of the Team was guided by a concern for including representatives of stakeholders in the Networks. Since there was no natural division of labor dictated by the makeup of the Team, an initial grid was created that assigned specific points of the TOR to at least two Team members to guarantee that each point would get coverage from different points of view. This mechanism served as an initial framework to guide document review and interviews but was not considered mandatory as a device for reporting because it was felt that the report should reflect, to the extent possible, a consensus of the Team on all major points of the Terms of Reference. To achieve this, three exercises were held. The first was a two day session during which the Team divided in to two subgroups and articulated (on flip charts) findings relevant to each of the points in the Terms of Reference. The output from each subgroup was then combined. Subsequently, the Team met in Abidjan (without Jerry Brown and Dr. Palmier, each of whom had other professional obligations that required them to leave the Team after their stay in Cotonou) to prepare the major findings to be presented to Network Coordinators in Bouake for the debriefing meeting that was held there on November 28. Finally, the Team met again on November 29 to begin developing recommendations. With the exception of the Financial Analyst, complete written individual reports were not made mandatory.

The Team agreed on several major principles to guide it in developing recommendations. The first was to be sensitive to the potential disruption of recommendations to the continuity and sustainability of the Networks. The Networks are gaining maturity by developing their own governance mechanisms. Dictating change via an evaluation report could be disruptive and disempowering. It requires time and effort to put in place management arrangements. Any benefit gained by imposing change needs to be weighed against lost efficiency and decreased morale. Here we acknowledge the wisdom of S. K. Reddy, Assistant Director of REDSO/WCA, who advised the Team "that if it's not broken, don't fix it." To the extent possible, the Networks should monitor their own activities and devise the management solutions necessary to improve effectiveness.

The main report is organized into two sections. The first section is organized around the Terms of Reference for the Evaluation and attempts to respond to each point raised therein. Given the difference between Networks, it was felt that a comprehensive view of each one should be provided and therefore a second section entitled Status of the Networks has been included.

## **PROGRESS MADE SINCE THE LAST EVALUATION OF SAFGRAD**

The final evaluation of SAFGRAD II was conducted in July 1991. The purpose of this evaluation was to examine how and to what extent support of the SAFGRAD II Project for four collaborative agricultural research Networks for food corps and for the OAU/STRC/SCO has contributed to increased efficiency and effectiveness of agricultural research and production techniques for sorghum, millet, maize and cowpeas in semi-arid Africa.

The principal finding was that the Project has been successful as designed, and it had achieved most of the planned outputs and the expected end-of-Project conditions as identified in the Project paper's revised logistical framework.

The principal recommendation emerging from this evaluation was that USAID and other donors and agencies should make at least a ten-year commitment of financial and technical assistance to SAFGRAD Networks, including continued support for an office to assure essential Network-specific direction and secretariat

support. Subsequent to the evaluation, USAID decided to fund the Networks via the CGIAR grant mechanism, with IARCs acting as executing agencies. Coordination and funding of the Sorghum Network was placed with ICRISAT while that of the Maize Network was placed with IITA. Both Networks have been funded at reduced levels, with funds being allocated on a yearly basis. The Cowpea Network did not receive sufficient funding to maintain a Coordinator. It has received some funds for research which are administered by IITA.

The other major change that occurred subsequent to the evaluation was the addition of the WARDA Rice Task Forces (which was considered to constitute a Rice Network) to the USAID-sponsored Networks.

As suggested by the Evaluation Team, an impact assessment of the SAFGRAD commodity Networks was conducted in 1992.

The Networks have expanded their research activities into areas other than varietal development as recommended by the Evaluation Team.

Linkages with other sources of research programs such as CRSP, NGOs, etc. have not improved much since the last evaluation. The Networks' long-term objectives and short-term targets are not explicitly defined in terms of their policy relevance and on-farm implications due to lack of strategic planning which was one of the recommendations of the Evaluation Team.

# 3. Technology Development, Exchange and Dissemination

## EFFECTIVENESS OF PROCEDURES FOR PLANNING AND IMPLEMENTATION

### *Planning and Priority Setting*

The following discussion is related to the Maize and Sorghum Networks primarily. The Rice Task Forces have a different history and their process will be treated separately. The Cowpea Network, to the extent that it has functioned, has used a priority setting process that is similar to the Maize and Sorghum Networks.

The current procedures are an outgrowth of constraint analysis done largely by National scientists under the SAFGRAD II project in 1986. This analysis identified major constraints to production at the regional level (drought, Striga soil fertility, and pests). The Cowpea Network analysis also identified storage issues as a constraint requiring research, and the Maize Network identified the need for early varieties. This initial analysis has served as a framework for orienting Network research ever since. Research proposals are conceived in relationship to these constraints. Further screening and prioritizing is carried out by the Network Steering Committees and in the case of Maize by an external ad hoc committee, whose recommendations are subject to the approval of the Steering Committee.

The current procedures offer several advantages. First, as intended, they are effective in identifying the major regional production constraints and areas of shared interest and comparative advantages between the NARS and the IARCs. Second, they provide a framework for developing structured research proposals. Third, they provide a process by which the agendas of the NARS and IARCs can be vetted and reconciled in a collegial fashion. Finally, there is an added value to the process in terms of capacity building. Scientists that participate in the process improve their skills in problem articulation, focussing their research and structuring proposals that relate a specific activity to other work ongoing on the same topic. Also, it can be surmised that the planning skills obtained by participating scientists will benefit the planning process in the national programs.

The Network research programs reflect the core program of the IARCs and the member countries' National Research planning process. As such, they also reflect the strengths and weaknesses of the various strategic planning and priority setting processes that define these programs. Generally, the planning and prioritization procedures suffer from the following weaknesses.

- They tend to translate priority constraints directly into research projects with little refinement and consideration of the economic feasibility of projected solutions, comparative advantages, and previous research results.
- They lack tracking mechanisms to assess payoffs of previous research, chart future work, and determine when results should be summarized and passed on to users.
- The constraint analyses are focussed on farm-level production constraints and lacks a subsector perspective.
- They lack communication mechanisms for drawing on a wide range of constituents in identifying areas of research.

- They lack the capacity to articulate specific medium to long term goals and to identify the sequence of the specific research activities necessary to achieving them.
- The governance mechanisms (NARS Director Committees for example) for arbitrating between research emphasis on commodities are not effectively utilized.
- The process is governed by researchers and donors and lacks mechanisms for establishing accountability to local and regional constituencies.

*Recommendation: that each Network conduct an assessment of current research activities and develop a five year strategic plan. The assessment should evaluate current lines of research and their potential for producing sustainable technologies. The strategic plan should clearly identify targets in terms of the problems to be resolved and should contain strategies for achieving these targets, as well as annual benchmarks and projected impacts and mechanisms for monitoring.*

*Recommendation: that Networks include socio-economic criteria and analysis in developing and approving their research programs and activities.*

### ***Reception and Screening of Technologies***

Exchange between NARS and between IARCs and among NARS is well structured and the processes for screening research on an individual proposal basis is well defined and results in more rigor in the screening process. With respect to the reception of technologies into the Networks, there are only two potential sources of technology, the IARCs or the NARS. The Networks should open up the process to a wider range of sources. Implementation of planning exercises and the application of socio-economic criteria as recommended above would also benefit the screening process.

### ***Effectiveness of Monitoring***

Monitoring of Networks programs is generally satisfactory. Monitoring tours should be broadened to include visits to National activities that are pertinent to work being carried out by the Network and should be expanded to include visits with processors and agribusinesses.

### ***Impact Evaluation***

The Networks have taken advantage of the program offered to Sahelian scientists by INSAH to conduct impact assessments. The Networks themselves do not have any systematic mechanism or methodology for monitoring impact of Network generated technologies on end users. Impact at an initial level can be monitored via tracking the varieties multiplied at the national level. Unclear processes for technology transfer and varietal release inhibit both impact and the ability to track impact. More effective impact monitoring will require additional specific resources to develop a methodology and implement impact assessment surveys.

## ***EFFECTIVENESS OF EXCHANGE OF RESEARCH AND TECHNOLOGY***

### ***Relevance of Research Agenda to Member Countries Development Agenda***

Most countries have fairly broad development objectives so there is latitude for a broad range of research activities within this framework. The Network research agenda are relevant in broad terms to all member countries development objectives. The topics targeted for research are relevant, but often the results lack relevance because they fail to consider socio-economic constraints. The crops and the constraints identified are certainly relevant to the development objectives of most of the countries and are genuine concerns to a large number of farmers. What is lacking is the further refinement of the research agenda that increases the likelihood of relevant results and identifies the correct arenas for national solutions. In this vein there is also a need to reconcile the concept of demand driven, market led research with food security and small holder production technologies. A well implemented strategic planning process would increase relevance.

### ***Extent of Technology Transfer from IARCs to NARS and Among NARS***

Evidence of exchange of technologies between NARS and IARCs and among NARS is well documented (Tables 2A, 2B, 2C, 6B, 6C, 8, 9, and 11). The Networks have served as a means for enhancing relationships between NARS and IARCs and provided a forum for improved communication and technology exchange.

### ***Extent of Network Reliance on IARCs-Generated Technologies***

Tables 2A, 2B, 2C, 4A, 4B, 6B, 9, 10 and 11 illustrate the technologies that have been provided to the Networks by the IARCs. It should be added to this that the IARCs have provided useful research technologies such as IITA's virus screening techniques to the Maize Network.

Reliance suggests dependency. The formulation of this point is perhaps misconceived because it portends a notion of Network success based on the ability to function independently of IARCs. The other intention of this question may be to elicit comments on the effectiveness of the IARCs' programs. Either way, this conception of success and sustainability is erroneous and tends to foster the competition and resentments that have too often characterized this relationship. The true measure of success and sustainability is the ability of the NARS, the Networks and the IARCs to correctly assess their programs, their strengths and weaknesses and create the partnerships necessary to producing useable technologies on a cost effectiveness basis. The more important question is whether or not Networks can efficiently source the technologies they need to meet their objectives.

One could expand this point to include the extent that the Networks have expanded their partnerships to provide a broader array of technology sources. Taking this interpretation, the Evaluation Team finds that the Networks should be more proactive in creating relationships with other centers of expertise such as the CRSPs, universities and research centers in other regions and private companies as well. Network participants need to expand their awareness of technologies from around the world. There seems to be little consideration of bio-technology and the possible long term implications it could have for the Networks breeding programs. A greater awareness of developments in feed and food technologies in Asia for example, could stimulate a more creative agenda for subsector development.



### *Extent to Which Networks Support Member Countries On-farm Testing*

The Networks have been active in supporting on-farm testing which is commendable. The on-farm testing program should be more fully used to address socio-economic issues, and results from the on-farm testing programs should be more fully exploited to reshape the research agenda. For example, the Sorghum Network has conducted some farmer adoption surveys. Major constraints to adoption were lack of inputs, markets and adequate information concerning the new technologies. This type of information should be factored in to the planning process that sets research priorities and used by Research Institutes to more effectively participate in National Policy planning. However, on-farm testing should not become a substitute for extension and seed multiplication programs.

### *Extent to Which Network Training, Sharing of Disciplinary Expertise and Technologies Meet National Needs*

#### *Training*

The Networks have considered training as one of their main activities for strengthening the research capabilities of NARS. For the most part, their short term training programs have been very effective and useful in meeting national needs. However, all countries visited by the Evaluation Team expressed their need for long term (degree) training. This goes beyond the mandate and capacity of the Networks. Nevertheless, the Networks could facilitate such training through their respective IARCs and provide guidance with thesis research. Long term training is best addressed through bilateral and/or other arrangements.

#### *Germplasm Exchange*

Various mechanisms are being used by the Networks to effect germplasm exchange between the national programs. These include: collaborative research projects; regional uniform variety trials; and resident research by Network Coordinators on problems identified as integral parts of the Network programs.

NARS scientists are benefiting in terms of acquiring germplasm through such exchange mechanisms. Several NARS are contributing their elite materials to regional trials. The Maize Network has contributed to national needs significantly as evidenced by the release of early and extra-early varieties in countries like Mali, Ghana, and Benin.

#### *Sharing of Disciplinary Expertise*

Disciplinary expertise exchange is somewhat limited in number and scope. It is mostly done through consultation visits by the Steering Committee members and some visiting scientists, monitoring tours, workshops and specialized training courses. More could be done if sufficient funds were available. The Networks have done what they could with limited resources. The Networks should consider more exchange of disciplinary expertise in the areas of agricultural economics and seed technology.

#### *Sharing of Developed Technology*

As noted above, the sharing of developed germplasm has been effective. All Networks, including the WARDA Task Forces, are now putting more emphasis on the promotion of available technologies through on farm research. This shift in emphasis was prompted by a constant demand for an impact assessment by both donors

and national governments. Progress on exchange and adoption of technologies (except germplasm) is minimal. The Networks could make a more significant contribution to strengthening the capability of the NARS to package and disseminate results.

## **DOCUMENTATION OF INCREASED SUSTAINABLE TECHNOLOGIES BY THE NETWORKS**

The Networks have, during the period of the evaluation, increased the availability of sustainable technologies in the region. Most notable are the successes in Early and Extra-early Maize varieties. Sorghum has made relatively less progress since the previous phase. The Cowpea Network has released new varieties and has a promising new technology in the pipeline for the use of cowpeas as a trap crop to reduce Striga in cereals. The tables provided in the Status Report of the Networks document the generation of sustainable technologies during this period.

Sustainability is dependent on a wide range of factors such as markets, output prices, availability and prices of inputs. It was interesting to note that the relatively widespread adoption of Early Maize varieties in Mali was made possible by the presence of a well developed cotton subsector which provides support services to food crops. The same technology in a less structured environment might be less sustainable. It should also be noted that the release of these varieties has been complemented by a bulletin that characterizes these varieties and makes summary recommendations. This is a useful example of how to improve the effectiveness of the varietal release programs.

## **PUBLICATION AND DISSEMINATION OF NETWORK-GENERATED TECHNOLOGIES**

Appendices III, IV and VI contain the lists of publications produced by the Networks and Task Forces. Network performance in this area is particularly weak. Most information produced by the Networks is for internal consumption by Network members. Future phases should structure funding to favor the production of information for users and to a lesser extent journal articles.

Research Institutions, the NARS, the IARCs and the Networks cannot effectively supplant other players in technology transfer to users. Donors tend to exert pressure for final impact on research institutions which is understandable, but it leads to distortions in what research does and inefficiencies in delivering technologies. In response to this pressure much of what is labeled on farm testing is extension in disguise. This has some payoffs in spreading new technologies, but the danger is that the process of technology development and transfer becomes muddled and the truly successful technologies don't benefit from the full acknowledgment they would get by a well ordered release process. Each country will vary in the extent to which they will want research to be involved in technology transfer via such activities as seed production and information diffusion, but what is important is that what takes place be done in a conscious and clearly defined fashion. The politics of varietal release has bearing on how and when varieties are released. If this process is dysfunctional in a given country it may serve no purpose to insist that it be respected as it would only inhibit the useful release of improved varieties on a more informal basis. Nevertheless, formal and well organized technology release processes should be encouraged. If well conceived and supported, they have the advantage of providing a basis for consensus about the utility of a technology, they provide a clear characterization of varieties and their potential advantages in different cropping systems and they can provide a basis for defining the roles of an array of potential partners in developing and implementing promotional campaigns that address development and dissemination of information and multiplication of seeds.

Although research is not responsible for wide-scale contact with farmers, it could facilitate the process by assuring that the technologies that are available are clearly described in a user friendly fashion and is readily available to those agencies involved in technology transfer and/or relatively more sophisticated users who could apply the information to his/her production needs. This would enhance the status of research in the eyes of local constituents. The viability and sustainability of technologies varies from one moment to the next according to changes in Markets. Therefore, research institutions cannot be held constantly accountable for the profitability of the results they produce. However, they can and should be held accountable for clear cut information about these technologies that enables users to determine the appropriateness of that technology in a given cropping system or in a given market setting.

The process of developing information packages can be beneficial to a research institution. It can have the effect of improving the focus of the research agenda by identifying areas where more information is needed, and more importantly by aiding researchers make a determination on areas where further research would be of relatively little increased marginal value. Finally, in areas where an institution lacks strengths (such as processing technologies, horticultural varieties, etc.) it can compensate at relatively low costs by doing a better job of brokering existing information. The process of reviewing information should extend beyond the locally generated results and spawn a greater awareness of the technologies on the shelf in other countries. This is an area where the Networks could play an important role, both in helping to identify information sources and identifying strong models for the development of user information.

Of the countries visited, Ghana has demonstrated strengths in translating research results into user information. The Networks have already benefitted from courses offered by CRI in Ghana. They should continue to take full advantage of this resource. The Networks should place a high priority on establishing and using the full range of electronic communications to access and share information.

Future funding to the Networks should include funds for specific use in developing and disseminating information and studies related to improving and clarifying the technology release and dissemination process in member countries.

## **EXTENT OF PLANNING AND PROGRAMMING OF NETWORK ACTIVITIES INDEPENDENT OF IARCS' PROGRAMS**

The Network planning and programming process is documented in the Status Report. The support of processing initiatives is largely independent of the IARCs programs and there is exchange of germplasm between NARS independently of the IARCs programs.

## **COMPLIMENTARITY BETWEEN IARCS' PROGRAMS AND NETWORKS' ACTIVITIES**

In order to fully respond to this question the Team would have had to review the IARCs' programs. Although it must be assumed that the key players in the Network are generally cognizant of IARCs' programs, the Network planning documents do not furnish an explicit and systematic consideration of the IARCs' programs and their relationship to the Networks' activities. Maize is to some extent an exception in this respect, and the Maize Network has been successful in striking a balance of comparative advantage that draws on IITA's capacity to source exotic germplasm for earliness. Generally the Networks have made effective use of the IARCs' training capacity.

The Sorghum Network should re-evaluate ICRISAT's role in the Network; there appears to be an overlap between ICRISAT and NARS activities. This is more fully discussed at the end of this section.

The Cowpea Network, in spite of the lack of a coordinator, has continued to draw on IITA training and germplasm. This has been for the most part on an ad hoc country by country basis. INRAB (Benin) has taken the fullest advantage of its proximity to IITA in developing its program.

The Rice Task Forces are conceived to serve as a means to develop a joint program between the NARS and WARDA. This integration makes it difficult to consider complementarity of programs. There is complementarity in the organization of tasks. The Task Forces contribute to the research on the major projects in the WARDA portfolio that is complimentary to work done by WARDA scientists. These projects have an established time frame for producing technologies.

The WARDA Medium-term plan can serve as a basis for defining the relationship between the Task Forces and WARDA as well as providing a time frame for dictating shifts in Task Force focus from research to Technology Transfer.

### *Special Comments by Network*

#### *Sorghum*

The Sorghum Network program contains some degree of overlap between ICRISAT and the NARS. It fails to draw on ICRISAT's potential strengths to contribute to longer term planning of the sorghum subsector. Donor pressure for end user impact has forced ICRISAT to operate in the same niche as the NARS by carrying out on-farm trials, seed multiplication and creating outreach partnerships on the ground. NARS' insistence that ICRISAT focus on local germplasm inhibits the use of ICRISAT's potential to introduce exotic germplasm which may not fit the current small holder demand, but could open avenues that will permit future technological breakthroughs and help the Network maintain a vibrant program.

Sorghum research as currently conducted may be reaching the limits of its ability to produce the impact necessary to warrant further investment. The impact assessment of the SAFGRAD Networks and the review of governance, research issues and achievements by Coffi Prudencio of REDSO/WCA indicate low return to investment in Sorghum research. The orientation toward improving small holder subsistence production of food crops is laudable but if it does not hold hope for producing significant gains it needs to be reassessed. The Network can't generate an agenda independently of its members, but it should foster a forward looking subsector approach by providing the analysis and information that will stimulate a more critical look at the current agenda.

The recommendation made in Chapter One that the Networks carry out a research assessment and develop a strategic plan is particularly pressing for the Sorghum Network. The research on Striga needs to be evaluated and if no significant breakthroughs in breeding appear likely, then the Network should focus on putting together the best possible recommendations for Striga control and shift focus to other areas. The same may be true for drought resistance. The potential for more productive research for feed, irrigated sorghum, and commercial production for processing should be assessed.

The Network could be made more cost effective by combining with the Millet Network. This is already being considered by the respective Networks and the Team strongly endorses the proposal that the two Networks merge. The planning exercise recommended for sorghum could be extended to include millet.

*Recommendation: that the Sorghum Network merge with the Millet Network.*

## *Maize*

The Maize Network like the Sorghum Network, should actively pursue a market driven focus. The Network should attempt to capitalize on its achievements in QPM and Hybrids to foster commercial production and linkage to processors. The Maize Network has experienced a degree of success with the production of early and extra early maize varieties. The challenge for the Maize Network is to look ahead to the areas of opportunity that will permit them to maintain the current momentum. The Report on the Meeting to Elaborate Strategies for Promoting Technology Transfer and Adoption in WECAMAN Member Countries, held October 1996 in Bouake, contains the type of subsector analysis necessary to helping the Network shift to a more market driven research agenda. The Maize Network should also take stock of the work done on drought and Striga resistance and produce the best possible packages and move on to other areas.

## *Cowpeas*

RENACO has suffered from the lack of a coordinator. The Network has carried on useful work in some countries in spite of this. There is some discussion of merging the Cowpea Network with a Natural Resource Management Network. We find this idea to be ill-conceived, because Natural Resource Management is too broad to have a meaningful relationship to Cowpeas, and merging would cause the loss of commodity focus. On the other hand, the possibility of merging with the Grain Legumes Improvement Program has been raised and the evaluation team finds that this possibility should be pursued. The recommendation to carry out an assessment and strategic planning activity is equally important for this Network. The Network and NARS have developed some useful storage techniques, and have done some useful research in mixed cropping and use of legumes as a trap crop for Striga. This work along with the work in germplasm development needs to be assessed to determine where further research would be productive and where it would be more productive to package the information that is available and disseminate it. Increased socio-economic research and the screening of existing technologies as well as the technologies in the pipeline is also necessary.

## *Rice*

The Rice Task Forces are major contributors to research on WARDA's "core" projects. Each one of these projects has a time frame for production of technology. This time frame should be used as a basis for developing a strategic plan and managing a transition from research task forces to a Network configuration that is much more streamlined and designed to work on technology transfer, testing and adaptive research. As WARDA moves to subsequent generations of projects, the necessity of using the Task Force's mechanism will need to be critically examined. The justification for creating the Task Forces was based on the fact that rice had benefitted from less basic research relative to other commodities. It is assumed that with completion of this initial phase of more basic research, the task force approach may be less warranted. WARDA needs to move toward diminishing the size and numbers of the task forces. Suggested ways for achieving this are to reduce the number of breeding task forces from four to one, phase out the emphasis on the mangrove system, and group the rest into systems and production and promotion task forces. In the immediate future, NARS need to pay greater attention to integrating task force members at the National level and being more selective in choosing the Task Force activities that are of most value to their respective institutions. USAID can influence the changes advocated above by targeting grant funding to the Networks.

*Recommendation: that funding to the Networks should be substantially increased but targeted to four main areas:*

1. *grants for linking research to processors that would help share risk in developing and testing new products and processes;*
2. *grants for producing outreach information and working on resolving policy constraints to extension;*
3. *funds for carrying out a research assessment and developing a strategic plan ; and*
4. *funds for creating an impact monitoring capacity.*

Work on a research assessment and strategic plan should be funded now in order for the results to be included in proposals for a new phase in 1998.

Many of the findings of The SAFGRAD Evaluation of 1992, and the Impact Assessment of the SAFGRAD Networks completed in 1994 remain valid and relevant and should continue to serve as guidance in Network planning of technology development and transfer. The document entitled The USAID Funded Agricultural Networks in West and Central Africa, a Review of Governance, Research Issues and Achievements, by Yves-Coffi Prudencio at USAID/REDSO/WCA, also contains many useful observations.

## **CAPACITY BUILDING**

### *Effectiveness of Networks in Training of National Scientists*

Training has been well targeted and effective. Almost all training has been short term and has been primarily for technicians. The Rice Task Forces have offered some Fellowships for work at the WARDA station in Bouake. Training has been primarily related to research, and breeding techniques. There has been one training program in outreach in Ghana. Networks have taken advantage of IARCs' training at no cost to the Networks. It is important that NARS take care in choosing training candidates who are actively involved in the area targeted by the Network programs and monitor the application of the skills acquired in training in order to provide guidance to the Networks on the effectiveness of Network training.

Much of what happens in training depends on funding availability, but there are other areas which could be targeted, and training could be used to facilitate some of the changes advocated in this report. For example, workshops on subsector analysis and new areas for research and new partnerships could be useful in laying the groundwork for planning a subsequent phase.

Modeling, GIS and biotechnology should be included in the training programs, not necessarily for immediate application, but at least to help Network scientists stay current of the technological changes and relate their potential use for Network research.

Training could also draw on a wider range of partnerships, such as the CRSPs, private sector processors and Universities.

### *Network Impact on NARS Contribution to National Development Objectives*

Networks have had a positive impact on NARS contribution to National Development Objectives. This is evidenced by the release, multiplication and adoption of a number of improved varieties. This is detailed in the report found in the Status Report.

Although one can assume that improved research capacity and increased crop production fall within the scope of member countries' national development, there is no systematic way by which the Evaluation Team

could address this question. A fuller response would require a review of National Development Objectives and a more detailed analysis of the economic impact of the varieties/technologies released during this phase. It is an obvious concern that the Networks do in fact contribute to National Development Objectives. The proposals and the grant agreements give a brief rationale that explain the importance of Network contributions to member countries. Any more extensive treatment of the question in future proposals would require a more detailed analysis of the existing statements of National Objectives. Given that most statements of national development objectives are formulated in fairly broad terms, the utility of such an exercise could be questionable.

### *Contribution of Networks to NARS Resources*

In most cases Network resources increase NARS resources. There are some cases where the only resources available for research at the national level are provided by the Network. These cases need to be examined and brought to the attention of National Directors and decision makers.

There are two possible reactions to these situations. On one hand, it may be fortunate that Network resources are available to permit a minimum level of research. On the other hand, if there is not enough emphasis placed on a commodity at the national level to provide a minimum level of funding, then one might wonder if in fact the commodity is of sufficient importance to national objectives to warrant continued full involvement in the Network programs. It is recommended that Network Steering Committees examine this issue to determine if there should be a minimum level of national support in order to qualify for full participation in Network funded research.

### *NARS Responsibility in Managing, Monitoring and Funding Networks*

The mechanisms put in place during this phase for Network management give a larger role to the NARS which they have successfully assumed. The NARS are active in operating the Steering Committees and conducting and monitoring Network sponsored research. This situation is somewhat static. There are no explicit mechanisms for effecting a transfer of responsibility to the NARS. If this is intended as a major output, the proposals need to include a specific process for achieving it.

### *Prospects For Maintaining Networks Without IARCs' Backstopping*

The NARS could carry on a certain level of Networking without IARCs backstopping (refer to question 9 in the following section). The Networks could begin fostering this capacity by identifying NARS that could take a lead role in handling communication and germplasm exchange. This function would include the overall sponsorship and promotion of communication exchange, identifying and sharing extra Network sources of information and organizing the exchange of germplasm. The information exchange could eventually be formalized in the form of a Network bulletin (electronic, preferably).

*Recommendation:* that the Networks, via NARS' consensus, identify NARS that could take a lead role in fostering a Communications and Germplasm Exchange Network and provide the support necessary to its creation on a sustainable basis.

In the meantime, and to the extent that funds are available, there is no good reason to hasten the phaseout of the IARCs' backstopping. The coordination function may appear costly, but it is offering good value for the money. The current level of activity requires not only strong scientific capability, but strong administrative and logistical support capacities. The arrangements with the IARCs seem to be the best arrangement for implementing the Networks agenda at this time. The notion that IARCs could support more out of their overhead seems

somewhat fatuous. If IARCs can arbitrarily take on more activities from their core budgets or from their overhead, it would lead one to assume that their overhead rate is incorrectly calculated and/or their direct costs for core activities are over funded. The REDSO/WCA report<sup>2</sup> provides a good analysis of this issue on pages 10 and 11.

If the IARCs assume more of the Networks' costs from their core budgets, it will exacerbate the notion that the Networks are IARCs dominated and will also diminish prospects for sustainability by hiding the true costs of Network operations.

The Evaluation Team specifically asked the opinion of the NARS scientists in the countries visited if they preferred to see management of the Networks shifted to the NARS or other entities. They did not advocate changing current arrangements. They appreciated the IARCs' administrative and logistical strengths and also found it advisable for the time being to keep Network management on neutral ground. Part of the reason for this sentiment was based on the experience gained in the attempt to create poles.

### ***NARS Capacity to Take Over Funding, Coordination of Technical Programs, and Scientific Leadership***

The NARS are not ready to take over Network funding. The answer to this question lies to some extent in USAID's own intentions. If the USAID strategy foresees the Networks as important mechanisms for influencing economic and technological development in Africa, then the tendency will be to define and fund a wider range of activities. In this case it should not be anticipated that the NARS can assume funding responsibilities. On the other hand, if the intention of USAID's intervention is to put in place, as rapidly as possible, Networks that are sustainable by the NARS, then USAID's approach and focus should be so oriented. Generally, research grants for monitoring tours and training programs would not be sustainable if they were dependent on NARS funding. The best approach for USAID in designing any subsequent phases of Network support is to clearly identify the activities that are feasible to transfer to the NARS and clearly plan the process of transition to the NARS accordingly.

Many of the NARS have the human resources necessary to assuming Network leadership. But, they lack institutional stability and have operational weaknesses. These problems need to be overtly recognized in addressing the issues and strategies for transferring Network Management to the NARS.

Implementation of the recommendation found at the end of the above section would lay the groundwork for the NARS taking over more responsibility for communication exchange and scientific leadership.

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<sup>2</sup> The USAID Funded Agricultural Research Networks in West and Central Africa, a Review of Governance, Research Issues and Achievements; by Yves-Coffi Prudencio, USAID/REDSO/WCA, Abidjan, Ivory Coast, 1995.



## 4. Network Administration and Management

### SIZE AND COMPLEXITY OF NETWORKS

The attached Network Status Report provides an extensive explanation of the size, complexity, objectives and achievements of the Networks. Below are extracts that give more detail related to this point in the terms of reference.

#### *Maize*

The current Network focuses on the Guinea Savanna zone where maize has the greatest potential. (More than 50 percent of production is from this zone.) Due to fund limitations, the Network is covering only 8 countries out of 17. This is based on the criteria of 200,000 t/yr. of national maize production. Collaborative research projects are assigned on a competitive basis so as to motivate NARS scientists to increase research output and to be creative.

Maize has achieved cost effectiveness by limiting the number of countries that fully benefit from research support. This avoids spreading research resources so thinly that they can't achieve an impact and facilitates monitoring. The program is not diverse, but has the advantage of being focussed on early and extra-early varieties. Diversity is only an advantage to the extent that it can provide a pay off. Diversity can tend to lead to dispersion. Other areas of research have been advocated by the Evaluation Team but these should be targeted within the overall framework that rationalizes each area and its intended outcome.

#### *Sorghum*

Since its inception, WCASRN has embraced all member countries (18) in West and Central Africa, hence resources are thinly spread. The governance and structure of the Sorghum Network is identical to that of the Maize Network except that there is no ad hoc research committee in WCASRN. Instead, a concept of working groups is adopted (on a nominal basis) to increase efficiency. Five working groups have been formed. They are composed of ICRISAT and NARS scientists, and their mandate is to take leadership on behalf of the Steering Committee and advise the Steering Committee on training needs. The five working groups are technology transfer, pest control and management, Striga control and management, adoption/impact assessment, and sorghum processing and utilization. Priority setting is based on inputs of NARS directors or their representatives at planning meetings of member countries (the general assembly). Broadly speaking, the Sorghum Network's activities are similar to those of the Maize Network, i.e., collaborative research projects assigned on competitive basis; resident research of the coordinator, scientific information exchange and training, and impact assessment. ICRISAT provides support for the coordination unit and technical backstopping, using its own core funding.

WCASRN has included many more countries than the Maize Network which is more equitable, but this policy may be spreading resources to the point that they can't have a significant impact. Research is generally focussed on production technologies. Activities have been expanded recently to include sorghum processing research.

### ***WARDA's Rice Task Forces***

At a meeting of national rice scientists held in 1989, two research Working Groups (Varietal Improvement and Crop and Resource Management Research) were constituted. The Working Groups diagnosed a range of problems that have troubled relationships between NARS and IARCs in the past and which required correction in the development of WARDA's new approach. Based on this diagnosis, the task force concept was born, and in 1991 the first Task Forces became operational. The Task Forces were designed as mini-Networks that bring together regional scientists who are working on similar research problems in similar rice growing environments. Task Forces are structured along thematic groupings. Currently, there are nine such Task Forces, i.e., Upland Rice Breeding, Lowland Rainfed Rice Breeding, Mangrove Swamp Rice Breeding, Irrigated Rice Breeding, Problem Soils, Rice Based Cropping Systems, Rice Economics, Integrated Pest Management (IPM) and Sahel Resource Management. Today, more than 75 national rice scientists from 17 countries cooperate in the nine Task Forces.

Task Force members are active researchers nominated by national research directors from countries where the focal theme is important. The Task Forces are self-managing with plenary meetings and steering committees chaired by national scientists. A WARDA scientist serving as Task Force Coordinator.

National programs with strengths in particular research disciplines have been identified to play a lead role to generate technologies working closely with WARDA scientists for the benefit of the region. All NARS participate in the testing of new technologies and in the exchange and dissemination of results. Through special complementary funding by other donors, the Task Forces also provide small grants to assist national programs to conduct activities having spill over benefits and are beyond the scope of national research.

One hundred fifty-four (154) collaborative research projects with a total cost of \$332,177 were supported by the Task Forces during 1994-96. (Appendix V). Projects included breeding for resistance/tolerance to drought, iron toxicity, blast and other major fungal diseases, African rice gall midge, rice yellow mottle virus (RYMV), control of weeds and major insect pests, nematodes and research on sustainable rice based cropping systems.

The Task Force approach is found by the national scientists to have the following advantages:

- ▶ well focussed common subject of interests in small groups;
- ▶ high participatory nature of planning;
- ▶ greater chance of obtaining individual research grants;
- ▶ less expensive coordination due to the fact that the Task Force coordinators are WARDA scientists and are not paid by the project; and
- ▶ better integration of NARS concerns in the IARCs research programs.

However, as the Task Forces expanded and accumulated experience, a number of shortcomings have become evident that require WARDA's attention. These include:

- ▶ inadequate circulation of Task Force results and lack of publications;
- ▶ lack of coordination between Task Forces;
- ▶ uneven quality of national research activities, leading to unusable results;
- ▶ lack of interdisciplinary approach to research planning and implementation; and
- ▶ limited team work.

Most NARS scientists as well as the Evaluation Team find that the number of Task Forces is too many and needs to be streamlined. For instance, IPM and economics cut across disciplines, hence could be part of thematic Task Forces. One scenario for change could be to combine the breeding Task Forces into one, and group the rest into systems and production and processing promotion Task Forces. In any event, the decision to streamline its Task Force structure should rest with WARDA as it has gained three years of valuable experience.

### *Cowpea Collaborative Research Network*

#### *Background*

The activities of the West and Central Africa Cowpea Research Network (RENACO) under SAFGRAD II ended in September 1993, though it had received a very positive assessment. In 1994, a strong appeal was made to USAID by NARS through IITA for continuation of its support. As a result, a sum of \$75,000 was provided by the 1994-95 financial year.

A planning meeting of RENACO was held in Ouagadougou in 1994 to review the status of RENACO. Based on the favorable assessment report of 1992-93, it was agreed that the RENACO program should comprise short and long-term components. The short-term goal was to improve the extent of the transfer of those technologies generated earlier through on-farm testing with farmers participation. The longer term component would involve applied research on natural resource management focussing on cereal-based production systems where cowpea is the main secondary crop (the Northern Guinea Savanna, the Sudan Savanna and the Sahel regions).

Due to a shortage of funds, it was decided to focus on technology transfer through a range of adaptive research activities. Consequently, the number of countries where activities would be carried in 1994-95 was reduced from 17 to 8 (Benin, Burkina Faso, Cameroon, Ghana, Mali, Niger, Nigeria and Senegal). Each country was requested to submit proposals for short as well as long-term research according to priorities identified during the planning meeting.

## **IARCs' CONTRIBUTION TO NETWORKS**

### *Providing Qualified Network Coordinators*

#### *Maize Network*

IITA has provided a well qualified and competent Network Coordinator. Dr. Badu-Apraku was the national maize coordinator for Ghana before being appointed to the position of Coordinator of WECAMAN. He commands the respect of his fellow maize scientists in the region.

### *Sorghum Network*

This Network has had three Coordinators in the last three years. The first Coordinator, Dr. A. Tenkouano, was a well qualified and competent scientist. He was appointed by ICRISAT in October 1994 as the first WCASRN Coordinator. He served until June 1996 when he took up a position with IITA. At the request of the Steering Committee, Dr. S. K. Debrah, ICRISAT's Country Representative and a highly respected economist, acted as WCASRN's Coordinator until Dr. I. Akintayo was appointed as the new coordinator in September, 1996. Dr. Akintayo was selected among several highly qualified applicants from within the region.

### *Cowpea Network*

There is no Coordinator for the Cowpea Network since 1993. The affairs of the Network are being handled by an interim Steering Committee of four members, chaired by Dr. O. O. O. Olufayo of Nigeria.

### *Rice Task Forces*

The nine Task Forces are designed as mini-Networks. Each Task Force is coordinated by a scientist working full time for WARDA. The nine Task Forces provide critical support to the mandate of WARDA, as it does not have any outside international cooperation mechanism. No structure exists for the Task Forces to evolve outside WARDA.

### *Effectiveness of Logistical and Administrative Support to the Coordinators*

#### *Maize*

The Coordinating Unit is located in Bouake, Ivory Coast at WARDA's headquarters. IITA has a liaison office attached to WARDA where a regional liaison scientist is posted. WECAMAN receives adequate logistical and administrative support from WARDA through the liaison office.

#### *Sorghum*

WCASRN receives logistic and administrative support from ICRISAT's regional office in Bamako, Mali. The Coordination Unit is based at the ICRISAT research station at Samanko and enjoys the full support and cooperation of the Regional Office.

#### *Cowpeas*

RENACO receives financial support from IITA as an executing agency for the Cowpea Project. Since there is no coordinator for the Cowpea Network, there is no structure to provide logistic and administrative support.

#### *WARDA's Rice Task Forces*

The research programs of all nine Task Forces are under the direct supervision of the WARDA's Director of Research with WARDA scientists serving as Task Force Coordinators. The Head of Financial and Support Services is responsible for ensuring that WARDA rules and regulations, fiscal and administrative procedures are followed. A Task Force research assistant, attached to the office of WARDA's Director of Research, provides administrative support to all Task Forces.

### ***Technical Backstopping of Research Programs***

All Networks receive technical backstopping from their respective IARCs in different forms. IARCs' scientists participate in the Networks' training activities, monitoring tours, workshops and the provision of improved technologies. The maize and sorghum Networks also provide core funds for the coordinators resident research. The WARDA Task Forces actually work on WARDA's mandate activities with the support and concurrence of the NARS scientists. This program is highly dependent on WARDA. The Cowpea Network benefits from some technical backstopping from IITA for training and technical advice, but the absence of a Coordinator makes this less systematic and organized.

### ***Technical Coordination of Research Activities***

There appears to be well defined relationships between the commodity leaders of IARCs with the Network coordinators. In the case of maize for example, the Network coordinates only early and extra-early regional maize trials, while IITA coordinates intermediate and late maize variety trials.

### ***Training***

As discussed earlier, IARCs have contributed significantly to the Networks short term and specialized technical training activities, but have contributed little to long term (advanced degree) training.

### ***Alignment of IARCs' Support in the Region with Network Priorities***

In the case of rice, the Task Force priority agenda is more or less the same as that of WARDA's core activity which is harmonized with NARS' priorities. IITA and ICRISAT have their own mandated priority activities which do not necessarily align with Network priorities. In both cases, Network priorities are identified by a general assembly and implemented by the Steering Committee through the Coordinators. Both IARCs can and sometimes do influence the Networks' priority setting through their representatives attending assembly meetings.

### ***Use of IARCs Core Funding to Support and Backstop Network Activities***

#### ***Rice Task Forces***

As discussed earlier, coordination of each Task Force activity is carried out by the WARDA scientist in charge of the research theme within WARDA with no salary cost to the "mini-Networks." Both IITA and ICRISAT use their core funds to pay for resident research by the Network Coordinators on problems identified as an integral part of the Networks' programs. In addition, scientists from the respective IARCs attend planning meetings, workshops and monitoring tours at their own expense. They also provide short-term training courses paid for by the IARCs.

### ***Conclusions***

- ▶ IARCs should facilitate and/or assist in advanced training by identifying candidates and supervising thesis research.
- ▶ IARCs should maintain a closer dialogue between donors and NARS to identify national program needs.

- ▶ IARCs capacity should be used to strengthen Networks capabilities in Technology Transfer, market information, commodity utilization and linkage to producers and processors.
- ▶ IARCs could and should influence NARS policy makers to streamline their variety release procedures so as to expedite seed multiplication and diffusion and utilization of proven varieties.

## **IDENTIFICATION OF TASKS/ACTIVITIES THAT REQUIRE BUT DO NOT RECEIVE ADEQUATE NATIONAL AND/OR BILATERAL SUPPORT**

The strength of the Networks is dependent on the strength of the NARS, so evaluation of the Networks inevitably requires consideration of the NARS effectiveness. However, it is difficult to address this question without doing a full institutional analysis of the NARS. It is also difficult to address it without making generalizations that can't be entirely supported by observations made strictly within the framework of the evaluation. It leads to observations that are pertinent, but far beyond the manageable interest of the Networks. This being the case, we offer the following observations.

The Team identified the following areas as tasks/activities requiring more national or bi-lateral attention:

- ▶ ability to translate strategic plans into operational programs;
- ▶ in-country constituency building and the related ability of the NARS to sell themselves to clients;
- ▶ clear policy and implementation procedures for technology transfer;
- ▶ lack of opportunity for advanced training;
- ▶ low salaries and low motivation of NARS staff;
- ▶ improving operationality (getting the job done on a day-to-day basis, ability to follow through on planning, implementation and monitoring of activities);
- ▶ capacity to prioritize research based on potential economic impact and capacity to carry out subsector analyses and identify new opportunities for research;
- ▶ constraint analysis that fails to identify the external market and policy problems that inhibit potential utility of agricultural research; and
- ▶ lack of long-term research funding necessary to give stability to planning and implementation of research.

NARS are under-funded and/or do not have a balance between staff, operations and investment to permit them to function effectively without reliance on donors. Salaries that are not competitive with the Private sector lead to low staff motivation, brain drain and the inability of NARS to retain qualified accountants, computer specialists, and other categories of specialized labor/science.

This weakness impacts on all facets of NARS operations; operationality, planning, monitoring, and constituency building are all negatively affected. Some NARS receive adequate investment and operations

support from projects but can't use them to their best advantage due primarily to motivational problems. Hopes for the NARS taking over management of the Networks is illusory until these problems are resolved. The NARS have excellent human capital, but they are poorly supported and therefore poorly motivated. Staff turnover of key personnel in a scientific discipline or in financial and computer management can transform a strong NARS into a weak one overnight. Investments in both long term and short term training have low impact due to an institutional environment that lacks the ability to stimulate and motivate personnel.

The Networks cannot resolve many of these problems but they can influence the effectiveness of the NARS by creating sound planning models that can stimulate changes in the NARS planning process.

## **EFFECTIVENESS OF NARS PARTICIPATION IN NETWORKS**

### ***Allocation of Full-time Personnel to Network Activities: Number and Level of Training, Other Resources***

Given the current number of NARS scientists, it is not possible for any NARS to allocate personnel on a full time basis to Networks activities. Network activities are viewed as an add-on to NARS activities; (albeit in some cases the NARS lack funding for research in which case their entire agenda is devoted to Network sponsored research). However, the Networks could favor increased NARS' participation in Networks by calling on NARS scientists to assume a wider range of coordinating functions.

### ***Integration of Network Sponsored Research into the National Research Program***

Given the fact that the Networks program is an outgrowth of national constraints analysis, there is a natural basis for integration of the two programs. However, there is some tendency to view Networks as mini-projects as opposed to a mechanism for catalyzing regional collaboration and providing complementary research to the NARS programs. To overcome this we have already recommended that monitoring tours include all relevant national trials. This will provide a mechanism to monitor the complementarity of the two programs.

### ***Effectiveness of Trial Supervision and Quality of Results***

This varies from country to country. The stronger NARS are producing good quality results, whereas the weaker ones are still struggling to produce meaningful results and provide reports to the Coordinators.

### ***Effectiveness of the Steering Committee in Providing Technical Guidance***

In general, the Steering Committees have done a good job in providing technical guidance. Initially the Steering Committee membership was dominated by breeders. This has been corrected to some extent by the inclusion of other disciplines. The technical guidance of the steering committee could be improved by adding more socio-economic, seed production and outreach expertise. The addition of the ad-hoc committee (Maize Network) for screening of proposals has provided additional technical guidance and has diminished the national bias in resource allocations.

Suggestions related either directly or indirectly to the effectiveness of the NARS' participation in the Network programs are as follows:

- ▶ Monitoring tours should not be limited only to Network activities. They should include all related NARS trials.
- ▶ There should be more direct interchange between USAID project managers and the NARS to permit USAID to better understand the NARS' perspective on the Networks and issues related to their participation.
- ▶ Greater effectiveness could be achieved by both the NARS and donors devoting more effort to reconciling Network and bi-lateral research activities.
- ▶ The effectiveness of the NARS is related to their ability to define a sharply focussed national research program which can then be used to match national needs to the Networks programs and donor resources. NARS should be more proactive in promoting the subsector linkages necessary to providing a more diversified and productive research agenda. The Networks cannot substitute for the NARS in this respect.

## **INVOLVEMENT OF NARS DIRECTORS IN PRIORITY SETTING AND MANAGEMENT OF NETWORKS**

The NARS directors approve priorities and Network research proposals at the country level either in person or by delegation. They have oversight authority for funds disbursed by the Networks. The Directors do not have a direct involvement in management of the Networks. This is handled by the Steering Committee (composed of NARS scientists) and the Coordinators. Generally the NARS Directors are sufficiently informed about the Network activities to form opinions for input on Network policy issues.

## **EXTENT TO WHICH THE PRESENT MIX OF NETWORKS ARE IN LINE WITH REGIONAL PRIORITIES**

### *Recommended Steps*

The current mix of Networks are in line with national priorities. However, there are increased efficiencies that could be achieved by mergers, and there are burgeoning areas of opportunity which are taking on increased importance in the region. To the extent that resources permit, these opportunities should be explored with an eye to strengthening existing Networks, linkages to Networks outside the region or creating new ones.

Chapter One recommends that the Sorghum and Millet Networks merge and that the possibilities for merging the Cowpea Network with the Grain Legume Improvement Program (and possibly PEDUNE) be actively explored. Bringing cowpeas into a Network that works on other grain legumes would offer greater possibilities for determining which grain legumes were economically most appropriate for which cropping systems. Soybeans are beginning to be extended in the region and both cowpeas and soybeans are being produced for commercial processing offering an alternative to groundnuts. There is duplication of effort between the CORAF Maize Network and WECAMAN. The possibilities of a merger should be explored, but not at the risk of compromising WECAMAN's current effectiveness in carrying on research.



### *Livestock and Poultry Feeds*

There is potential for increased emphasis on forage legumes including cowpea hay, macuna, and dolicos, but this might better be approached via an animal feed Network. An animal feed Network could be devised to promote the nascent feed industry in the region and could focus on both feed crops, processing and rations. In any event there are few sources of technology for development of the feed industry in the region but there is a wealth of technologies that could be adapted to the regions needs. A Network that capitalizes on existing technologies could have a high pay off and give added impetus to the orientation of the cereals and grain legume sectors toward processing. The livestock Networks are more focussed on production technology, so they don't meet this need. USAID should consider supporting the creation of a poultry and livestock feed Network.

### *Oil Seeds*

The region imports large quantities of cooking oil. The devaluation of the CFA currency has renewed regional interest in the production and processing of oilseeds both for cooking and cosmetics. There is a need for technical support to the oilseeds subsector. Groundnuts and to a lesser extent sesame, have benefited from extensive research in production technologies. But there are a wider range of opportunities that could be explored such as neem and shea nut. The bulk of the work necessary to develop this subsector is in the area of collection, marketing and processing. NARS and the IARCs don't have predominant capability in these areas. Therefore creating Networks for this purpose would require finding other institutional bases.

### *Potatoes*

Potato production is taking on increased economic importance in West Africa. The NARS in the region have limited capability in this area. Linking them to PRAPACE and CIP should be explored.

### *Fruits and Vegetables*

Fruits and vegetables are also taking on increased economic importance in the region. There is a West African Network for Fruits and Vegetables based in Bambey, Senegal. From the information obtained it does not appear to be extremely active. Much of the technology in this area is being provided by the private sector. The prospects for increased public/Network support should be further investigated.

### *Roots and Tubers*

There are already existing Networks for Cassava and Coco Yams. Cassava is becoming more widely grown in countries that traditionally were not significant producers. The technologies that have been developed and disseminated in the countries that are major producers should be more widely shared throughout the region. Networking arrangements for this purpose should be explored.

## **IDENTIFICATION OF BEST PRACTICES IN PROVIDING COST-EFFECTIVE APPROACHES FOR ORGANIZATION, MANAGEMENT, COORDINATION AND/OR GOVERNANCE OF REGIONAL COLLABORATIVE RESEARCH NETWORKS**

The major findings with respect to more cost effective methods for Network management are the following:

- ▶ NARS scientists should be linked by e-mail, and e-mail should become institutionalized.
- ▶ Thematic training should be consolidated and single programs offered to all Networks.

- ▶ NARS directors and scientists should communicate more spontaneously to promote linkages and resolve governance issues. The more that communication becomes spontaneous and fluid, the less the Networks will be reliant on formal events to resolve problems.

## **A PROTOTYPE TECHNICAL AND ADMINISTRATIVE ORGANIZATIONAL CHART**

The Team engaged in two activities related to this task. An initial one produced a more traditional chart that established proposed linkages between the various entities currently involved in West and Central African agricultural research Networks. Subsequently, a second exercise was organized to reflect upon the output of the first, and it was concluded that the task needed to be revisited and approached from the standpoint of functionality and purpose of linkages. In this exercise it was assumed that the primary function of Networks was to enhance scientific exchange and secondarily to create linkages to donors and political entities.

Therefore, this exercise produced a chart that places emphasis on linking countries with shared ecological characteristics. Two country/commodity groupings were identified, and an organization chart common to both was created. This is presented in Figure 1. The chart that is provided is done in an attempt to be responsive to the Terms of Reference. However, as evidenced by the following discussion, it is not endorsed by strong convictions. Consequently, any action on implementing the scheme represented should first benefit from additional analysis.

This exercise was attended by extensive Team discussion on the benefits and dangers of creating higher level political bodies for Network Coordination.

The Evaluation Team can suggest arrangements for linking stakeholders but we would prefer that the issue be referred to the Networks for resolution. Guidelines for creating linkages between stakeholders should be based on the potential value of exchange between them. Existing Networks should examine this issue and be responsible for taking the initiative for creating the linkages that they find to be most useful. NARS leaders are aware of the various Networks that exist and should take the initiative of linking their institutions to the ones that appear useful. If duplication exists between Networks, the governing bodies of these Networks need to weigh in to resolve it.

NARS decision making in this respect is often driven by a desire to take advantage of funding opportunities rather than a desire for rational use of resources. The sustainability and the growth of the Networks and their member NARS depend on their willingness to be proactive in deciding governance and resource management issues.

The Evaluation Team appreciates the need for higher level bodies to make decisions on harmonizing emphasis between commodities, determining potential roles of different countries and IARCs in the Networks and interacting with donors. However, there was a consensus that a word of caution was in order with respect to their creation. The organizational effort required is considerable and may detract management time and donor resources away from more pressing issues at the operational levels. The value of higher level policy bodies is relative to the strengths and effectiveness of the programs at the ground level.

National and Network Program strength need to be built from the ground up. Attempts to mandate leadership roles or commodity emphasis will lack the ownership at the scientist level to make them successful and will increase dependency on donor driven impetus for making decisions. The management bodies that exist now at the Network levels could and should tackle some of the linkage issues that higher bodies if created would be called upon to resolve. Leadership roles need to evolve naturally out of internally created strengths.

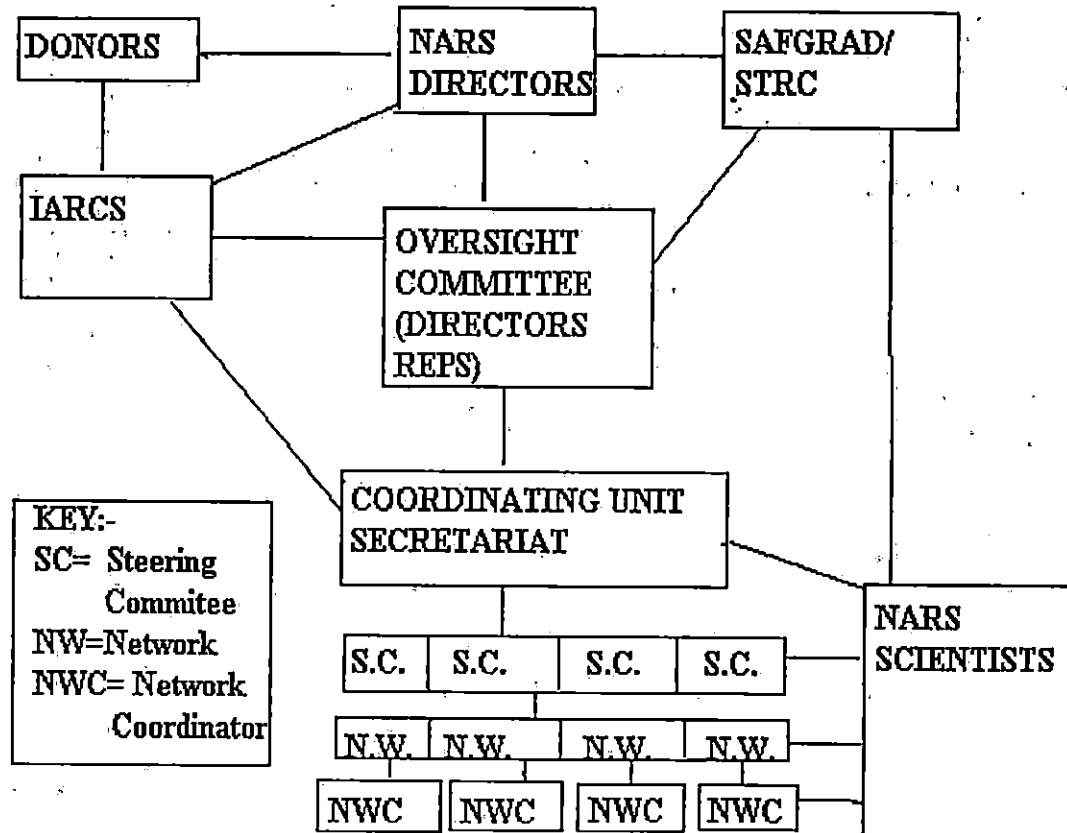
Some issues that supra-national governing bodies may be called upon to manage, such as commodity focus and lead countries for different areas of research, may best be resolved in a more spontaneous and market driven fashion. Improvements in communications technologies and a more liberalized market and processing environment should lead to more privately generated technologies and more private information exchange which could diminish the relevance of publicly created organizations. Most public institutions, once created, are difficult to dissolve. There is the danger of creating bodies that are resource and time intensive but are not effective enough to have any particular influence on impact.

Finally, there is one particularly disturbing facet of the various policy making schemes that exist now, be it at the NARS, the Network or the Regional level, and that is that they are all researcher and donor governed. There are almost no mechanisms for direct guidance from constituencies outside the African scientific and the donor communities. SACCAR is often pointed to as a model of a political and scientific linkage. SACCAR grew out an internal political dynamic that doesn't exist in West and Central Africa.

The major reasons that appear for creating Regional governing bodies seem to be to deal with harmonizing of donor efforts and making decisions on the future funding and orientation of IARCs. There are mechanisms, although imperfect, that exist to deal with these issues. The possibilities of using these mechanisms should be fully explored before creating new ones. Investments in creating additional higher level bodies will detract attention and resources from more pressing issues at the ground level.

Figure 1

PROTOTYPE COORDINATION MODEL



## **PROSPECTS FOR NETWORKS CONTINUING WITHOUT USAID FUNDING**

Prospects for continuing the array of activities currently being carried out by the Networks without USAID funding are probably nil. We take note of REDSO/WCA's suggestion to explore endowments and debt swaps and in no way would we want to discourage efforts to find creative ways of funding the Networks on a long term basis. However, these solutions require a large investment in management time and it is probably unlikely that these mechanisms could be brought in to play before several years even if there were a concerted willingness to pursue their creation.

NARS contributions are unlikely because most NARS don't have adequate investment and operational funds and if any revenue can be generated from users, the NARS would most likely have first claim, and rightfully so. There are some limited prospects for involving other donors in the Networks by expanding them or combining them. The fusion of the Sorghum Network funded by USAID with the Millet Network which is supported by another donor is an example of this. And the inclusion or linking of the Cowpea Network to other legume programs could provide greater sustainability. However, we suspect that the intention of this question is also to examine the sustainability of the Networks without outside donor funding.

The primary value of Networks is information and germplasm exchange. This being the case, their sustainability at an initial level of activity is more dependent on the willingness of the NARS, IARCs and individual scientists to carry on exchange between and among themselves and with other centers of expertise than on the availability of funds.

The costs associated with sharing results, research plans, and protocols is minimal, and doing so depends more on initiative and willingness than funding. It would be worthwhile to further explore directly with the NARS how they perceive the issue and to what extent they carry on their own Networking activities, and what measures could be taken to foster the NARS initiatives to conduct formal and informal Networking activities. One informant pointed out that willingness to share information with the outside depends to some extent on the level of self-confidence that the scientists have with regard to their own work. The formal Networks will hopefully foster this confidence and thereby foster more spontaneous Networking between scientists.

E-mail and the Internet are indispensable to developing Networks, and it is important that they become a part of the daily life and culture of the NARS. Efforts invested in this respect will be crucial to future Networking and the ability of the NARS to maintain their credibility as research institutions.

## **ASSESSMENT OF PERFORMANCE OF USAID MANAGEMENT**

There were major issues raised concerning USAID management by the Network Coordinators. The most serious are related to timeliness and stability of funding. Delays in receiving funds for annual programs compromises the ability of the Networks to plan and implement their annual agenda. Uncertainty concerning the availability of funds in future years make it difficult for Networks to make plans on a multi-year basis and reduces motivation to develop medium and long term programs, be it for specific research activities or the programs of the Networks as a whole. Although the evaluation findings of the IARCs financial management procedures identify some weaknesses, it is fortunate that the Networks are associated with institutions that have a broader funding base that can provide some stopgap support when USAID funds are delayed. Any prospects of funding directly via the NARS would not be feasible as long as timely funding could not be assured. The uncertainty of year-to-year funding has had a particularly adverse effect on the Sorghum Network because qualified Coordinators are reluctant to stay in a position that offers so little job security.

USAID/W decision making is seen by the Network Coordinators as being dispersed, and they are confused about who to contact when they need information or a decision that requires USAID/W input. It is not clear who plays what role between various project managers in Africa Sustainable Development Bureau and what the relationship between this Bureau is to Global with respect to operational issues. It was further observed that there was insufficient feedback provided to the Coordinators on the information that they supplied on technical and administrative matters.

It was suggested that USAID/W should explore the potential advantages of transferring more management responsibility to REDSO/WCA. The arguments for this are that REDSO/WCA has technical and financial support and management capacity and has the advantage of geographic proximity to Network activities. REDSO staff make frequent visits to most of the member countries and could expand the purpose of travel to include backstopping and monitoring of Network activities. The Evaluation Team was impressed by the display of interest and knowledge of the REDSO technical staff. The Team benefitted greatly from the document that REDSO/WCA had prepared reviewing the progress of the Networks.

A final argument for more field presence in Network management is that the strategic vision for Networks that has been developed by USAID/W is poorly understood by Network management, and therefore more contact with Network management is necessary for them to appreciate what USAID hopes to achieve via Networking.

# 5. Financial Management

## NARS ADEQUACY IN ACCOUNTING FOR THE NETWORK FUNDS

The response to this question is rendered difficult by the absence or tardiness of advance reconciliation reports at the IARCs level. In some cases the NARS have provided accounting, but the IARCs haven't done reconciliations before providing additional advances. There is no official agreement between the IARCs and the NARS to serve as a basis for management of funds and establishing NARS responsibilities. The approved project proposals are the only basis for monitoring and accounting. NARS' financial managers often receive the funds for transfer to the collaborating scientist with no budget line items, and therefore they have no basis for monitoring the expenditures. There are often delays in transferring funds from NARS headquarters to scientists. With the exception of Ghana, the NARS and IARCs do not have mechanisms to prevent duplicate funding of activities conducted by the Networks (i.e., the same piece of work could be paid for by another donor and the Networks also). The Networks require that NARS account for funds advanced for research prior to receiving additional funding in subsequent years. This provides a certain degree of control over advance accounting but the weaknesses in advance reconciliation could limit the effectiveness of this procedure.

In order to prepare the NARS for assuming more responsibility for accounting for Network funds, they need to receive the accounting criteria by which their financial management will be evaluated. Establishing funding agreements between the NARS and the IARCs is important not only for legal and accounting reasons; it is important also because it is the first step in creating the basis for the NARS' assumption of greater responsibility for the Network accounting process.

There is also a lack of mechanisms for providing systematic financial reporting to the NARS and the Steering Committees. This limits their ability to provide oversight of the funds.

As a whole, the team found that the current accounting procedures were overly burdensome for the amounts of funds involved and may not be cost effective. An inordinate amount of IARCs and Coordinator time is consumed by tracking advances and obtaining receipts. The Team recommends that USAID determine the feasibility of using other mechanisms such as fixed fee arrangements whereby the research reports based on approved proposals would be the end product purchased by Network funds and would satisfy accounting requirements.

*Recommendation: that IARCs establish agreements with the NARS defining financial management responsibilities, requirements, and procedures for Network funds provided to the NARS.*

*Recommendation: that the IARCs complete reconciliation of all outstanding advances and that they provide regular financial reports on outstanding advances to the NARS and Steering Committees.*

## ADEQUACY OF IARCS' CONSOLIDATING OF FINANCIAL REPORTS TO USAID ON NARS NETWORK EXPENDITURES

The current Grant Amendment requires IARCs to send expenditure reports to the CG Secretariat within 15 working days after the end of each quarter for consolidation before they are submitted to USAID. There are significant delays in submitting the Centers expenditures to the CGIAR Secretariat. In some cases these have

resulted in delayed release of funds to the Networks. IARCs and NARS records differ on the amount of advances outstanding to the NARS. There is an absence of periodic advance reconciliation and information on the advances outstanding were not conveyed periodically to the NARS management for monitoring and reconciliation. Reports on NARS advances are not submitted to the steering committee for monitoring of the budget they have approved. The Grant agreement requires that property having an acquired value of \$1,000.00 or more be reported to the USAID Grant Officer and that property control systems be maintained. It was observed that equipment procured with Networks funds for \$1000 or more was not reported.

## **TRANSFER OF NETWORK FUNDS FROM USAID TO IARCS, FROM IARCS TO NARS, AND FROM NARS TO INDIVIDUAL SCIENTISTS**

USAID transfers funds to IARCs by amending the Grant Agreement with the CGIAR which covers all of the centers concerned. The amendments increase obligations of funding to the CGIAR. The amendments include attachments describing the purpose, the activities and the budgets of the programs being funded under the amendment. CGIAR submits monthly requests for advances based on projected expenditures and cash on hand. The CGIAR secretariat advances funds to the individual IARCs. In the case of ICRISAT, the headquarters in Hyderabad receives the funds and then advances them to the Center in Mali. The Networks have experienced delays in fund transfers at this level, but they have usually been due to delays in the Grant Amendment approval process. Some activities, such as training, Network conferences, and coordination expenses, are funded directly by the IARCs.

Advances to the NARS are made on the basis of proposals for activities approved by the Steering Committee. These are handled differently by each Network. ICRISAT gives a 50 percent advance for research activities at the beginning of the agricultural season to minimize the amount outstanding. The remaining 50 percent is provided halfway through the season but is not dependent on justification of the first tranche. Accounting for the total amount is done at the end of each year. IITA provides an advance for the entire annual amount and accounts for advances at the end of the year. Both ICRISAT and IITA consolidate their advances and send them to the NARS. WARDA (Rice Task Forces) on the other hand, sends checks to individual scientists via their respective NARS. For convenience, WARDA handles some advances to NARS for IITA and is subsequently reimbursed. The Cowpea Network is funded by IITA. Funds for research go to the NARS for disbursement to the scientists. Scientists in the Maize and Sorghum Networks receive subsequent advances of IARCs from the NARS, as opposed to receiving them directly from the IARCs. They are in turn responsible for providing receipts to the NARS financial managers.

The arrangements used by WARDA have the advantage of establishing accountability directly with the scientists and minimize the risks that funds will be delayed within the NARS administration. But there are several disadvantages. They use individual checks of relatively small amounts that go to scientists at the same location. This creates higher transactional costs, as banks in Africa have high flat rate fees for handling the checks. Another disadvantage is that the process bypasses the NARS accounting process which diminishes NARS' responsibility and involvement in Task Force activities.

In all cases, funding advances to the NARS suffered from the fact that the NARS had insufficient budget information on which to base oversight of the use of funds. Also, as mentioned above, the absence of any formal understanding between the IARCs and the NARS on financial management of advances makes it difficult for NARS financial managers to fully incorporate Network funds into the NARS accounting system.



One last observation on the procedures was that funds placed in bank accounts in countries having soft currencies are exposed to loss due to decreases in value of the local currency. The length of time that funds are held in-country prior to required use should be kept to a minimum.

## **AUDITING MECHANISMS OF THE IARCs NETWORK**

In accordance with the terms of the above mentioned grant agreement, the IARCs shall have an audit made of the funds provided by USAID and of the financial Statements of the IARCs as a whole. The audit shall be a financial audit to be performed annually. Annual audits are performed of the financial statements of the IARCs.

During the period under review, no specific audit was made of the funds provided by USAID for the Networks. *Given the above mentioned observations made of the IARCs accounting and administrative system, the Team recommends that an audit of Network funds be conducted in conjunction with a general audit of the IARCs for the year ending December 31, 1996.*

# **6. Status Report on USAID Funded Networks in West and Central Africa - Focus Period: October 1, 1993- September 30, 1996**

## **STRUCTURE AND GOVERNANCE OF NETWORKS**

Each Network is composed of active agricultural scientists working on specific commodity in the region. The governance bodies include the General Assembly (highest authority); the Steering Committee (which plans, coordinates and monitors the activities of the Network); the Network Coordinating Unit (which implements decisions through the Coordinators); and the National Coordinators (NARS senior scientists who coordinate Network activities at the country level).

In contrast with the Sorghum Network, the Maize Network has an ad-hoc research committee of three scientists appointed by the Steering Committee from non-WECAMAN countries who review research proposals and allocate research funds on competitive basis which is subject to approval by the Steering Committee. The purpose is to avoid nationality bias and insure neutrality.

The Rice Research Network is composed of nine Task Forces (mini-Networks) along thematic groups, with each Task Force coordinated by a WARDA scientist and NARS scientists who coordinate activities at the country level. The Rice Network receives additional funding from the EU and ADB. The Task Force approach was set up by WARDA in an attempt to resolve the problems encountered between NARS and IARCs. It is characterized by a well focused, small group of scientists working on thematic problems, with less expensive coordination within each Task Force. However, there are problems of lack of inter-Task-Force coordination, lack of team work and interdisciplinary approach.

The Cowpea Network (RENACO) does not have a Coordinator due to lack of funds. A four-man Steering Committee still exists and has met twice since 1993 to initiate activities on a limited scale with a \$75,000 grant from USAID.

## **MAIZE NETWORK - (WECAMAN)**

### *Objectives*

To assist national maize programs in West and Central Africa to pool their human, infrastructural, material and financial resources together in order to tackle production problems common to countries in the sub-region.

### *Steps*

Maize scientists assembled in March 1987 and prioritized major constraints, reviewed the research capabilities of each NARS, and developed a Network strategy composed of: a council of Directors of NARS to provide policy

guidelines; an Oversight Committee of six members to follow progress and performance; and a Steering Committee of NARS scientists to establish research priorities, provide guidelines and monitor Network activities. Collaborative projects were assigned to "lead centers." Technologies and information were made available to other member countries. IITA provided a Network Coordinator. The OAU/STRC SAFGRAD Coordination Office provided administrative support. SAFGRAD II was terminated in March 1993 after three extensions. IITA submitted a two-year proposal to USAID to continue the project. USAID provided bridging funds from April 1 to September 30, 1994. Following a review of the proposal submitted by IITA, USAID approved funding from October 1, 1993 to September 1, 1995 to the West and Central Africa Maize Collaborative Network (WECAMAN). Funding was extended by USAID from September 1995 to 1998. Mid-term and end-of-project evaluations of SAFGRAD revealed that the Maize Network had achieved most of the planned outputs and project purposes. Impact assessment was conducted from May 1992 to March 1993, and the results were summarized as follows.

### *Results of Achievements*

- The Maize Network was successful in stimulating the capacity and initiative of national scientists to solve maize production problems.
- National scientists were taking on the necessary share of responsibilities in sharing technology between countries.
- Several technologies were in the pipeline for further testing and release.
- There were significant returns to investments in research.

### *Major Weaknesses*

- Research projects were biased towards breeding due to the fact that the Steering Committee was composed of breeders.
- Socio-economic constraints to enhance technology adoption were not addressed.
- Research grants were not allocated on a competitive basis.
- Criteria for allocation of funds and retrieving expenditure receipts were not well established.
- No efficient system was established to retrieve technical data from NARS.

Three specific recommendations were made: (1) The financial reporting system should be well defined; (2) mechanisms for retrieving expenditure receipts should be put in place; and (3) a strategy should be devised for the proper management of Network funds allocated to NARS.

The current Maize Network focuses on the Guinea savanna zone where maize has the greatest potential (more than 50 percent of production is from this zone). Due to fund limitations, the Network is covering only eight of 17 countries. The criteria for selecting these countries was based on the amount of maize produced by each country (200,000 t/year) which is somewhat subjective. Collaborative research projects are assigned on competitive basis so as to motivate NARS scientists to increase research output and to be creative. During the

first meeting held in Bouake in April 1994, the research committee reviewed 37 proposals and assigned seven projects to member countries (Tables 1a and 1b) and allocated \$80,700 for the 1994 cropping season. In 1995 the committee allocated \$101,700 for collaborative research projects. The major thrust of the Maize Network has been on varietal development; of special interest is the development and release of extra-early and early maize varieties by the Network. These varieties can be harvested at a time when other staples are not ready thus filling the hunger gap in July. Maize varieties made available to NARS through the WECAMAN Network are given (Tables 2a, 2b, and 2c).

### *Activities of the Maize Network*

Since October 1, 1993, WECAMAN has carried out six main activities: (1) collaborative research projects; (2) resident research; (3) regional trials; (4) exchange of information and technologies; (5) impact assessment; and (6) human resource development.

### *Collaborative Research Projects*

During 1994-95, seven collaborative research projects have been assigned to six countries in the areas of breeding, Striga control, agronomic research, promotion of technology transfer and on-farm level seed production both on a competitive basis as well as on interest and need. For the 1996-98 period, eight collaborative research projects were allocated to all eight countries (more or less the same projects initiated during 1994-95 except for two additional projects, i.e., promotion of marketing and utilization systems and breeding for grain quality, storability, and utilization). Project funding increased from \$81,000 in 1994 to over \$100,000 in 1996. Funding for breeding projects was reduced while that for promotion of impact activities increased, notably in 1996. The deliberate attempt to give more emphasis to the promotion of impact activities is in response to donor demands. There could be a danger of premature abortion of important activities in an attempt to satisfy donor demands. For instance, all the member countries had one or more projects in the area of promotion of impact activities even though WECAMAN may not have a comparative advantage in this activity. Moreover, several proposals were rejected, not because they were not good but due to fund limitations. Details are given in Tables 3a, 3b and 3c.

Achievements: Efforts from the collaborative research projects have achieved some tangible results.

- Breeding for Disease Resistance - Early generation breeding populations of both normal and quality protein (QPM) endosperm types have been developed; inbred lines have been advanced to S5 generation; varieties and crosses of heterotic combinations have been tested; some screening for streak resistance has been done; promising materials from extra-early RUTV's have been crossed and advanced to F3.
- Breeding for Drought - Two 90-day populations (one white and one yellow) have been developed, and lines have been identified for recombination. Breeding for drought resistance is a difficult and complex undertaking. WECAMAN may not have a comparative advantage in undertaking a full fledged breeding program. IARCs like CIMMYT and IITA may be in a better position to pursue this further. WECAMAN could be a partner at the testing and adopting stages for an effective use of its scarce resources.
- Breeding for Striga Tolerance/Resistance - This is also another area where WECAMAN may have to rely on technologies (control packages) developed elsewhere (by those who have a comparative advantage) and adopt the recommended packages where applicable. So far, no single agronomic control has been found to be effective in Striga control.

**Table 1a. Collaborative Research Projects Assigned to WECAMAN Member Countries, 1994-1995**

Project	Participating Countries
1. Breeding for disease resistant, intermediate maturing maize varieties	Cameroon, Ghana, Côte d'Ivoire
2. Breeding for drought tolerant and disease resistant early maturing varieties	Burkina Faso, Ghana
3. Breeding for disease resistant extra-early maturing maize varieties	Burkina Faso, Cameroon
4. Striga control	Cameroon, Ghana, Benin, Togo, Mali
5. Agronomic research for intermediate early and extra-early maize varieties	Burkina Faso, Mali, Nigeria, Côte d'Ivoire, Cameroon, Benin
6. Promotion of technology transfer	Côte d'Ivoire, Benin, Nigeria, Mali, Togo
7. Promotion for on-farm level seed production	Burkina Faso, Benin, Mali, Cameroon, Togo

**Table 1b. Allocation of Funds to Projects in 1994, 1995 and 1996**

Project No.		Project Title	Funding (US \$'000)			
94-95	96		94	95	96	TOTAL
1	-	Breeding for disease resistant intermediate maturing maize varieties	12	11	-	23.0
2	7	Breeding for drought-tolerant and disease-resistant early maturing varieties	8	6	7	21.0
3	-	Breeding for disease-resistant extra-early maturing maize varieties	6	6	-	12.0
-	5	Breeding for Striga tolerance/resistance in extra-early, early and intermediate maturity groups	-	-	8	8.0
-	8	Breeding for improved grain quality, storability and utilization	-	-	4.5	4.5
4	6	Striga control	14	12	14	40.0
5	3	Agronomic research on intermediate, early and extra-early maize varieties	19.4	23.9	18	61.3
6	1	Promotion of technology transfer	11.3	10.8	28	50.1
7	2	Promotion of on-farm level seed production	10	11	23	44.0
-	4	Promotion of marketing and utilization systems	-	-	7	7.0

**Table 2a. Maize Varieties Made Available to NARS through the Network**

i) Late and intermediate maturing varieties (110-120 days) for Northern Guinea Savanna Zone

Variety	Origin
Abelechi	Ghana
AB22	Togo
CSM 8710	Cameroon
Okomasa	Ghana
EV8422-SR	CIMMYT-ITTA
EV8428-SR	CIMMYT-ITTA
EV8435-SR	CIMMYT-ITTA
EV8443-SR	CIMMYT-ITTA
EV8449-SR	CIMMYT-ITTA
NDOCK 8701	Cameroon
TZB-SR	IITA
TZPB-SR	IITA
Golden Crystal	Ghana
Composite 4	Ghana
ZM 10	Senegal
Synthetic C	Senegal
BDs	IRAT/Senegal
AB22	Togo
CJ1	IRAT/Benin
Staha	Tanzania
IRAT 100	IRAT/Burkina Faso
IRAT 102	IRAT/Burkina Faso
IRAT 178	IRAT/Côte d'Ivoire
NH2	IRAT/Benin
Elite x Early Mexican Composite	Ghana

**Table 2b. Maize Varieties Made Available to NARS through the Network**

ii) Early maturing (90-100 days) and/or drought tolerant varieties for Sudan Savanna

Variety	Origin
Across 86 Pool 16 DT	IITA-SAFGRAD
Across 87 Pool 16 SR	IITA
Across 88 Pool 16 DT	IITA-SAFGRAD
BDP-SR BC3 F3	Benin-SAFGRAD
DMR-ESRW	IITA
DMR-ESRY	ITTA
DR Comp. Early	IITA-SAFGRAD
Early 86 Pool 16 DT	IITA-SAFGRAD
EV 8730-SR	CIMMYT-IITA
EV 8731-SR	CIMMYT-IITA
Farako-Ba 86 Pool 16 DT	IITA-SAFGRAD
Farako-Ba 88 Pool 16 DR	IITA-SAFGRAD
FBC 6	Burkina Faso
Ikenne 88 BU-ESRW	IITA
Kamboinse 88 Pool 16 DT	IITA-SAFGRAD
Kawanzie	Ghana
Maka-SR	Mauritania-SAFGRAD
SAFITA-2	IITA-SAFGRAD
TZE Comp. 3x4	IITA
TZESR-W	IITA
TZESRW-SE	IITA
Mexican 17 Early	Ghana
Jaune Dente de Bambrey	Senegal
MTS	IRAT/Côte d'Ivoire

**Table 2c. Maize Varieties Made Available to NARS through the Network**

iii) Extra-early maturing varieties for Sudan savanna and to bridge hunger gap in other zones. No international center worked on this maturity group:

Variety	Origin
(Across 8131 X FJS) x Local Raytiri	IITA-SAFGRAD
CSP	CIMMYT
CSP-SR	IITA-SAFGRAD
CSP x Local Raytiri	IITA-SAFGRAD
Pool 27 x Bua 314	IITA-SAFGRAD
Pool 28 x Gua 314	IITA-SAFGRAD
Pool 30 x Gua 314	IITA-SAFGRAD
TZEE-W1	IITA-SAFGRAD
TZEE-W2	IITA-SAFGRAD
TZEE-White Pool	IITA-SAFGRAD
TZEE-WSR	IITA-SAFGRAD
TZEE-Y	IITA-SAFGRAD
TZEE-Yellow Pool	IITA-SAFGRAD
TZEE-YSR	IITA-SAFGRAD
TZEE-Y	IITA-SAFGRAD
TZESR-W x Gua 314	IITA-SAFGRAD

- iv) Improved Agronomic Practices
- a. Tied ridges for soil moisture conservation in Sudan Savanna.
  - b. Better seed treatment chemicals for improved plant establishment and grain yield.
  - c. Increased plant population for higher grain yield of early and extra-early varieties.
  - d. Earlier date of fertilizer application (top dressing) for increased yield of early and extra-early varieties.



**Table 3a. Submission, Approval and Success Rate of Project proposals from the WECAMAN Member Countries in 1994 and 1996**

Country	Project No.											Total
	94 (96)	1 -	2 7	3 -	4 5	5 8	6 6	7 3	8 1	9 2	10 4	
Benin Submitted Approved % Success							3 2	5 3	1 2	2 2		11 9 81.82
Burkina Faso Submitted Approved % Success			2 2	1 1	1		5 3	3 2	2 1	2 2		16 11 68.75
Cameroon Submitted Approved % Success		1 1	2 1	1 1	1 1	1 1	2 1	3 2	2 1	3 3	1	17 12 70.6
Cote d'Ivoire Submitted Approved % Success		1 1			1 1			2 1	2 2	1		6 6 100
Ghana Submitted Approved % Success		1 1	2 2	1	1 1	1 1	3 1	4 2	1	1 1	2 1	17 10 58.8
Mali Submitted Approved % Success			1				1	2 1	4 2	2 2	1 1	10 7 70.0
Nigeria Submitted Approved % Success					1		2 1	7 2	3 1	1	1 1	15 5 33.3
Togo Submitted Approved % Success							1 1	2 1	4 2	1 2		8 6 75.0
Total Submitted Approved % Success												90 66 73.3

**Table 3b. Distribution of Collaborative Research Projects into Subject Matter Areas Among Member Countries of WECAMAN**

Country	Subject Matter Area				Total (max=4)
	Breeding	Agronomy	Striga Control	Promotion of Impact	
Benin	-	x	x	x	3
Burkina Faso	x	x	x	x	4
Cameroon	x	x	x	x	4
Côte d'Ivoire	x	x	-	x	3
Ghana	x	x	x	x	4
Mali	-	x	x	x	3
Nigeria	-	x	x	x	3
Togo	-	-	x	x	2
Total (max=8)	4	7	7	8	

**Table 3c. WECAMAN Guidelines for Preparing Proposals for Collaborative Research Projects**

1. There are seven projects in all. These are:

Project 1	Breeding for disease resistant, intermediate maturing maize varieties (110 days to maturity). Available funds = \$10,000
Project 2	Breeding for drought tolerant and disease resistant early maturing maize varieties (90-95 days to maturity). Available funds= \$10,000
Project 3	Breeding for disease resistant extra-early maturing maize varieties (80-85 days to maturity). Available funds= \$10,000
Project 4	Striga Control - \$10,000
Project 5	Agronomic research for intermediate, early and extra early maturing varieties. Available funds = \$24,000
Project 6	Promotion of technology transfer. Available funds= \$24,000
Project 7	Promotion of on-farm level seed production. Available funds= \$12,000

2. Projects 1, 2, 3 and 4 would each be assigned to 2-3 countries (lead centers) on competitive basis.

3. Projects 5, 6 and 7 would be assigned to participating countries on the basis of need, interest in any of these three projects.

4. The criteria for selection of lead centers would be: submission of well conceived research proposal for review by ad-hoc Research Committee; availability of qualified research personnel; and financial and infrastructural resources to effectively carry out.

- Technology Transfer Through On-farm Level Production - Some farmers were trained in seed production and post-harvest activities. Seeds of identified and/or released varieties have been multiplied and on-farm trials conducted. The involvement of all member countries in this project is very encouraging. Here again, it is beyond the capability of WECAMAN to be fully involved in technology transfer and on-farm level seed production in isolation. It could act as a catalyst in the creation of new linkage mechanisms of stakeholders and be part of such partnership initiatives to have a sustainable technology transfer scheme in place

### *Resident Research*

The Network Coordinator spends about 25 percent of his time on regionally oriented resident research on problems which are an integral part of the Networks program. These include: breeding for drought-tolerant Striga disease and streak resistant early varieties; germplasm conservation and maintenance; seed multiplication of RUTVs; and the establishment of nurseries for training purposes. This arrangement will enable the coordinator to stay abreast of new developments in the area of maize research. However, breeding for drought and Striga resistance may not produce the desired end products during the life of the project (see comments above).

### *Regional Trials*

The objectives of the regional trials are to provide a forum for national scientists to test their elite varieties and technologies to promote their exchange within the sub-region. The Coordinator packages the trials and dispatches the sets to both member and non-member countries. Entries include seed of varieties emanating from the Network as well as varieties contributed by the NARS scientists. Two types of RUTVs (early and extra-early) were offered in 1993-95 (Tables 4a and 4b). In the early RUTVs, 37, 34 and 32 sets were sent to eight member countries and non-member countries in 1993, 1994 and 1995 respectively (101 sets for three years). The corresponding figures for extra-early RUTVs were 32, 26 and 30 for 1993, 1994 and 1995 respectively (88 sets for three years.) In general, the rate of recovery was good (except Mali and Nigeria).

Achievements - The Network's achievements include: availability of new early and extra-early varieties for the semi-arid zones of WCA; participation of NARS scientists in contributing varieties to regional trials; NARS scientists benefitting in terms of germplasm through such exchange mechanisms.

### *Exchange of Scientific Information and Technologies*

Scientific information and technologies exchange is accomplished through monitoring tours and consultation visits to National programs and training and regional workshops.

Monitoring Tours - Groups are composed of selected members of the Steering Committee, the Network Coordinator, IARCs scientists and NARS scientists selected by their Directors of Research. The Network Coordinator proposes names of Steering Committee members based on their qualifications and experience in the relevant disciplines. These are approved by the Steering Committee. Monitoring tours are held every two years. Weaker NARS are visited by the Steering Committee and not by all the Monitoring Tour groups. Since Monitoring Tours have a value not only as a verification mechanism but also as an opportunity for professional growth, the exclusion of NARS scientists from visiting weaker NARS defeats the intended purpose. Part of this anomaly is due to shortage of funds. Monitoring tours are expensive but have a high pay off in capacity building. Such visits should not be limited strictly to Network funded projects. They should

Table 4a. Description of Entries in RUVT Early, 1993-1995

Entry No.	Name	Proposed By	Parentage	Grain Type	Year Evaluated		
					1993	1994	1995
1	KAMBOINSE 88 POOL 16 DT (RE)	SAFGRAD	Pool 16 (Tropical Early White-Dent)	White-dent	✓	✓	✓
2	FARAKO-BA 90 POOL 16 DT (HD)	SAFGRAD/Burkina	" "	White-dent	✓	✓	✓
3	INA 90 POOL 16 DT	SAFGRAD/Benin	" "	White-dent	✓	✓	X
4	MAROUA 90 POOL 16 DT	SAFGRAD/Cameroon	" "	White-dent	✓	✓	X
5	NYANKPALA 90 POOL 16 DT	SAFGRAD/Ghana	" "	White-dent	✓	✓	X
6	BDP-SR BC5	SAFGRAD/Benin	BDP (local variety from Benin), SR donor	White-dent	✓	✓	✓
7	FBC 6	Burkina Faso	Composite of DMR-ESRY, Rod 6, Rod 12, Revolution precoce, FBC4, Maka, IRAT217 and TZESR-Y C2	Yellow semi-flint	✓	✓	X
8	TZE COMP 3 C1	ITTA	Composite of early maturing germplasm	White flint	✓	✓	✓
9	MAKA-SR BC5	SAFGRAD/Mauritania			✓	✓	✓
10	TZE Comp 4 C1	IITA	Maka (from Mauritania), SR Donor	Yellow semi-flint	✓	✓	✓
11	DORKE SR	Ghana	Pool 16 (Tropical Early White-dent)	White-dent	✓	✓	✓
12	CHECK	Collaborator	Various	Various	X	X	✓
3*	AB II	Togo		White-dent	X	X	✓
4*	Syn E2	WECAMAN/Cameroon		White-dent	X	X	✓
5*	NAES POOL 16 DT	WECAMAN/Ghana	Pool 16 (Tropical Early White-dent)	White-dent	X	X	✓
7*	TZE Comp 4 DmR BC2	IITA	A composite of early maturing germplasm	White-dent	X	X	✓
12*	KPB	Burkina Faso		White-dent	X	X	✓

Table 4B. Description of Entries in RUVT Extra-Early, 1993-1995

Entry No.	Name	Proposed By	Parentage	Grain Type	Year Evaluated		
					1993	1994	1995
1	CSP-SR BC3	IITA-SAFGRAD	Compuesto Selection Precoz, SR source	Yellow flint	✓	✓	X
2	TZEE-W-SR BC3	IITA-SAFGRAD	Local & introduced germplasm, SR source	White-semi-dent	✓	✓	✓
3	TZEE-Y-SR BC5	IITA-SAFGRAD	Local & introduced germplasm, SR source	Yellow flint	✓	✓	✓
4	TZESR-W X GUA 314	IITA-SAFGRAD	TZESRW x Columbian germplasm	White flint	✓	✓	✓
5	CSP SR BC5	IITA-SAFGRAD	Compuesto Selection Precoz	Yellow flint	✓	✓	✓
6	TZEE-W	IITA-SAFGRAD	Local & introduced germplasm	White-semi-dent	✓	✓	X
7	TZEE-Y	IITA-SAFGRAD	Local & introduced germplasm	Yellow flint	✓	✓	X
8	CSP X L RAYTIRI	IITA-SAFGRAD	CSP X Local variety	Yellow flint	✓	✓	✓
9	TZEE-Y	IITA-SAFGRAD	Local & introduced germplasm	Yellow flint	✓	✓	✓
10	CHECK	Collaborator	Various	Various			✓
1*	KEJ	Burkina Faso		Yellow flint			✓
3*	KEB	Burkina Faso		White flint			✓
6*	CSP-SR X TZEE-Y	Cameroon	Local & introduced germplasm	Yellow flint			✓

\* Codes for 1995 only

include all NARS trials relevant to the constraints targeted by the Network and should also include visits to extension systems and agribusiness to provide a linkage mechanism for technology transfer. Two monitoring tours were organized to Côte d'Ivoire and Mali (1994) and Ghana and Burkina Faso (1996).

Consultation Visits - One of the responsibilities of the Network Coordinator is to hold consultation visits to National programs. Consequently, the following visits were made: 1994 (three countries); 1995 (seven countries), and 1996 (five countries). Details are give in Table 5. Such visits have enabled the Network Coordinator to establish better communication between the Network and NARS and to verify the proper execution of collaborative research projects.

**Table 5. Consultation Visits**

Year	Country Visited	Date of Visit
1994	Togo Benin Cameroon	Sept. 25-28 Sept. 28 - Oct. 1 Oct. 6-8
1995	Burkina Faso Ghana Benin Togo Côte d'Ivoire Burkina Faso Cameroon-	May 7-9 Aug. 10-26 Sept. 18-23 Sept. 24-29 Oct. 18 and 30 Oct. 24-28 Oct. 1-8
1996	Togo Benin Nigeria Côte d'Ivoire Mali	Oct. 13 Oct. 8-11 Oct. 13-16 Oct. 2-4 Oct. 16-19

Biennial Workshops - Regional workshops are held in those countries with adequate facilities and reasonable logistical costs. Member countries do not have an equal opportunity to host such regional workshops. A biennial regional workshop on maize was organized in 1995 in Cotonou, Benin where 60 maize scientists participated. This workshop was organized jointly with the Regional Maize and Cassava Project (RRPMC). In 1994, a special workshop on Striga control and technology transfer was organized for eight scientists, one from each of the Network member countries. Another workshop, held in Ghana, was organized in seed production in 1995. Such workshops serve as a vehicle of information exchange and promote friendship among NARS scientists.

### *Impact Assessment*

Significant progress has been made by WECAMAN in varietal development. Emphasis has now been shifted to the promotion of available technologies, seed production and on-farm research. In an attempt to monitor the adoption of Network technologies, WECAMAN has asked each member country to collect such information. The Network has also sponsored economists from Benin and Côte d'Ivoire to participate in an impact assessment of research on maize production, productivity and incomes. Progress on the issue is minimal. A clear government

policy and implementation procedures for technology transfer and commercialization is needed to tackle this important and timely issue. The Network should devote its effort to delineate those issues that can be solved through research as opposed to policy guidelines. NARS should also develop the capability of better packaging and dissemination of results, achievements, and information so as to be able to sell their output to their constituency.

### *Human Resources Development*

WECAMAN considers training as one of its main activities to strengthen the research capabilities of the national programs. The following short-term training courses were offered by the Network: a five-month Technician Training course for eight participants in 1994; a two-week seed production course for 27 participants in 1995; a one-week Preparation of Extension Materials course for 15 participants in 1996; a two-week Striga Control and Technology Transfer course for eight participants in 1995; a two-week Advanced Statistical Computing course for 17 participants in 1996; and a five-month Technicians Training course for nine participants in 1996. Short-term training programs have been effective for the most part. Long-term (degree) training is lacking. However, this type of training is beyond the mandate and capacity of Networks (though they could facilitate such training through their IARCs and provide guidance with thesis research).

Long-term training is best addressed through bilateral or other arrangements. In November 1995, the European Union (EU) indicated to all IARCs in sub-Saharan Africa that the EU was willing to consider funding one joint proposal on training activities from the region. The Inter-Center Training Group (ICTG) of the IARCs has met twice so far (November, 1995 at WARDA and May, 1996 at ISNAR) to work on this proposal, in addition to efforts by the individual IARCs. The proposal is being jointly written by the IARCs and NARS, and the regional organizations are to be actively involved in the execution of the project. A new approach to training is in the pipeline, and WECAMAN should link up with it through IITA.

### *Technologies in the Pre-release Stage*

Three Quality Protein Maize (QPM) hybrids from Ghana, four open-pollinated varieties from IITA/WECAMAN, and ten open-pollinated varieties from WECAMAN are to be promoted for on-farm evaluation in the member countries. A large number of extra-early and early varieties of maize are also in the pipeline at the Network level in 1996. Three types of cultural practices are also in the pipeline. They are: (1) the use of *Parkia biglobosa* pods to reduce Striga population in maize; (2) the use of peanut varieties Rmp 12, 21, and 69-01 and the cowpea variety 90K-56 for stimulation of Striga seed germination and hence its control; and (3) the use of maize-legume rotations for improved soil fertility and increased grain yield. Several promising maize technologies are also in the pipeline for release/promotion by the Network member countries in 1996 (Table 6a, 6b, and 6c).

### *Network Publications*

The following publications have been produced during the period 1993-96: (1) Annual Reports for 1993-94, 1994-95 and 1995-96; (2) five reports of Steering Committee meetings; (3) Ad-hoc Research Committee Reports (1994, 1995 and 1996); (4) reports of the early and extra-early RUTVs (1993, 1994 and 1995); (5) two quarterly performance reports submitted to USAID only; (6) the WECAMAN Project Proposals (1993 and 1996) along with the revised logframe for the 1996 proposal; and (7) four workshop and symposium presentations. (See Appendix III for a list of publications.)

**Table 6a. Technologies in the Pre-release Stage: Maize Varieties Tolerant/Resistant to Biotic and Abiotic Stresses**

Variety	Type	Origin
GH 110-28	Hybrid (QPM)	Ghana
GH 110-88	Hybrid (QPM)	Ghana
GH 132-28	Hybrid (QPM)	Ghana
GH 22 x 1368 x 5012	Hybrid	Ghana
GH 20 x 1368 x 5012	Hybrid	Ghana
Acr 9349 STR-A	OPV	IITA/WECAMAN
9143-13	OPV	IITA/WECAMAN
9147-3	OPV	IITA/WECAMAN
9147-11	OPV	IITA/WECAMAN
DR-W Pool	OPV	WECAMAN
DR-Y Pool	OPV	WECAMAN
TZEE-W Pop-DT-STR*	OPV	WECAMAN
TZEE-Y Pop-DT-STR	OPV	WECAMAN
TZE-W Pop-DT-STR	OPV	WECAMAN
TZE-Y Pop-DT-STR	OPV	WECAMAN
EV DT 94	OPV	WECAMAN
95 TZEE-W1	OPV	WECAMAN
95 TZEE-W2	OPV	WECAMAN

QPM = Quality protein maize

\*DT = Drought tolerant; STR = Striga tolerant/resistant; SR = streak resistant

**Table 6b. Promising Technologies in the Pipeline at the Network Level in 1996**

Attributes	Name of Varieties
1. Extra-early varieties	(Across 8131 x JFS) x Local Raytiri, CSP-SRBC, CSP x Local Raytiri, Pool 27 x Gua 314, Pool 28 x Gua 314, Pool 30 x Gua 314, TZEE-Y-SR BC <sub>3</sub> , TZEF-Y-SR, TZESR-W x Gua 314, 95 TZEE-W <sub>1</sub> SR, 95 TZEE-W <sub>2</sub> SR, TZEF-SR, 95 TZEE-Y <sub>1</sub> , KEJ, KEB, CSP-SR x TZEE-WSR
2. Early varieties	Across 90 Pool 16 DR, Farako-Ba 90 Pool 16 DT, Ina 90 Pool 16 DT, DT-E-W SR, Kamboinse 90 Pool 16 DT, Maroua 90 Pool 16 DT, Kyankpala 90 Pool 16 DT, Maka SR BC <sub>3</sub> , Dorke SR, Syn. E2, Kamb. 88 Pool 16 DT, TZE Comp 4, BDP SR BC <sub>3</sub> , DT-E-W-SR, TZE Comp 3 C <sub>1</sub> , ACR.95 TZE Comp, AB11, NAES Pool 16 DT, KPB, KPJ, AK 9331-DMRSR, ACR 92 TZE Comp5-W, DT-E-Y-SR BC <sub>3</sub> , DTE-W SR BC <sub>3</sub>
3. Cultural practices	i) the use of parkia biglobosa podo to reduce Striga population in maize; ii) the use of peanut varieties Rmp 12, Rmp 21 and 69-01 and the cowpea varieties 90 K-56 for stimulatino of Striga seed germination and hence Striga control; and iii) the use of maize-legume rotations for improved soil fertility and increased grain yield.



**Table 6c. Promising Maize Technologies in the Pipeline for Release/Promotion by Network Member Countries in 1996**

Country/Name	Technologies
Benin	DMR-ESRW, 88 Pool 16 DT, EV 8328-SR, TZEE-W SR
Burkina Faso	FBC 6, KPB, KPJ, KEB, KEJ, Pool 16 DT, TZEE-W SR, TZEE-Y SR
Cameroon	TZEE-W SR, TZEE-Y SR, Syn E2, Pool 16 DT
Côte d'Ivoire	Maka SR BC <sub>5</sub> , Pool 16 DT, Ferke 8336, TZE Comp 4, DMRESR-Y, TZEE-W SR, CSP-SR BC <sub>5</sub> , BC <sub>5</sub> , CSP-SR BC <sub>5</sub> , TZE SR X Gua 314
Ghana	Dorke SR, Obatanpa (QPM), TZEE-W SR, QPM hybrids
Mali	DMR-ESRY, TZEF-Y SR, Suwan I, Nieleni, Sotubaka Appolo
Nigeria	TZEE-W SR, TZEF-Y, TZE SR-W x Gua 314, TZE Comp 4
Togo	AB11, AB12, AB13, TZEF-Y SR, TZEE-W SR BC <sub>5</sub>
All Countries	<ul style="list-style-type: none"> <li>a) Tied ridges for soil moisture conservation in Sudan savanna</li> <li>b) Use of seed treatment chemicals for improved plant establishment and grain yield</li> <li>c) Optimal plant population for higher grain yield of early and extra-early varieties</li> <li>d) Optimal time of fertilizer application (top dressing) for increased yield of early and extra-early varieties</li> <li>e) Use of local sources of fertilizer and organic matter for soil improvement</li> <li>f) Use of a row of maize to two rows of groundnut in maize-groundnut association to maximize grain yields</li> <li>g) Use of appropriate dates of planting in maize-legume intercrop to maximize grain yields.</li> </ul>

Publications are primarily annual reports, Steering Committee meeting reports, RUTV reports and workshop proceedings. Dissemination is not adequate. Quarterly reports go to donors only. There is a need for a joint Newsletter by all Networks for wider circulation. Support is needed for journal publications, and more importantly there is a need for translating research results into user friendly communications.

## **SORGHUM NETWORK (WECASRN)**

### *Background*

The West and Central African Sorghum Research Network (WCASRN) was created in 1985 with a membership of 18 countries. Between 1986 and 1991, a period corresponding to Phase II of SAFGRAD funding by USAID, ICRISAT was sub-contracted by SAFGRAD to manage the Sorghum Network. The coordination unit was based with ICRISAT in Ouagadougou until 1989 when the ICRISAT program became a regional program and moved to Bamako, Mali. At the end of SAFGRAD Phase II (August 1991), USAID financed a transition period between September 1991 and December 1992, and a further extension until March 1993. The activities of the Network were carried out without funding from USAID between April and September 1993. In 1993, ICRISAT submitted a proposal to USAID and received a grant of \$400,000 in September 1993 to support the West and Central African Research Network (WCASRN) for one year. The grant was renewed at the same level of funding each

year. From October 1, 1996 to September 30, 1997, the level of funding was reduced to \$345,000. The Network Coordination Unit is based at the ICRISAT research station at Samanko, and is coordinated by a full-time scientist, recruited competitively among the member countries, and is supported by a seven-member Steering Committee. In 1995, the Network formulated and submitted a Medium-Term Plan (1995-98) to USAID for funding. The Medium-Term Plan (MTP) development led to a revision and reformulation of the original objectives with emphasis shifting to technology development appropriate to farmers in the different agro-ecologies to conduct and manage research commonly agreed upon through competitive bidding of projects and ensure dissemination of scientific information through workshops, visits, monitoring tours, publications and extension.

### *Network Administration and Management*

At the time USAID's funding was coming to an end in March 1993, a new concept of regional integration in sorghum research (known as the Sorghum Pole) was initiated by INSAH and SPAAR for the CILLS member countries and later enlarged to include non-CILLS countries. In 1994, the Pole concept was unanimously rejected by members of a general meeting, and the Network concept was reinforced. Since 1994, WCASRN has had three Coordinators, (one being interim), the current one appointed in September 1996. This rapid turnover of coordinators is partly due to the uncertainty of the funding situation.

### *Network Size and Complexity*

Since its inception, WCASRN has embraced all eighteen member countries in West and Central Africa, hence resources are thinly spread. The governance and structure of the Sorghum Network is identical to that of the Maize Network except that there is no ad-hoc research committee in WCASRN. Instead, a concept of working groups is adopted (on an informal basis) to increase efficiency. Five working groups have been formed composed of ICRISAT and NARS scientists, and their mandate is to take leadership on behalf of the Steering Committee and advise the Steering Committee on training needs. Five working groups have been formed (technology transfer, pest control and management, Striga control and management, adoption/impact assessment and processing and utilization of sorghum). Priority setting is based on inputs of NARS directors or their representatives at planning meetings of member countries (the general assembly.) Broadly speaking, the Sorghum Network's activities are similar to those of the Maize Network, i.e., collaborative research projects assigned on a competitive basis; resident research by the Coordinator; and scientific information exchange, training, and impact assessment. ICRISAT provides support for the coordination unit and technical backstopping using its own core funding. The working relationships between the Sorghum Network and the USAID/EG/AFS staff is reportedly very cordial. The Network coordination unit has access to both USAID/REDSO in Abidjan and USAID/Bamako.

### *Technology Development, Exchange and Dissemination*

The development process, definition of priorities, disbursement of funds, project execution and monitoring are more or less the same as those of the Maize Network described above. There were no activities in 1994 as it was a transition period for the restructured Network. The collaborative research projects conducted in 1995-96 included: on-farm variety tests; regional adaptive trials; a regional Striga resistance trial; a regional Striga agronomic trial; soil fertility competitive projects; head bug/grain mold regional trials; and sorghum processing and utilization projects. The allocation of research projects and budget among the 18 WCASRN countries in 1995-96 is given in Tables 7a and 7b. On-farm variety trials were conducted in eight countries while regional adaptive trials were conducted in all member countries. The Striga control package trials were tested in nine countries. The soil fertility competitive projects were conducted in two countries only (Burkina Faso and Chad.) The head bug/grain mold interaction trials were tested in ten countries. The sorghum processing and utilization projects were handled by two countries (Côte d'Ivoire and Mali.) Guinea Conakry did not receive any funds

Table 7a. Allocation of Research Projects and Budget Among WCASRN Member Countries, 1995-96 Season

Countries	P1. Verification and Transfer of Technology				P2. Control of Insect Pest and Diseases	P3. Diversification of Sorghum Processing and Utilization	Budget Allocation* (FCFA)		
	SP11. Evaluation of Improved Cultivars		SP2. Striga Control Package		SP3. Cropping Systems				
	A-111 (on-farm)	A-112 (Reg'l trial)	A-121 (Variety)	A-122 (Agronomy)	Competitive Projects	Headbug Grain Mold Interaction	Competitive Projects	Research	Coordination
Benin	4	2	1	1	0	1	0	3 440 000	200 000
Burkina Faso	6	3	1	1	1	1	0	6 360 000	200 000
Cameroon	0	2	1	2	0	1	0	1 800 000	200 000
Cape Verde	0	1	0	0	0	0	0	300 000	200 000
Central Afr. Rep.	0	1	0	0	0	1	0	900 000	200 000
Chad	4	2	1	1	1	1	0	4 740 000	200 000
Côte d'Ivoire	0	1	0	0	0	1	1	2 400 000	200 000
The Gambia	0	1	1	1	0	0	0	900 000	200 000
Ghana	0	1	1	1	0	1	0	1 500 000	200 000
Guinea-Bissau	0	1	0	0	0	0	0	300 000	200 000
Guinea-Conakry**	0	1	0	0	0	0	0	0	200 000
Mali	6	3	1	1	0	1	1	6 060 000	200 000
Mauritania	2	1	0	0	0	0	0	1 120 000	200 000
Niger	4	2	1	1	0	1	0	3 440 000	200 000
Nigeria	6	3	1	1	0	1	0	4 560 000	200 000
Senegal	4	1	0	0	0	0	0	1 940 000	200 000
Sierra Leone	0	1	0	0	0	0	0	300 000	200 000
Togo	0	2	0	0	0	0	0	600 000	200 000
<b>Budget (FCFA)</b>	<b>14 760 000</b>	<b>8 400 000</b>	<b>2 700 000</b>	<b>2 700 000</b>	<b>3 100 000</b>	<b>6 000 000</b>	<b>3 000 000</b>	<b>40 660 000</b>	<b>3 400 000</b>

\* Research budget allocation is based on the following:

- P1. SP11, A111 (on-farm variety tests) : 410 000 FCFA per trial (site)
- P1. SP11, A112 (reg'l adaptive trials) : 300 000 FCFA per trial
- P1. SP12, A121 (reg'l Striga resistance) : 300 000 FCFA per trial
- P1. SP12, A122 (reg'l Striga agronomic control trial) : 300 000 FCA per trial
- P1. SP13, Soil fertility competitive projects : 1 800 000 FCFA for Burkina, 1 300 000 for Chad
- P2. Headbug/grain mold regional trial : 600 000 FCFA per trial
- P3. Processing/utilization projects : 1 500 000 each for Côte d'Ivoire and Mali

\*\* Funds were not allocated to Guinea-Conakry this year as funds allocated in 1995 were unused because the trials were not conducted.

**Table 7b. NARS Accounting of Network Funds, Example from 1995 Disbursements**

Country	Amount Transferred (CFA)	Amount Accounted For (CFA)	% of Amount Transferred Justified by 30 April 96
Benin	3727174	3731765	100
Burkina Faso	12676000	5182656	41
Cameroon	1020000	1022330	100
Cape Verde	610000	434200	71
Chad	8462000	3738445	44
Côte d'Ivoire	1610000	1648886	100
The Gambia	835050	432480	52
Ghana	610000	609544	100
Guinea Bissau	610000	606611	100
Guinea Conakry	446000	0	0.00
Mali	6888715	310506	45
Mauritania	1059803	736536	70
Niger	3615744	3489448	97
Nigeria	5034702	680213	13*
Senegal	2457183	1290086	53
Sierra Leone	610000	520772	85
Togo	610000	387613	64

\* Funds arrived late in the year due to delays in the banking system. Once funds were received and released for use for the WCASRN projects, all expenditures and supporting documents were to be verified through the Institute's accounting office for transmission to ICRISAT. Delays were encountered at this level too. Steps have been taken to avoid delays both from ICRISAT and from IAR.

Source: WCASRN Annual Report 1995, page 24

during this period as funds advanced the previous year were not used. Though each country received different amounts of research funds, all 18 countries received the same amount (FCFA 200,000) for coordination purposes.

### *Technology Verification and Transfer*

This project has three sub-projects: testing of high yielding cultivars under farmers' conditions; testing of improved packages for Striga control under farmers' conditions; and testing of improved technologies for sustainable improvement of sorghum-based cropping systems.

#### *Testing of High Yielding Cultivars under Farmers' Conditions*

In 1994 and 1995 improved cultivars were tested in eight countries under farmers' conditions. Twenty-seven promising varieties were identified for further testing (see Tables 1, 2, 3, of 1995 Annual Report, pages 6-7).

#### *Testing of Improved Packages for Striga Control under Farmers' Conditions*

Testing of cultivars tolerant to Striga was conducted in six countries. No inclusive results were provided.

## *Testing of Improved Technologies for Sustainable Improvement of Sorghum-based Cropping Systems*

Emphasis was on improvement of soil fertility through the use of rock phosphates, organic matter, crop residues and nitrogen fixing legumes. The tests were conducted in Burkina Faso and Nigeria. A lot of research has been conducted on Striga and soil fertility in the past several years in the region. Perhaps, the Network should take stock of what has been achieved so far, or is achievable through research, and develop a medium-term plan accordingly. For example, the use of rock phosphate in improving soil fertility has been proven beyond doubt; the question is how difficult or how expensive is it to mine and/or extract the element? In short, the Network should focus on priority issues that are achievable through research with its limited resources.

## *Sustainable Control of Pests of Sorghum*

The objective of this project is to examine the interaction between sorghum head bug and grain mold for control of insect pests under farmers' conditions. It is being conducted in ten out of 18 countries.

## *Diversification of Sorghum Utilization*

Chad undertook a project on the use of sorghum as weaning food in 1995 and 1996. Mali and Côte d'Ivoire are conducting research in parboiled sorghum and purification of sorghum beer, respectively. These activities should be accelerated in order to create a demand for sorghum which is a low value staple crop with limited market outlets. The Network could play a major role in promoting partnership among stakeholders (processors, end-users and producers). This activity is likely to attract more donor funds if a well defined medium-term project is put in place.

## *Seed Technologies Released*

Several varieties of sorghum are currently being adopted in member countries. Most of them were developed by NARS and ICRISAT prior to 1993, i.e., before the creation of the current WCASRN. The list of varieties developed since 1986 and diffused by WCASRN is given in Tables 8 and 9.

## *Seed Technologies in the Pipeline*

Some twenty-eight varieties are being yield tested in regional trials. Six promising varieties have been identified by a panel of experts during the monitoring tours for further testing. These are: ntenimissa - a high yielding, medium variety suitable for an 800-900 mm rainfall zone; ICSH 89002NG, a hybrid with excellent panicle and good grain quality; Sarioso 9, derived from the guineense land races with good grain quality; CGM19/9-1-1, the same as Sarioso 9; 90SN7, an early maturing caudatum variety with loose panicle and vigor; and BF 88-2/31-3, an early maturing and input responsive variety.

## *Impact Assessment*

Three adoption and impact studies were conducted in Cameroon, Chad and Mali in 1995 with support from WCASRN. The studies in Chad and Cameroon evaluated the impact of an ICRISAT sorghum (S-35) which was introduced in 1981 and 1986 in Cameroon and Chad, respectively and tested widely in the Network's regional trials. The Mali study assessed the impact of millet and sorghum improvement research. In Chad, the adoption rate of S-35 increased from seven percent in 1990 to 27 percent in 1995. In Cameroon, S-35 adoption increased

**Table 8. Seed Technologies Based on NARS Research and Diffused Through WCASRN, 1986 to 1996**

Technology	Where Developed	Where Used	Level of Use	
			Research	Farmer
S35	Nigeria*	Cameroon		X
	Cameroon	Chad		X
	Chad	Togo	X	
CE180-33	Senegal	Togo	X	
CE145-66	Senegal	Mauritania		X
CE151	Senegal	Mauritania		X
Nagawhite	Ghana	Mauritania	X	
Malisor 84-1	Mali	Guinea	X	
		Togo	X	
		Cote d'Ivoire		X
BF83-3/48-2-2	Burkina Faso	Senegal		X
CS95	Cameroon	Togo	X	
Sepon 82	Niger	Senegal	X	
		Togo	X	
S-129	Senegal (CI)	Ghana	X	
IRAT 209	Niger	Burkina		X

**Table 9. Seed Technologies Based on ICRISAT Research and Diffused Through WCASRN, 1986 to 1996**

Technology	ICRISAT Programme where Developed	Where Used	Level of Use	
			Research	Farmer
ICSV 111 IN	India	Benin		X
	Burkina Faso	Ghana		X
		Nigeria		X
		Senegal	X	
		Togo	X	
ICSV 1079 BF	Burkina Faso	Mali		X
		Togo	X	
ICSV 1078 BF	Burkina Faso	Mali	X	
		Togo	X	
ICSV 1083 BF	Burkina Faso	Togo		X
ICSV 1089 BF	Burkina Faso	Senegal		X
		Mali	X	
		Togo	X	
ICSV 1063 BF	Burkina Faso	Mali		
		Togo	X	
ICSV 1171 BF	Burkina Faso	Senegal	X	
E 35-1	India	Gambia	X	
	Burkina Faso	Burkina Faso		X
ICSV 400	India	Nigeria		X
ICSH 89002 NG	Nigeria	Nigeria		X

from 24 percent in 1990 to 35 percent in 1995. In 1995, S-35 covered 64,000 ha and 44,000 ha in Chad and Cameroon, respectively (Tables 10 and 11). The adoption of S-35 together with recommended crop management practices have resulted in significant yield gains in farmers' fields (51 percent and 31 percent in Chad and Cameroon, respectively.) In Mali, farmers gained 52 percent over and above the yield from traditional cultivars by using improved varieties. Earliness, high yield and good food and fodder qualities of the improved varieties were some of the traits liked by the farmers. Lack of seeds, information and technological packages that go with them were mentioned as the reasons by the farmers who did not adopt the technologies.

**Table 10. Sorghum (S-35) Adoption Rates and Area in Chad and Cameroon, 1990-1995**

Year	Chad			Cameroon		
	Adoption Rate (%)	Total Rainfed Sorghum Area	Area Under S-35 (ha)	Adoption Rate (%)	Total Rainfed Sorghum Area (ha)	Area Under S-35 (ha)
1990	7	170 500	11,935	24	133,685	32,350
1991	8	208 000	16,640	22	142,815	31,783
1992	10	234 600	32,844	24	154,876	37,617
1993	17	184 800	36,860	30	137,760	42,125
1994	22	233 980	56,155	30	134,967	41,780
1995	27	237 259	64,059	32	134,991	44,091

Source: Based on 1995 on-farm survey results and national agricultural statistics.

**Table 11. Adoption of Improved Sorghum Varieties in Mali, 1990 to 1995**

Year	Adoption Rate (%)	Total Sorghum Area (ha)	Area Under Improved Sorghum Varieties (ha)
1990	17	809 000	137 530
1991	19	741 000	140 790
1992	20	820 000	164 000
1993	22	780 000	171 600
1994	24	977 000	234 480
1995	29	977 000	283 330

Source: Based on 1995 on-farm survey results and national agricultural statistics.

### *Capacity Building*

The Network's activities are essentially geared towards short- term training of young scientists and technicians. Long-term training is lacking (common to all Networks). Roughly 80 scientists and technicians from the 18 member countries have been trained under the auspices of the WCASRN/ICRISAT/CIRAD training activities during the review period. The breakdown of WCASRN training activities were as follows: disease management; impact assessment; agricultural experimentation; Striga management; and insect pest management. More

emphasis has been given to agricultural experimentation and insect pest management training (25 percent each of the total number of participants.) The participants were supplied with the GENSTAT software and documentation by ICRISAT free of charge.

### ***Publications and Document Produced by WCASRN***

Approximately fourteen documents were produced by WCASRN during the period October 1, 1993 to September 30, 1996 (Appendix IV). Most of the publications are annual reports, Steering Committee and monitoring tour reports. Quarterly reports go to donors only. Dissemination is not adequate. Support is needed for scientific journal and newsletter productions.

### ***Integration of Networks***

The Sorghum and Millet Networks are both hosted by ICRISAT in Mali and Niamey, respectively. The Sorghum Network is financed by USAID while the Millet Network is being financed by the Swiss Development Corporation. The Millet Network (ROCAFREMI) covers 14 countries in West and Central Africa, all of which are included in the 18 member countries covered by the Sorghum Network (WCASRN). The similarities between the two Networks are enormous. Although the major sorghum and millet growing areas do not necessarily overlap, there are many countries where both crops are grown together. In such cases, the same NARS scientist is usually responsible for both crops. Since both Networks have a similar structure and the projects are more or less organized in the same way, it would be cost effective (in both human and financial resources) to have a jointly sponsored Sorghum and Millet Network under one management structure. Both NARS and IARCs scientists seem to favor such integrated approaches.

In fact, the argument could be stretched even further to integrate several activities of the five Networks in the region. Almost the same scientists represent their countries at separate Network meetings and workshops. Several activities of the various Networks could be jointly sponsored and executed to make them cost-effective. Examples of such activities include short-term training courses, workshops, monitoring tours, impact assessment studies, general assembly meetings to set priorities, technology transfer and other activities that cut across commodities.

## **WARDA'S RICE TASK FORCES**

### ***Background***

At a meeting of national rice scientists held in 1989, two research working groups (Varietal Improvement Research and Crop and Resource Management Research) were constituted. The Work Groups diagnosed a range of problems that have troubled relationships between NARS and IARCs in the past and which required correction in the development of WARDA's new approach. Based on this diagnosis, the concept of Task Forces was born, and in 1991, the first Task Force became operational. The Task Forces were designed as mini-Networks that bring together regional scientists who are working on similar research problems in similar rice growing environments. Task Forces are structured along thematic groupings. Currently, there are nine such Task Forces, i.e., Upland Rice Breeding, Lowland Rain-fed Rice Breeding, Mangrove Swamp Rice Breeding, Irrigated Rice Breeding, Problem Soils, Rice Based Cropping Systems, Rice Economics, Integrated Pest Management (IPM), and Sahel Resource Management. Today, more than 75 national rice scientists from 17 countries cooperate in the nine Task Forces.



Task Force members are active researchers nominated by national research directors from countries where the focal theme is important. The Task Forces are self-managing with plenary meetings and steering committees chaired by national scientists with a WARDA scientist serving as Task Force Coordinator.

National programs with strengths in particular research disciplines have been identified to play a lead role to generate technologies working closely with WARDA scientists for the benefit of the region. All NARS participate in the testing of new technologies and in the exchange and dissemination of results. Through special complementary funding by other donors, the Task Forces also provide small grants to assist national programs to conduct activities having spill-over benefits and are beyond the scope of national research.

### ***Objectives***

The Task Forces have four primary objectives:

- coordinate regional research activities thereby reducing duplication and identifying complementary forms of collaboration;
- provide national scientists with access to research information and research results;
- transfer and test technologies in a more targeted and systematic manner; and
- strengthen the regional rice research system through technical, material and financial assistance.

In May 1993, the Africa Rice Network Project (Task Forces) was developed and submitted to USAID for funding to complement existing donor commitments to allow WARDA to expand its collaboration with national program. The goal was to strengthen the rice research capacity in West Africa on a sustainable basis by enabling NARS scientists to jointly plan and execute complementary research activities.

### ***Technology Development, Exchange and Dissemination***

#### ***Collaborative Research Projects***

One hundred fifty-four (154) collaborative research projects with a total cost of \$332,177 were supported by the Task Forces during 1994-96 (Annex V). Projects included breeding for resistance/tolerance to drought, iron toxicity, blast and other major fungal diseases, African rice gall midge, rice yellow mottle virus (RYMV), control of weeds and major insect pests, nematodes, and research on sustainable rice based cropping systems. The following are the major accomplishments of the USAID supported Task Force activities:

- Seven high-yielding upland rice varieties with multiple stress tolerance are being multiplied by national agencies for on-farm demonstrations and possible release in six countries.
- Two Rain-fed lowland varieties and two irrigated varieties are in the pipeline for release in Nigeria, the Gambia and Côte d'Ivoire.
- Three high yielding mangrove varieties with superior performance in the acid sulphate and saline soils of mangrove swamps are being multiplied for release in Sierra Leone, Guinea Bissau, Nigeria, Senegal and the Gambia.

- Three stable and high-yielding varieties have been released in Senegal.
- Task Force studies on the African rice gall midge (*Orseolia oryzivora*) were conducted in Burkina Faso, Côte d'Ivoire and Mali. These collaborative studies are providing regional information on the ecology and natural predators of the gall midge which would help in the formulation of sustainable integrated control measures.
- Elite materials were screened for resistance to blast. Five varieties were identified as highly resistant.
- In RYMV screening nurseries, three varieties (Moroberekan, Seberong and MR77) have been identified as the most resistant in Mali.
- Several improved varieties selected by the Task Forces out yielded the local checks in on-farm trials (1993-94). Yield gains ranged from 13-58 percent.

### ***Monitoring Tours***

With support from Task Force projects, twelve monitoring tours were organized during 1994-96 as follows: Cameroon, Guinea, Sierra Leone, Mauritania, Senegal and Mali (1994); Burkina Faso, Guinea, Côte d'Ivoire, Chad, Nigeria, Niger and the Gambia (1995); and Burkina Faso, Mali, Guinea and Guinea Bissau (1996).

Seventy-nine NARS scientists and twelve WARDA scientists participated in the above monitoring tours. During these tours, the scientists were able to identify production constraints over a range of conditions, evaluate the performance of technologies in Task Force trials, review small grant management, select genetic materials for future trials and/or release.

### ***Capacity Building***

The following fellowships were awarded to scientists from the region to support short-term training in specific research areas:

- The first fellowship was awarded to a young researcher from Togo to visit WARDA to enhance his capabilities to select rice varieties that were tolerant to weeds. He subsequently developed a full thesis research proposal on this subject.
- The second fellowship was awarded to a young cereal breeder from Ghana in upland and lowland rice breeding.
- The third visiting scientist was a breeder from Togo who selected materials developed by WARDA for the Upland Task Force trials.
- The fourth visiting scientist was an entomologist from Cameroon who worked with WARDA scientists to identify rice field insects collected by IPM Task Force.
- A nematologist from Burkina Faso was awarded a fellowship to work with the WARDA nematologist.
- A breeder from Sierra Leone worked with the WARDA lowland rice breeders.

- An economist from Côte d'Ivoire participated in a USAID-sponsored impact assessment workshop.
- An economist from Sierra Leone traveled to Nigeria and Ghana to provide technical assistance in adoption and impact studies.
- An economist from Mali traveled to Guinea to provide technical backstopping in cost of production studies.
- An economist from Senegal traveled to Bouake to work with WARDA economists and biometrician.
- A visiting scientist from Burkina Faso visited WARDA and interacted with economists in using the SHAZAM program for data analyses.
- The Assistant Minister for Research in the Ministry of Agriculture and the Director General of CARI, Liberia visited WARDA in 1996.
- A scientist from Guinea Bissau attended a four-week training course in breeding production, data analysis and report writing.
- A scientist from Gambia received training for two weeks at WARDA on parasitic nematodes.
- A scientist from Burkina Faso visited WARDA's documentation center.
- A scientist from Sierra Leone visited WARDA for three months to receive training in breeding methodologies.

### ***Institutional Support***

WARDA provided an annual grant of \$30,000 to support the Rice Research Station in Sierra Leone to continue the research activities on Mangrove Swamp Rice Task Force Program.

### ***Regional Workshops***

Project funds were used to finance the participation of 16 West African scientists in five regional workshops, i.e., Gambia, Senegal and Mali (1994); Mali and Niger (1995).

### ***Rice Yellow Mottle Virus (RYMV) Symposium***

WARDA organized the first international symposium on Rice Yellow Mottle Virus (RYMV) in 1995. Fifty-five scientists from 15 countries attended the symposium. The Task Force funds were used to finance travel and subsistence costs for 20 participants; interpretation costs; stationery and refreshments. Based on the analysis of the papers presented, the meeting concluded that: measures of the importance of RYMV and its dynamics are lacking; the variability of the virus is still not well known; the epidemiology of the disease is not yet known; and the mechanisms of resistance are not understood.

The meeting also noted that although the major emphasis of current work is on genetic resistance, different

approaches are being applied simultaneously (pedigree breeding and recurrent selection, wide crosses, inter-specific crosses and creation of transgenic plants using virus coat protein and synthetic genes).

One of the major outcomes of the meeting was to identify areas where separate teams working with different strategies need to share results and harmonize components of their work for greater effectiveness and efficiency. The RYMV International Network was formed by this meeting. Its challenge is to define more concretely the elements of cooperation and to set an ambitious target of developing a solution or several solutions to neutralize the threat of RYMV by the year 2000.

### *Quantitative Assessment of Program Impacts*

- Annual review and planning meetings: 1994 (8), 1995 (9), i.e., one per WARDA Task Force. Steering Committee meetings: 1994 (8), 1995 (9). Regional Workshops: 1994 (3), 1995 (3).
- Varieties released/disseminated through regional evaluations: 1994 (3 in Sahel), 1995 (4).
- Varieties advanced to pre-release stage: 1994 (14), 1995 (16). Yield advantage of improved varieties in on-farm trials: 1994 (15-55 percent), 1995 (15-55 percent). Varieties regionally evaluated: 1993 (600), 1994 (620), 1995 (700). Collaborative research projects implemented: 1994 (51), 1995 (57).
- Scientists participating in training: 1994 (4), 1995 (16).
- Regional monitoring tours: 1994(3-35), 1995(5-29).

As discussed earlier, the Task Force approach is generally preferred by scientists for the following reasons: well focussed common subject of interest in small groups; high participatory nature of planning; greater chance of obtaining individual research grants; less expensive coordination due to the fact that Task Force coordinators are WARDA scientists and are not paid by the project; and better integration of NARS concerns in the IARCs research programs. However, as the Task Forces expanded and accumulated experience, a number of shortcomings have become evident that require WARDA's attention. These include: inadequate circulation of Task Force results and lack of publications have made it difficult for all users to receive the required results on a timely basis; lack of coordination between Task Forces; uneven quality of national research activities leading to unusable results; lack of interdisciplinary approach to research planning and implementation; and limited team work.

Most NARS scientists feel that the number of Task Forces is too many and need to be streamlined. For instance, IPM and Economics cut across disciplines, hence could be part of the Thematic Task Forces. Another scenario could be to combine the four breeding Task Forces into one and group the rest into systems and production, processing and promotion Task Forces. In any event, the decision to streamline its Task Force structure should rest with WARDA as it has gained three years of valuable experience.

### *Task Force Publications*

Between 1993 and 1996, approximately fifty-two publications (Working Group Series) were produced (Appendix VI) broken down as follows: 16 editions in 1993; 20 editions in 1994; 15 editions in 1995; and one edition in 1996.

As is the case with the Maize and Sorghum Networks, all of the publications are workshop proceedings and Steering Committee meetings and monitoring tour reports. As discussed earlier, there is a need for technical scientific journal publications, as well as newsletters.

## **COWPEA COLLABORATIVE RESEARCH NETWORK**

### ***Background***

The activities of the West and Central Africa Cowpea Research Network (RENACO) under SAFGRAD II ended in September 1993, though it had received a very positive assessment. In 1994, a strong appeal was made to USAID by NARS through IITA for continuation of its support. As a result, a sum of \$75,000 was provided by the 1994-95 financial year.

A planning meeting of RENACO was held in Ouagadougou in 1994 to review the status of RENACO. Based on the favorable assessment report of 1992-93, it was agreed that the RENACO program should comprise short- and long-term components. The short-term goal was to improve the extent of the transfer of those technologies generated earlier through on-farm testing with farmers participation. The longer-term component would involve applied research on natural resource management focussing on cereal-based production systems where cowpea is the main secondary crop (the northern Guinea savanna, the Sudan savanna and the Sahel regions).

Due to a shortage of funds, it was decided to focus on technology transfer through a range of adaptive research activities. Consequently, the number of countries where activities would be carried in 1994-95 was reduced from 17 to eight (Benin, Burkina Faso, Cameroon, Ghana, Mali, Niger, Nigeria and Senegal). Each country was requested to submit proposals for short as well as long-term research according to priorities identified during the planning meeting. Funds were allocated for 1994-95 activities to six countries (except Mali and Senegal) as neither sent representatives to the meeting nor submitted research proposals. Funds allocated to RENACO member countries for 1994-95 activities were: \$7,280 to Benin; \$9,086 to Burkina Faso; \$6,855 to Cameroon; \$9,582 to Ghana; \$9,086 to Niger; and \$12,910 to Nigeria.

The allocation of funds by USAID from September 30, 1995 to September 29, 1996 for the RENACO Network was increased to \$100,000. The same six countries plus Mali participated in 1995-96. The scope of work for each country in 1995-96 was as follows.

### ***Nigeria***

- Testing of cowpea varieties with resistance to Striga gesnerioides and Alectra ogelii on 75 farmers' fields.
- Testing four cowpea varieties in cotton/cowpea mixture.
- Seed Multiplication

### ***Burkina Faso***

- On-farm testing of four improved varieties on farmers' fields with and without insecticides.

### *Cameroon*

- Testing of four improved cowpea varieties on 40 farmers' fields in both intercrop and monocrop.
- Seed multiplication.

### *Niger*

- Testing six improved varieties on 50 farmers' fields.
- Seed multiplication.

### *Ghana*

- Evaluation of improved varieties in on-farm trials.
- On-farm testing of four varieties on 80 farmers' fields in northern, upper east and upper western regions.
- Community seed production projects.

### *Benin*

- Evaluation of 15 improved lines for resistance to Zankota strain of *S. gesnerioides* on 45 farmers fields in three regions.

The results of the 1995/96 trials were not made available to the Evaluation Team.

The budget breakdown for 1995/96 was (U.S. dollars): coordination - \$12,700; planning/evaluation - \$4,700; research collaboration - \$75,000; training/institute strengthening- \$7,600 ; administrative support - 0; total - \$100,000.

### *Financial Support to National Programs*

Funds sent to national programs in 1995/96 were (U.S. dollars): \$ 4,000<sup>3</sup> to Benin; \$18,000 to Burkina Faso; \$8,400 to Cameroon; \$15,100 to Ghana; \$7,900 to Mali; \$4,000<sup>4</sup> to Niger; and \$17,500 to Nigeria.

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<sup>3</sup> Benin and Niger received relatively small amounts because their research proposals were sent late after funds had been allocated to others.

<sup>4</sup> Same as above.

## ***Technology Development, Transfer and Dissemination***

### ***Activities and Achievements 1994-95***

- Burkina Faso** Four newly developed cowpea varieties were evaluated in 56 farmers fields in four agro-ecological zones. The new varieties were resistant to aphids and thrips and tolerant to pod sucking bugs. They out yielded the farmers variety by 40 percent.
- Cameroon** Two new varieties (GLM92 and GLM93) were compared with a recommended variety (BR1) and the farmers' local variety on 24 farmers' fields. GLM92 and GLM93 out yielded the local variety by 54.0 percent and 55.2 percent respectively. The recommended variety was out yielded by GLM92 and GLM93 by 260.2 percent and 263.0 percent, respectively. Despite its high yield, GLM92 was not accepted by farmers because of its grain color and size.
- Ghana** A new heat tolerant line (Sul 518) was found promising in on-station trials. Neem (*Azadirachta indica*) was evaluated for insect pest control on 18 farmers' fields. The application of neem extract resulted in 24.2 percent and 84.1 percent increase in grain yield compared to the farmers practice and unsprayed treatment, respectively. Six farming communities cultivated one ha each of recommended varieties.
- Niger** Four new varieties were compared with a recommended variety (TN5-78) and local control on 50 farmers' fields. The new varieties out yielded the local control and the recommended variety by 37-90 percent and 5-15 percent, respectively. Seeds of two varieties were multiplied on a 5.0 ha. to meet farmers' needs.
- Nigeria** Three varieties resistant to *Striga gesnerioides* and *Alectra vogelii* were compared with the farmers local variety conducted in *S. gesnerioides* endemic areas on 51 farmers' fields. In all cases, only few *S. gesnerioides* emerged on resistant varieties. However, these varieties out yielded the local variety in only few instances.
- In another trial, improved cowpea varieties were evaluated in cotton/cowpea mixture with and without insecticide application on ten farmers fields. Although the insecticide was applied directly to cotton, it increased grain yield of the associated cowpea by 90 percent compared with the unsprayed treatment. Since farmers usually spray cotton, there is a great scope for increased production of cowpea in the cotton/cowpea cropping system.

About 0.6 tons of seed of improved cowpea varieties was produced.

### ***On-Farm Testing of Improved Cowpea Varieties***

Fifty-six farmers evaluated the new cowpea varieties in four agro-climatic zones. The varieties tested were resistant to aphids, thrips and pod-sucking bugs.

### ***Constraints***

Although the 1995 season's activities were more or less satisfactory, the following constraints were noted:

- New varieties were susceptible to S. gesnerioides.
- New varieties needed further effort to make them resistant to pod-sucking bugs (possess some level of tolerance).
- Storage problems forced farmers to sell their grain immediately after harvest when supply is high and prices are low.
- Lack of organized marketing systems made farmers restrict the area under cowpea or use a portion of the recommended inputs.

### *Visits to National Programs*

In order to monitor research activities in participating countries, the Chairman of the Steering Committee visited Burkina Faso, Niger and Nigeria. All three countries implemented their research in line with the approved project proposals.

### *Institutional Strengthening/Training (1996)*

- RENACO sponsored two scientists (from Ghana and Burkina Faso) in the Legume Breeding course held at IITA.
- Two scientists (from Benin and Nigeria) attended the 4th Workshop of the Pan-African Striga Control Network in Mali.
- Representatives from Nigeria attended a two-day meeting at IITA to develop a proposal for a natural resources management network.
- Cowpea scientists representing RENACO from Nigeria, Benin, Ghana, Burkina Faso, Niger, Cameroon and Mali participated in a cowpea research review and work planning meeting in Nigeria, March 20-22.

### *Overall Assessment of RENACO*

RENACO does not fall under the typical Network structure as it does not have a full-time Coordinator. However, the Chairman of the Steering Committee is still active. The affairs of the Network are being handled by an interim committee (four members) who meet once a year. This decision was taken to keep funds flowing to participating countries.

Long-term planning has been difficult due to uncertainty of funding on a yearly basis. There seems to be no problem with the management of funds by IITA. If funding could be increased, the number of countries in RENACO could also increase. The activities of RENACO have focused on technology transfer (partly due to shortage of funds).

Cowpea plays a major role in improving soil fertility, animal feed, suicidal germination of Striga hermonthica and reduction of soil erosion.



In-country activities have been carried out effectively by the participating scientists. This demonstrates the fact that certain NARS scientists do have the capacity to manage their own research work if funds were available.

The idea of having a combined network for legumes (cowpea, soybeans, groundnut, pigeon pea, bambara groundnuts and lablab) does have merit as being cost-effective and should be explored further. The proposed legume-based natural resources management network is too broad and would be difficult to manage as well as to implement. Natural Resource Management is too broad an area to achieve any meaningful impact in the short to medium-term.

### ***Important Events Related to RENACO, September 1993 - November 1996***

- September 1993 - RENACO (SAFGRAD Phase II) ended.
- April 25-27, 1994 - IAR/IITA Joint Planning Meeting, Kano, Nigeria
- May 19, 1994 - Letter from IITA to USAID (at the request of NARS) to request support for RENACO
- June 24, 1994 - Informed by USAID that RENACO will be funded during 1994-95 (\$75,000)
- September 12-13, 1994 - RENACO Planning Meeting, Ouagadougou, Burkina Faso
- June 22, 1995 - Informed by USAID that RENACO will be funded during 1995-96 (\$100,000)
- September 3-8, 1995 - RENACO funded 10 NARS scientists from RENACO member countries to participate in Second World Cowpea Research Conference in Accra, Ghana.
- March 19-22, 1996 - Meeting of RENACO scientists in Kano, Nigeria to review past work of 1995 and plan 1996 activities
- May 14-15, 1996 - RENACO Task Force Meeting to develop a draft proposal for a "Legume-based Natural Resource Management Project"
- June 17, 1996 - Informed by USAID that RENACO will be funded during 1996-97 \$85,000)
- July 3, 1996 - 1994-95 RENACO Annual Report (English version) sent to French-speaking collaborators
- July 26, 1996 - 1994-95 RENACO Annual Report (French version) sent to French-speaking collaborators
- September 2-13, 1996 - One scientist from Ghana and one from Burkina Faso was funded by RENACO to participate in the Legume Breeding Workshop in Ibadan and Kano, Nigeria.
- October 13, 1996 - RENACO Steering Committee Meeting, Ouagadougou, Burkina Faso
- October 28-November 1, 1996 - One scientist each from Benin and Nigeria was funded by RENACO to participate in the 4th General Workshop of the Pan-African Striga Control Workshop in Bamako, Mali.

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# Appendices

## **Appendix I: Terms of Reference**

### **Evaluation of the USAID-funded Collaborative Agricultural Research Networks in East and West Africa**

#### **Scope of Work**

##### **OBJECTIVE**

The objective of this evaluation is to assess whether the anticipated results and targets of the seven collaborative agricultural research networks funded by USAID in East and West Africa have been achieved with regard to: capacity building; success in influencing the availability, access and use of technology; and related people-level impacts. Two evaluation teams will be organized to conduct separate evaluations, one for the networks in East Africa, one for those in West Africa, using the same scope of work. Network achievements will be assessed in four areas: (1) technology development, exchange and dissemination; (2) capacity building; (3) network administration and management; and (4) financial management.

The purpose of these networks is to: (a) develop, test, and put into place mechanisms which will enable participating NARS in Africa to progressively assume greater responsibility for management, funding and monitoring of regional agricultural research; and (b) increase the development, adaptation and utilization of sustainable agricultural technology. The goal is for NARS to access expertise, services, commodities, and supplies from the IARCs and other sources to support regional and national development objectives.

The evaluation will provide input into donor decisions regarding future network support. It will also provide guidance for the networks, NARS, regional research associations and affiliated IARCs on steps that might be taken to strengthen networking activities including their future orientation.

The networks to be evaluated are as follows:

##### **East Africa**

AFRENA (Agroforestry Research Network for Africa, with ICRAF)  
ECABREN (Eastern and Central Africa Bean Research Network--formerly EABRN, with CIAT)  
EARNET (East African Root Crops Research Network--formerly ESARRN, with IITA)  
PRAPACE (Regional Potato and Sweet Potato Improvement Program for Central and Eastern Africa--formerly PRAPAC, with CIP)

##### **West Africa**

WCASRN (West and Central Africa Sorghum Research Network, with ICRISAT)  
WECAMAN (West and Central Africa Collaborative Maize Research Network, with IITA)  
RENACO (West and Central Africa Cowpea Network, with IITA)

## Nine Rice Task Forces<sup>5</sup>, with WARDA

(Mangrove Swamp Rice, Upland Rice Breeding, Lowland Rice Breeding, Sahel Rice Improvement, Integrated Pest Management, Problem Rice Soils, Economics of Rice Systems, Cropping Systems, and Irrigated Rice Breeding)

### BACKGROUND

For more than ten years, USAID has been supporting the IARCs to initiate and implement agricultural research networking projects in Africa, in collaboration with the NARS. At their inception, these efforts were funded out of the Africa Bureau's Support to African Agricultural Research and Faculties of Agriculture (SAARFA) Project, the Southern Africa Regional Program (SARP), and the Semi-arid Food Grains Research and Development (SAFGRAD) Project. In 1991-92, a series of evaluations were completed for regional research networks supported under the SAARFA and SAFGRAD Projects. In 1992 the Africa Bureau consolidated its support for collaborative regional research networks in East and West Africa and incorporated them into the Policy Analysis, Research and Technical Support (PARTS) Project. The eight networks listed above were chosen for a second funding phase under the PARTS project. At that time, USAID project management was transferred to G/EG/AFS for the networks in East and West Africa.

In the past several years an increased level of effort has gone into developing and working through regional organizations/associations that facilitate cross network coordination and integration of network efforts with national programs, e.g., ASARECA, CORAF, and INSAH. It will be important for the Evaluation Team to engage these associations in the reviews.

### STATEMENT OF WORK

Each evaluation team will spend approximately three weeks during November 1996 in their respective African regions to carry out the review. In East Africa, the team should focus on network operations carried out from October 1, 1992 through September 30, 1996. In West Africa, the evaluation time period is October 1, 1993 through September 30, 1996. Each team will visit selected network member countries as chosen by USAID and the networks. The evaluation will be based on field visits to meet with NARS directors and scientists, staff of IARCs and affiliated institutions, network coordinators, USAID field missions and REDSOs, and select NGOs. Each team will review all appropriate records and documents including financial records. Most of this documentation is located in the network field coordination offices, and appropriate time will need to be scheduled in the field locations to review it.

Each evaluation team should address the following items for each network:

#### *Technology Development, Exchange and Dissemination*

- I. Assess the effectiveness of methods and procedures in place for:
  - a. regional research strategic planning and priority setting;
  - b. reception and screening of technologies in the networks;
  - c. monitoring the implementation of network research programs; and
  - d. evaluation of impacts from regional research efforts.

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<sup>5</sup>These nine task forces will be referred to throughout the scope of work as a single network.



2. Assess the effectiveness of network research and technology exchange in terms of:
  - a. relevance of research agenda pursued to the development objectives in the participating countries;
  - b. extent of technology transfer from IARCs to NARS and among the NARS themselves, facilitated by the networks;
  - c. the extent to which network member countries are relying on technologies/varieties developed by the IARCs and their collaborating entities;
  - d. extent to which the networks are supporting member country testing of technologies under farm conditions; and
  - e. extent to which network provided training, germplasm exchange, sharing of disciplinary expertise, and developed technology are meeting national needs.
3. Is the network increasing the availability, access and use of sustainable agricultural technologies in the region? Provide appropriate documentation of this to include: an analysis of where the networks were, technologically, at their inception versus today; a listing of technologies released in the last 2-3 years; and a listing of technologies in the pipeline for future release.
4. Has the publication and dissemination of network-generated technology been adequate?
5. To what degree is the planning and programming of network activities independent of IARC programs? Document the network planning/programming process.
6. To what degree do network activities and IARC programs compliment each other?

Based on the above, recommend steps to strengthen technology development, exchange and dissemination by the networks.

#### *Capacity Building*

1. How effective has the network, in collaboration with the IARCs, been in training of national scientists?
2. Is the network having an impact on the NARS contribution to national development objectives of participating member countries?
3. Does the network increase NARS resources or substitute for them?
4. Are the national programs progressively assuming greater responsibility for management, monitoring and funding of the network?
5. What are the prospects of maintaining the networks without current IARC backstopping?
6. Assess the extent to which NARS are ready to take over network funding, coordination of technical programs and scientific leadership. Based on the above, recommend steps to strengthen the capacity of NARS to assume these responsibilities.

#### *Network Administration and Management*

1. Assess the current size and complexity of each network's operation in terms of: effectiveness of research supervision and coordination; cost effectiveness; diversity of research, cost structure of key network services; and spread of network resources.

2. Assess IARC contribution to the network in terms of:
  - a. providing qualified network coordinators;
  - b. effectiveness of logistical and administrative support to the coordinators;
  - c. technical backstopping of network research programs;
  - d. technical coordination of research activities;
  - e. training;
  - f. alignment of IARC support in the region with network priorities; and
  - g. use of IARC core funding to support and backstop network activities.

Based on the above, recommended ways the IARCs' contribution can be strengthened.

3. Identify the tasks/activities that require but do not receive adequate national and/or bilateral support?
4. Assess the effectiveness of NARS participation in the networks in terms of:
  - a. allocation of personnel on a full-time basis to network activities (number and level of training) and other resources;
  - b. integration of network-sponsored research into the national research program;
  - c. effectiveness of trial supervision and quality of results; and
  - d. effectiveness of the Steering Committee in providing technical guidance.

Based on the above, recommend ways to strengthen the NARS participation.

5. How involved are the NARS directors in priority setting and management of networks?
6. Assess the extent to which the present mix of networks are in line with regional priorities and recommend steps, if required, to realign priorities and programs with a view to increasing their effectiveness.
7. Identify best practices in providing cost-effective approaches for organization, management, coordination and/or governance of regional collaborative research networks.
8. Develop a prototype technical and administrative organizational chart indicating linkages and relationships of stakeholders (i.e., ASARECA, NARS, IARCs, etc.).
9. What are the prospects for the networks continuing without USAID funding? How could the networks become more sustainable and less dependent on external funding?
10. Assess the performance of USAID management in terms of: timeliness of release of funds; provision of inputs; timeliness of management decisions; and feed-back on project implementation progress, issues and problems.

### *Financial Management*

- I. Are the member NARS adequately accounting for the network funds received?
2. Are the IARCs adequately consolidating financial reports to USAID on NARS' network expenditures.
3. Trace the steps of how network funds are transferred from USAID to the IARCs, from the IARCs to the NARS, and from the NARS to their individual scientists. Is there a timely flow of funds? Make recommendations for improvement.

4. What are the IARCs' network auditing mechanisms and are they adequate?

#### TEAM COMPOSITION

Each regional team should include: one representative from the IARCs (selected by the IARCs involved in the evaluation--this individual need not represent one of the IARCs to be evaluated); one representative from the NARS (to be jointly chosen by the networks to be evaluated); a USAID representative; a senior agricultural economist; a senior agronomist familiar with the commodity and program areas addressed by the networks; and a financial officer familiar with financial record keeping for donor-funded projects. In addition, in West Africa CORAF and INSAH will be invited to jointly nominate an individual to serve on the team in an independent capacity.

In addition to each team, the IARCs, networks and NARSs will be invited, at their own expense, to have key reference people accompany the team during their site visits, as appropriate.

#### REPORT

Each team leader will submit ten copies of the draft report to USAID no later than January 1, 1997. The report should include the following:

- a. Executive summary;
- b. Introduction including a brief project context, description and purpose;
- c. Methodology used in carrying out the evaluation including the scope of work and other details attached as appendices;
- d. Progress since the last USAID network evaluation in 1991/92 to include incorporation of recommendations made at that time;
- e. Evaluation findings;
- f. Conclusions, recommendations and lessons learned; and
- g. Appendices which include any 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 for each region, USAID will review the reports and, if needed, direct the Team Leaders to incorporate in their final reports the subsequent consideration of any questions or issues raised during this review. The Team Leader for each region will then resubmit ten copies of their final report by March 1, 1997. In addition, the two Team Leaders will develop a single synthesis summary report, incorporating the evaluation findings for the two regions, also to be submitted by March 1, 1997.

## Appendix IIA: Itinerary

### West African Network Evaluation Team Itinerary

Nov. 2 (Sat.)	Team arrives in Abidjan
Nov. 3 (Sun.)	Ground transport to Bouake
Nov. 4-8	Bouake
Nov. 8 (Fri. PM)	Ground transport to Abidjan
Nov. 9 (Sat. AM)	Leave Abidjan, Air Afrique #863, 8:00 AM; Arrive Ouagadougou 9:25 AM
Nov. 9-12	Burkina Faso
Nov. 12 (Tues. PM)	Leave Ouagadougou, Air Afrique #827, 8:50 PM; Arrive Bamako 10:05 PM
Nov. 13-16	Mali
Nov. 17 (Sun. noon)	Leave Bamako, Air Afrique #872, 10:45 AM; Arrive Abidjan 12:15 PM; Leave Abidjan, Ghana Air #561, 2:25 PM; Arrive Accra 3:10 p.m.
Nov. 18-20	Ghana
Nov. 18 (Mon. AM)	Fly to Tamale
Nov. 19	Tamale
Nov. 20 (Wed. AM)	Fly to Accra
Nov. 21 (Thurs. PM)	Leave Accra, Ghana Air # 440, 4:30 PM; Arrive Cotonou 6:15 PM
Nov. 22-25	Benin
Nov. 25 (Mon. PM)	Leave Cotonou, Air Afrique #819, 8:25 PM, Arrive Abidjan 8:50 PM
Nov. 26 (Tues. AM)	Debriefing at REDSO Ground transport to Bouake
Nov. 27-30	Wrap-up meeting with Network Coordinators Report drafting
Dec. 1 (Sun. AM)	Ground transport to Abidjan Team disperses

## Appendix IIB: Persons Met

### Persons Met

#### Côte d'Ivoire

<u>Name</u>	<u>Institution</u>	<u>Title</u>
Yao Koffi Augustin	CIRT	Food Scientist
Assamoi Anoh Francois	IDESSA-Ferke	Sorghum Breeder
Hala N'Klo Francois	IDESSA-Bouake	Entomologist
Adou Amalaman	IDESSA	Phytotechnic
Sylvestre A. Aman	IDESSA	Agropedologue
Anguete Kouame	IDESSA	Seed Technologist
Doumbia Sekou.	IDESSA/DCV	Agronomist
Coulibaly Felix	IDESSA	Phytopathologist
Attiey Koffi	IDESSA/DCV	Geneticien-Ameliorateur
N'Cho Achiaye Ludovic	IDESSA	Physiologist
Coulibaly M. Yayhya	IDESSA	Gencticien
Kouame Miezan	WARDA	Leader of Sahel Prog.
Robert Guei	WARDA	Gmplsm Exchng. Cord.
Dougou Keita	WARDA	TFRA
Peter Matlon	WARDA	Director of Research
Timothy Dalton	WARDA	Production Economist
Sy Abdoul Aziz	WARDA	Plant Pathologist (IPM-TF Coordinator)
Kanwar L. Sahrawat	WARDA Force Coordinator	Soil Chemist, Problem Soils Task,
Michael Dingluhn	WARDA-IBE	Ldr. of Continm. Prog.
S. K. Reddy	REDSO/WCA	Assistant Director
Yves-Coffi Prudencio	REDSO/WCA	Economist
Koffi Goi	IDESA	Director General
John Schamper	REDSO/WCA	Economist
Jeff Lee	REDSO/WCA	PSD
Shaul Horan	REDSO/WCA	Horticulturist
Moctar Touré	World Bank/SPAAR	Executive Secretary
Dr. Eugene Terry	WARDA	Director General

#### Burkina Faso

Hema Idrissa	INERA	Selectionneur Mais
Ola B. Smith	CRDI/Senegal	Representant Regional
Olusogi O. Olufajo	IAR/ABU/Nigeria	Agronomist
N. Diaye Siribre Tamadou	CRPA BXMN	Research Devel.
Traore Sami Firmin	CRPA-HB	R. Research Devel.
Traore Hantidou	IMERA/FADA	Malhobologue
Ouattara Bawliori	tNERA/Kamboinse	Agronome-Chef Stat.
Tankoano B. Frederic	CRPA-CE/Koujeba	R. Research Devel.
Pouahoukiga Anebakouri	CRPA du Centre	R. Research Devel.

Burkina Faso - continued

<u>Name</u>	<u>Institution</u>	<u>Title</u>
Traore Idrissa	CRPA/FADA	R. Research Devel.
Traore Doulaye	INERA/Farako	Entomologist
Lompo Francois	INERA	Chef Programme
Da Sansan	INERA	Chef Programme
Kambou Georges	INEPA	Eco-Toxicologue
Jeremy Ouedrago	INERA/Kamboinse	Selectionneur Niebe
Youl Sansan	INERA/Kamboinse	Agronome
Bonli Moussa	INERA/SARIA	Agronome/Fertilization
Traore Seydou	CRRRA/Farako	Chef Entomologie
Dakoiso Dona	Sorgho/Riz-Farako	Entomologiste
Rouamlia Albert	INERA/FBA	Selectionneur
Nebie Balema	INERA/Farako	Agronome
Segda Zacharie	INERA/Farako	Agronome Systeme
Sawodogo Abderasalam	INERA/Farako	Nemiatologiste
Diabri Seydou	INERA/FBA	Hydraulogue et Agroclima.
Some Noya	IRSN	Pharmacien
Trouche Gilles	CIRAD/INERA	Selectionneur Sorgho
Ouedraogo Oumar	INERA/Kamboinse	Modherbologiste
Ouedraogo Ousmane	SOS Sahel International	Agronome
Clementine Sabire	PROTEAGINEUX	Entomologiste/Chef de Prog.
Zoundi Sibli Jean	MRA	Zootech/Charge Liason R-D
Diallo B. Dolvien	Division Resours	Financier
Sereme Paco	FNERA	Directeur
FEen Victor	INERA	Agropedologue
Rouamba Albert	CRRRA-Farako	Selectionneur

Mali

Bourlema Dembele	IER-Sotuba	Maize Scientist
Mine. Dembele A. Rejane	I.E.R.	Maize Scientist
Aissata B. Beithe	IER	Maize Scientist
Mine. Bore Assa Kante	IER-Sotuba	Maize Scientist
Amadou Diarra	IER/DS	Maize Scientist
Abdoulaye Niare	IER	Maize Scientist
Ntji Coulibaly	IER	Programme Mais
Yagoua Ndjekoukousse Djool	CIRAD	Chef du Project Vivrier
S. K. Debrah	ICRISAT	Principal Ec. Scientist (Econ.)
I. Akintayo	ICRISTAT	ICRISTAT Rep.
Fousseyni Cisse	IER/Sikasso	WCASRN Coordinator
Abdoulaye Hadiadoun	IER/Sikasso	Selectionneur
Yacouba Doumbiyo	IER/CRRRA	Chief of Prog. Entomologist
Iboro Traore	CRRRA/Sikasso	Agronomic Prog-RIZ
		Phytopathologist

Mali - continued

<u>Name</u>	<u>Institution</u>	<u>Title</u>
Sounyabo Sarra	IER/Niono	Irrigation Specialist
Mamadou Simpara	IER-Sikasso	Hydrologist
Mamadou Kabirou Ndiaye	IER/CRRA/NIONO	Agropedologue
Timothy Schilling	IER/DS	PARA Coordinator
Gamby Kaditau Toure	IER/SRA-Sotuba	Entomologist
Abdoulaye Hamadoun	IER/PARA-Sikasso	Entomologist
Harry Birnholz	USAID	Deputy Mission Director

Ghana:

Roger Kanton	SARI-Manga	Agronomist
Wilson Dogse	SARI-Myanikpala	Agronomist
Dennis Diaglebley	SARI-Myanikpala	Agronomist
A.S. Laugyinhio	SARI	Agri. Economist
A. Y. Alhassan	SARI	Agronomist/Deputy Director
J. M. Kombiok	SARI	Agronomist
I. D. R. Atokple	SARI	Breeding
J. B. Naab	SARI	Soil Specialist
F.Z. Kaleem	SARI	Soil Microbiologist
Hector Mercer Quarshe	SARI	Director
Paul B. Tanzubil	SARI-Manga	Snr. Entomologist
Stephen K. Nutsegah	SARI-Tamale	Pathologist
I. D. R. Atokple	SARI-Tamale	Breeder
Mahyi Asidi	MOFA/N. Region	Regional Director
Andrew Kuyipou	MOFA/N. Region	N/A
Eledi	MOFA/N. Region	N/A
Frank Adongo	MOFA/N. Region	Management Info. Sys. Ofr.
Zacharia	MOFA/N. Region	Policy Plng. Monitoring/Eval. Ofr.
Akanko	MOFA/N. Region	Seed Inspectorate
Franklin Donkoh	DAE-Accra	Extensionist
Jacob K. Wumnaya	DAE-Accra	Extensionist
J. A. Baah	Dept. of Crop Service	Agronomist
J. A. Poku	DCS/MOFA-Accra	Weed Scientist
V. K. Ocran	DCS/MOFA-Accra	Plant Breeder
A. B. Salifu	SARI- Nyampala	Entomologist
Harry Palmier	SPAAR/World Bank	Inst. Devel. Specialist

Benin

Aseyemi Paceal	INRAB/CRA	Geneticen-Selection
Asiabe Paulin	INRAB/PRR	Agronomic

Benin-continued

<u>Name</u>	<u>Institution</u>	<u>Title</u>
Lokossou Bernardin	INRAB/CRRA-SB	Amenagement des sols
Mdingoyi Soule	INRAB/LESR	Agro-Economie
Vodouhe Raymond Sognon	INRAB/CRRA-SB	Genetique-Amerlioration
Gbehounou Gualbert	INRAB/LDC	Malherbologie
Monhouanou D. Jean	INRAB-Benin	Crop Utilization
Dossou A. Romuald	INRAB-STATION	Breeder
Yakpon Pierre	CHRDER-BorGOU	Vulgarisateur
Amidou Moutaharou	INRAB-STATION	Agronome
Savi Adolphe D.	INRAB-STATION	Socio-Economiste
Giele B. Mellon	INRAB-STATION	Technologie-Semenciere
Balley Jocelyn	DPQC	Certification des Semences
Yallou Ch. Gouro	INRAB/SRCU-INA	Selectionneur
Yehouenon Alphonse	SREV-INA	N/A
Dossou-Yovo Zigizbert	SRVC-INA	N/A
O. O. O. Olufayo	Ibadan/Nigeria	Cowpea Network Coordinator

Washington, D. C

R. H. Booth	IITA	Deputy Director General
M. H. Bassey	IITA	Director, Int'l. Corp. Division
J. G. Ryan	ICRISAT	Director General



### Appendix III: Maize Network Publications

1. Annual Reports 1993-94, 1994-95, and 1995-96
2. Reports of the Steering Committee Meetings:
  - i. Proceedings of the first meeting of Heads/Coordinators of National Maize Research programs of West and Central Africa, 27-28 January, 1994, Cotonou, Benin Republic. (This volume also contains the proceedings of the first meeting of the Steering Committee.)
  - ii. Proceedings of the second meeting of the Steering Committee, 7-9 November 1994, Bouake, Côte d'Ivoire.
  - iii. Proceedings of the third meeting of the Steering Committee, 1-2 June, 1995, Cotonou, Benin Republic.
  - iv. Proceedings of the fourth meeting of the Steering Committee, 13-16 November, 1995, Ibadan, Nigeria.
  - v. Proceedings of the fifth meeting of the Steering Committee, 24 - 25 April, 1996, Cotonou, Benin Republic.
3. Ad-hoc Research Committee Reports:
  - i. Report of the Ad-hoc Research Committee of WECAMAN, May, 1994.
  - ii. Report of the Ad-hoc Research Committee of WECAMAN, March, 1995.
  - iii. Report of the Ad-hoc Research Committee of WECAMAN, April, 1996.
4. Reports of the early and extra-early Regional Uniform Variety Trials:
  - i. Compilation of data from 1993, Regional Uniform Variety Trials
  - ii. Compilation of data from 1994, Regional Uniform Variety Trials
  - iii. Compilation of data from 1995, Regional Uniform Variety Trials
5. Quarterly Performance Reports:
  - i. West and Central Africa Maize Network Quarterly performance report, October - December, 1993.
  - ii. West and Central Africa Maize Network Quarterly performance report, January - March, 1994.
  - iii. West and Central Africa Maize Network Quarterly performance report, April - June, 1994.
  - iv. West and Central Africa Maize Network Quarterly performance report, July - September, 1994.
  - v. West and Central Africa Maize Network Quarterly performance report, October - December, 1994.
  - vi. West and Central Africa Maize Network Quarterly performance report, January - March, 1995.
  - vii. West and Central Africa Maize Network Quarterly performance report, April - June, 1995.
  - viii. West and Central Africa Maize Network Quarterly performance report, July -September, 1995.
  - ix. West and Central Africa Maize Network Quarterly performance report, October - December, 1995.
  - x. West and Central Africa Maize Network Quarterly performance report, January - March, 1996.
  - xi. West and Central Africa Maize Network Quarterly performance report, April - June, 1996.
  - xii. West and Central Africa Maize Network Quarterly performance report, July - September, 1996.
6. The WECAMAN Project proposals submitted to USAID by IITA in 1993 and 1996, along with the revised logframe for the 1996 proposal.
7. WECAMAN/SAFGRAD II Final Reports, 1987-1993 by IITA.

8. Impact assessment of the SAFGRAD Commodity Networks by J. H. Sanders, T. Bezuneh, and A. C. Schroeder. USAID/AFR, OAU/STRCSAFGRAD. 1994
9. Assessment of program impact (API) analysis for seven African research networks by J. C. Sentz. USAID/G/EG/A.FS IARC. 1995.
10. Badu-Apraku, B., J.M. Fajemisin and A.O. Diallo. 1995. The performance of early and extra-early maize varieties across environments in West and Central Africa. Presented at WECAMAN Regional Workshop on Maize and Cassava; Cotonou, Benin Republic, 28 May - 2 June, 1995.
11. Badu-Apraku, B., A.O. Diallo and J.M. Fajemisin. 1996. Progress in breeding for drought tolerance in tropical early maturing maize for the semi and zone of West and Central Africa. Presented at a Symposium on Developing drought and low-N tolerant maize, 25-29 March 1996; CIMMYT, Mexico.
12. Fajemisin, J. M., 1994. Regional approach to maize research for the semiarid zone of West Central Africa. pp 157-168 in J. M. Menyonga, T. Bezuneh, J.Y. Yayock and I. Souma (Editors): Progress in food grain research and production in semi-arid Africa. OAU/STRC-SAFGRAD, Ouagadougou, Burkina Faso.
13. Fajemisin, J. M., 1995. Maize improvement and technology options for its production in the West Central Africa Savannas. Invited paper presented at the Regional Workshop on Technology options and Transfer Systems for Food Grain Production in Sub-Sahara Africa: Future perspectives and lessons for the 21st Century. Abidjan, Côte d'Ivoire, 26-28 April, 1995.

## **Appendix IV: Sorghum Network Publications**

List of WCASRN Documents (covering the Period Oct. 1993-Oct. 1996)  
submitted to the USAID Evaluation Team November 1996

1. Annual Reports (1994, 1995)
2. An overview of the Status of Collaborative Activities of the Network during 1995 (Atenkouano)
3. Administrative and Financial Report of the West and Central Africa Sorghum Research Network (D. Doumbia)
4. Report on the Selection of the Steering Committee Members of the West and Central Africa Sorghum Research Network, 10 March 1995 (S. K. Debrah, Chairman of Electoral Commission)
5. Database for Assessment of Impacts of Sorghum, and Millet Research in the West and Central Africa Region (S. K. Debrah)
6. African Participation in ICRISAT's USAID-funded activities (Dr. Y. L. Nene)
7. Compilation of Steering Committee Meeting Reports (1994, 1995, 1996)
8. Coordinator's Report of the Steering Committee Meeting (6-10 May, 1996)
9. Report of the Working Groups (Pest Control, Technology Transfer, Impact Assessment, Control of Striga Hermonthica, Sorghum Utilization)
10. Enhancing Sorghum Production and Utilization in West and Central African Through Collaborative Development and Transfer of Sustainable Technologies. A project proposal to support the West and Central Africa Sorghum Research Network (WCASRN) from 1 October 1995 to 30 September 1998, ICRISAT/WCASRB Steering Committee, June 1995
11. Séminaire Atelier sur la Relance des Activités de Recherche sur le Sorgho en Afrique de l'Quest et du Centre, ICRISAT/IER/INSAH
12. Compilation of quarterly reports of Network coordinating unit (1994, 1995, 1996)
13. Report on the Selection of WCASRN Research Projects 1995, 1996. Parts I and II (in English and French)
14. Protocols for Trials (1996)

## Appendix V: Rice Task Force Research Projects

### USAID-funded Task Force Research Projects (1994-1996)

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IRB	Dr. S. R. Vodouhe	Benin	Selection des varietes resistantes au froid de contre-saison	3,500	1994
IPM	Assigbe Paulin	Benin	Controle des Advantices du Riz dans les bas-fonds du Zou	2,560	1994
CS	Dr. Assigbe Paulin	Benin	Association de culture du riz	1,830	1994
CS	Dr. Assigbe Paulin	Benin	Gestion integree de l'azote dans un systeme de culture	2,040	1994
IPM	Assigbe Paulin	Benin	Controle des adventices du riz dans les bas-found du Zou	1,350	1994
LRB	S. R. Vodouhe	Benin	Selection de varietes adaptees a la production de repousse	1,500	1994
CS	Segda Zacharie	Burkina Faso	Gestion de l'azote et des adventices dans un systeme a traves l'utilisation e legumineuses	1,530	1994
IPM	Sawadogo Abdoussalam	Burkina Faso	Etude de la pathogeicite des especes Hirschmanniella spinicaudata et h. Oryzae et comportement de quatre (4) varieties e riz vulgarisees au Brikina Faso	2,250	1994
IPM	Souleymane Nacro	Burkina Faso	Resistance varietale a la cecidomyie du ris Orseolia oryzivora	1,223	1994
IRB	Youssouf Dembele	Burkina Faso	Etude de la gestion de l'eau sur les sols filtrants	4,500	1994
IRB	Segda Zacharie	Burkina Faso	Etude de l'effet du compost sur l'amelioration de la fertelite des sols sous riziculture irriguee	1,600	1994
CS	Bindzi Boniface	Cameroon	Determination de la meilleure legumineuse en culture de ris au Nord-Comeroun	1,960	1994

Task Force	Scientist	Country	Project	Grant (US\$)	Year
CS	Julius Takow	Cameroon	Gestion integree del'azote, de l'eau et des adventices dans les rotations suivantes: sorgho/riz, riz/riz, legumineuse/riz, mais/riz et riz/muskwa au nord au Cameroun	1,320	1994
LRB	Ngninbeyie Pascal	Cameroon	Leaf and Paicle blast screening nursery	2,000	1994
LRB	Paul Kofi Dartey	Ghana	Breeding for drought tolerant rice varieties for rainfed lowlands	2,000	1994
LRB	Musa Mbenga	Gambia	Multilocation yield trial for medium-deep waterlogged ecology	2,500	1994
MSR	Essa Drammeh	Gambia	Advanced and obserational yield trials of short and medium duration	3,000	1994
LRB	Lourenco Abreu	Guinea Bissau	Screening for medium deep water varieties	2,500	1994
LRB	Lourenco Abreu	Guinea Bissau	Screening for low input lowland rice	1,300	1994
MSR	Lourenco Abreu	Guinea Bissau	Mangrove OFAR-farmer managed	3,500	1994
MSR	Lourenco Abreu	Guinea Bissau	On-station and on-farm multication	2,500	1994
CS	Bakary Traore	Mali	Gestion de la fertilite des sols de riz en culture continue	1,860	1994
IRB	Mamadou M. Coulibaly	Mali	Tests multilocaux hivernage et contre saison 1994	1,003	1994
IRB	Aboubakar Halidou	Niger	Effets des nematodes sur la baisse de rendement du riz	2,700	1994
CS	J. O. Ayodele	Nigeria	Effect of green manuring on lowland rice/vegetable cropping system	2,220	1994
CS	G. O. Olaniyan	Nigeria	Effect of cropping swquence an dnitrogen fertilizer on production of upland rice	2,400	1994

Task Force	Scientist	Country	Project	Grant (US\$)	Year
CS	Mfaiga A. Adagba	Nigeria	Effect of cropping sequence on weeds and soil fertility on inland valley swamps	1,900	1994
IPM	J. K. Kehinde	Nigeria	Effect of varietal type and spacing on weed control in upland rice	3,250	1994
IPM	E. D. Imolehin	Nigeria	Effect of crop phenology and planting date on African rice gall midge (ARGM) infestation and natural enemy composition	2,210	1994
IPM	J. K. Kehinde	Nigeria	Effect of seedling age and weeding regimes on performance of irrigated rice	1,700	1994
IPM	M. N. Ukwungwu	Nigeria	Screening of rice for African rice gall midge (ARGM) resistance	857	1994
IPM	E. D. Imolehin	Nigeria	Studies on rice blast yield loss and selection of moderately resistant rice varieties and micro-organisms for integrated	1,620	1994
LRB	P. I. Okocha	Nigeria	Breeding of rice iron toxicity resistance	3,000	1994
MSR	J. K. Kehinde	Nigeria	Optimum date of rice in the mangrove	2,500	1994
MSR	E. D. Imolehin	Nigeria	Soil and plant analysis	3,000	1994
MSR	E. D. Imolehin	Nigeria	Yield trial	3,250	1994
IPM	Saliou Djiba	Senegal	Importance de l'attaque des foreurs de tiges du riz en phase vegetative et phenomene de tallage compensateur	800	1994
IRB	Paul T. Senghor	Senegal	Tests multilocaux de varietes de riz irrigue a cycle court dans la valle du fleuve Senegal	3,555	1994
LRB	Souleymane Diallo	Senegal	Etude d'evaluation varietale a la toxicite ferreuse	2,000	1994

Task Force	Scientist	Country	Project	Grant (US\$)	Year
MSR	Souleymane Diallo	Senegal	Evaluation multilocal de varietes tolerantes en rapport avec differentes techniques culturales en riziculture de mangrove.	3,500	1994
CS	B. A. Kamara	Sierra Leone	Cropping intensification in the lowland	2,450	1994
CS	S. D. Johson	Sierra Leone	Improved fallow management systems of uplands	1,030	1994
IPM	Sahr N. Fomba	Sierra Leone	Integrated control of seedling blast, brown spot and crab pests in mangrove rice in Sierra Leone	1,500	1994
IPM	A. M. Alghali	Sierra Leone	Pests control in bililand rice agroecology	3,600	1994
IPM	Sahr N. Fomba	Sierra Leone	Scréning rices for stable resistance to blast and major fungal diseases	2,000	1994
LRB	Sama M. Monde	Sierra Leone	Developing varieties tolerant to iron toxicity for inland valley swamps	3,000	1994
LRB	Sama M. Monde	Sierra Leone	Developing lowland rice varieties with resistance to rice yellow mottle virus	2,500	1994
MSR	M. S. Jusu	Sierra Leone	Screening mangrove rice varieties for tolerance to acid sulphate conditions	3,500	1994
LRB	B. N. Derla	Tcjad	Essais riz de bas-fond en irrigue	1,900	1994
CS	Dr. Selome Y. Dogbe	Togo	Mise au point d'un systeme de culture pour une exploitation durabel des bas-fonds en riziculture	1,400	1994
IRB	Nebie Balema	Burkina Faso	Diagnostic de la salinite dans les parcelles de la vallee du Sourou	4,000	1995
IRB	Zacharie Segda	Burkina Faso	Etude de l'effet du Compost sur l'amelioration de la fertilite du sol en riziculture irriguee	2,500	1995

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IPM	Allarangaye Moundibaye	Chad	Essi comparatif de lutte contre les adventices enrizicatures irriguees	1,110	1995
IRB	Julius Takow	Cameroon	Evaluation an drestoration of fertility of irrigated rice soils in Soudano Sahelian zone of Cameroon	1,750	1995
IPM	Coulibaly Felix	Cote d'Ivoire	Etude du role du sole, de l'eau de ruissellement et de la semence dans la transmission du virus de RYMV	600	1995
IPM	Joe Kingsley Twumasi	Ghana	Studies on rices diseases in Ghana	1,821	1995
RE	A. A. Dankyi	Ghana	Adoption of improved rice technologies in inland valleys of southern Ghana	4,000	1995
MSR	Julio M. Injai	Guinea Bissau	Criblage pour semis direct	1,616	1995
RE	Sekou D. Agro-eco	Guinea	Determination des couts de produciton et de la rentabilite des systemes rizicoles en Guinee-Mariti	2,500	1995
RE	Sirajo Seidi	Guinea Bissau	Economic pay-offs to rice research and extension in mangrove swamp rice in Guinea Bissau	4,335	1995
IPM	Moro Traore	Mali	Eval. Multiloc. De la resistance au RYMV de var. Prometteuses en cond. Naturelle d'infestation	1,260	1995
IRB	Mamadou K. N'Diaye	Mali	Reguperation des sols degrades	2,700	1995
IRB	Mamadou M. Coulibaly	Mali	Tests multilocaux hivernage 1995 et contre saison 1996	3,000	1995
RE	Bakary S. Coulibaly	Mali	Caracterisation socio-economique des Bas-fonds de la zone de Sikasso au Mali	4,970	1995
IPM	Sy Ali	Mauritanie	Desherbage chimique de postlevee du riz en condition irriguee	1,484	1995
IRB	Diallo A. M'Mberry	Mauritanie	Essais multilocaux	1,500	1995



Task Force	Scientist	Country	Project	Grant (US\$)	Year
IRB	Hamidou Sarr	Mauritanie	Test de rendement (cycle court et cycle moyen)	1,000	1995
IRB	Adbourahamane Alou	Niger	Essai multilocal cycle court	1,300	1995
IPM	E. A. Maji	Nigeria	Effect of plant growth regulators on water economy and susceptibility to pathogens in rice	1,540	1995
IPM	O. A. Fademi	Nigeria	Integrated management of nematodes in upland rice	1,350	1995
IPM	E. D. Imolehin	Nigeria	Integrated pest management studies on the rice leaf scald ( <i>Gerlacia oryzae</i> )	1,200	1995
IPM	E. O. Bright	Nigeria	Survey of insectivorous birds in rice growing ecologies	1,050	1995
MSR	J. K. Kehinde	Nigeria	Optimum planting date of rice in the MSR	2,500	1995
MSR	E. D. Imolehin	Nigeria	Soil and plant analysis (characterization of the Nigerian Mangrove ecosystem)	2,700	1995
MSR	E. Akpomudjere	Nigeria	Varietal effects and soil amelioration on the performance of rice in saline acid mangrove swamp	2,025	1995
MSR	E. D. Imolehin	Nigeria	Varietal Improvement (Observational, Yield and Multi-localational Coordinated Trials of Promising Ma)	2,850	1995
RE	Vivian E. T. Ojehomon	Nigeria	Rice Varietal Technology Adoption in the Inland Valleys of Niger State	4,225	1995
MSR	Souleymane Diallo	Senegal	Essais collaboratifs, en relation avec deux organisations paysannes, pour l'évaluation de semences d	4,000	1995
IPM	Moustapha Diagne	Senegal	Caraterisation de la flore adventice des rizieres irriguees de la vallee double	1,200	1995
IRB	Famara Massali	Senegal	Evaluation de la qualite des semences et diagnostic des contraintes a l'obtention de semences de qu	2,700	1995

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IRB	Paul Senghor	Senegal	Test de comparaison en multilocal de varietes de riz irrigue dans la vallee du fleuve Senegal	3,000	1995
IPM	Harris M. Bernard	Sierra Leone	Evaluation Upland and Lowland Rice Cultivars for Competitive Ability Against Weeds	1,500	1995
MSR	M. S. Mansaray	Sierra Leone	Regional Replicated Yield Trial for West African Mangrove Swamps	2,500	1995
MSR	A. B. Jalloh	Sierra Leone	Seed Multiplication/Demonstration and Minikit for Mangrove Rice Farmers in Sierra Leone	1,890	1995
PS	Idriss Baggie	Sierra Leone	Iron Toxicity - Role of Other Nutrients	3,000	1995
PS	Idriss Baggie	Sierra Leone	Response to Phosphorus in Upland and Lowland Soils	3,000	1995
RE	Lansana Wonneh	Sierra Leone	Adoption of Improved Rice Varieties in Inland Valleys of Sierra Leone	4,000	1995
IPM	Lamin M. S. Jobe	The Gambia	Population Dynamics Studies of Stem Borers and Their Economics Impostance in Two Rice Ecologies (mangrove and irrigated swamps in The Gambia)	1,150	1995
RE	Robert M. Willis	The Gambia	Adoption of Modern Mangrove Swamp Rice Varieties in Western Gambia	1,602	1995
IPM	Ekoue Tevi	Togo	Prospection du Rice Yellow Mottle Virus RYMV au Togo	1,824	1995
LRB	Dogbe S. Yawovi	Togo	Cirblage des Populations en Disjonction pour la Resistance a la Secheresse en riziculture de B	2,600	1995
PS	Worou K. Soklou	Togo	Utilisation du Phosphate Naturel en Riziculture pluviale de Bas-fond	1,965	1995
RE	Kossi M. Sedzro	Togo	Impact de la devaluation du franc CFA sur la rentabilite de la production rizicole au Togo	4,238	1995

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IPM	Dr. S. R. Vodouhe	Benin	Inventaire sanitaire sur le riz au Benin (diagnostic de la virose)	1,140	1996
IPM	Dr. Midingoyi Soule	Benin	Analyse des facteurs intervenant dans les mecanismes du refus ou d'adoption des varietes selectionnees de riz	3,724	1996
IPM	Dr. Dakouo Dona	Burkina Faso	Etude de la resistance a la cecidomyie du riz Orseolia oryzivora	1,764	1996
IPM	Ouedraogo Ibrahim	Burkina Faso	Etudes sur la mycoflore pathogene vehiculee par ls semence de riz	1,000	1996
IPM	Dr. Sere Yacouba	Burkina Faso	Poursuite de l'etude en vue de la mise au point d'une gamme differentielle ouest-africaine pour la pyriculariose du riz	2,982	1996
SRCRM	Segda Zacharie	Burkina Faso	Etude de l'effet du compost sur l'amelioration de la fertilite du sol sous riziculture irriguee	2,415	1996
IPM	Dr. Asanga C. Tangwe	Cameroon	Survey of Rice Storage Insect Pests	1,480	1996
SRCRM	Dr. Takow Julius	Cameroon	Evaluation and Restoration of Fertility of Irrigated Rice Soils in Sudano-Sahelian Zone of Cameroon	3,000	1996
IRB	Joseph Fokou	Cameroon	Effets des basses temperatures sur les varietes elites du riz irrigue au Cameroon	2,500	1996
IRB	Joseph Fokou	Cameroon	Influence varietale et rendement a l'usinage (qualite grain) en fonction de la date de coupe	2,000	1996
RE	Timothee Essang	Cameroon	La riziculture des bas-fonds (pulviale): causes et consequences d'une expansion au Cameroon	3,000	1996
IPM	Dr. F. O. Anno-Nyako	Ghana	Screening of Available WARDA Improved Rice Varieties (lines) for Resistance to the RYMV in Ghana	1,000	1996

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IPM	Dr. S. K. Nutsugah	Ghana	Survey of Rice Diseases/Pests in Northern Ghana: Initiation of Cooperative Research Programme for Disease/Pest Management	1,200	1996
RE	Augustin S. Langyintuo	Ghana	Ex-ante Assessment of Improved fallow System of Rice Cultivation from a Farming Systems Perspective	500	1996
MSR	Sheriff Njie	Ghana	Monitoring of Acid Buffering Capacity of Gambian Mangrove Soils	1,000	1996
MSR	Mr. Mustapha	Gambia	Mult-locational Trial of promising Short Duration Mangrove Rice Varieties	2,000	1996
IPM	Dr. Fode L. Guilavogui	Guinea	Contribution a l'inventaire des insectes associes a la culture du riz en Guinea	1,150	1996
IPM	Moriba Pivi	Guinea	Inventaire et evaluation de l'impact economique des maladies en culture de riz	1,000	1996
IPM	Mohamed Camara	Guinea	Prospection et enquetes sur la distribution du Ramphicarpa fistulosa en culture du riz	1,000	1996
IRB	L. Camara	Guinea	Evaluation pour la qualite de grain	2,000	1996
MSR	Ousmane Camara	Guinea	Essai comparatif des varietes ameliores de cycle court en mangrove	3,000	1996
MSR	Barry M. Bilo	Guines	Test du semis direct dans les rizieres endiquees de mangrove	1,000	1996
RE	Sirajo Seidi	Guinea Bissau	Production cost and Comparative Economic Analysis is Mangrove and Inland Valley Rice Production Systems in Guinea-Bissau	4,500	1996
IPM	Abdoulaye Hamadoun	Mali	Dynamique de populations des insectes vecteurs de la panachure jaune du riz (RYMV) au Mali	1,582	1996

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IPM	Moro Traore	Mali	Etude preliminaire en vue de la mise au point d'une gamme differentielle ouest-africaine pour la tyriculariose du riz	1,222	1996
IPM	Soungalo Sarra	Mali	Inventaire des plantes hote de la panachure jaune du riz dans la zone de l'office du Niger	1,143	1996
IPM	Dr. Abdoulaye Hamadoun	Mali	Resistance varietale a la cecidomyie africaine du riz	1,600	1996
IRB	Mamadou M. Coulibaly	Mali	Criblage des varietes a cycle court de la collection de conservation a la panachure jaune	1,200	1996
SRCRM	Dr. Mamadou K. N'Diaye	Mali	Appui a l'identification de la degradation des sols par salanisation au Burkina Faso et au Tchad	4,000	1996
SRCRM	Dore Guindo	Mali	Gestion de la fertilité des sols pour une riziculture irriguee performante et durable au Sahel	3,017	1996
SRCRM	Dr. Mamadou K. N'Diaye	Mali	Recuperation des sols degrades	2,600	1996
IRB	Mar Sada	Mauritanie	Effets de la salinite sur des varietes de cycles court en contre saison froide 1996-1997	1,000	1996
IRB	Sarr Hamidou	Mauritanie	Essai varietal de contre saison froide 1996-1997	1,000	1996
IRB	Sarr Hamidou	Mauritanie	Test de rendement (cycle court et cycle moyen)	1,000	1996
IPM	E. A. Maji	Nigeria	Effect of Plant Growth Regulators on Water Economy and Susceptibility to Pathogens in Rice	1,000	1996
IPM	Wada A. Clement	Nigeria	Effect of Cropping Sequence on Occurrence of African Rice Gall Midge ( <i>Orseolia oryzae</i> - Harris and Gagne) and Incidence of Disease in Lowland Rice	900	1996
IPM	Dr. P. O. Imeokparia	Nigeria	Effects of Cropping Sequence, Tillage Management and Plant Populations on Weed Biomass in Hydromorphic Rice	1,300	1996

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IPM	Dr. E. D. Imolehin	Nigeria	Integrated Pest Management Studies on Rice Leaf Scald ( <i>Gerlacia oryzae</i> )	1,450	1996
IPM	Dr. M. N. Ukwungwu	Nigeria	Studies on Varietal Resistance to African Rice Gall Midge	1,515	1996
RE	Vivian Onjehomon	Nigeria	Economic Pay-off for Rice Research and Diffusion in Nigeria	4,000	1996
IRB	Dr. Paul Senghor	Senegal	Etude de l'introduction de la tolerance a la salinite chez les varietes irriguees diffusees dans la vallee du fleuve Senegal par l'utilisation des vitro-variations	1,800	1996
IPM	Dr. D. R. Taylor	Sierra Leone	Epidemiological Studies on Rice Yellow Mottle Virus (RYMV)	1,150	1996
IPM	Harris M. Bernard	Sierra Leone	Evaluating Lowland Rice Cultivars for Competitive Ability Against Weeds	1,000	1996
IPM	S. I. Kamara	Sierra Leone	Host Range and Off-season Survival of African Rice Gall Midge ( <i>Orseolia Orizivora</i> ) in Sierra Leone	1,000	1996
MSR	M. S. Mansaray	Sierra Leone	Characterization of Mangrove Swamp Rice Varieties for Salinity and Acid Sulphate Soil Stresses	2,500	1996
MSR	M. A. T. Bangura	Sierra Leone	Origin and Adoption of Broadcast Method of Rice Growing in Mangrove Swamps of Northwestern Sierra Leone	2,000	1996
MSR	M. S. Mansaray	Sierra Leone	Regional Replicated Yield Trial for West African Mangrove Swamps	3,000	1996
MSR	Malcom S. Jusu	Sierra Leone	Screening for Acid Sulphate Soil Conditions	1,500	1996
RE	James Edwin	Sierra Leone	Comparative Analyses of Two Production Systems and Compttitiveness of Rice in Each System	4,200	1996

Task Force	Scientist	Country	Project	Grant (US\$)	Year
IPM	Lamine M. S. Jobe	The Gambia	Assessment of Varietal Response to Stem Borer Attack in Six Elite Rice Varieties in The Gambia	1,000	1996
IPM	Ebrima M. Kunjo	The Gambia	Evaluation of Upland Rice Varietal Response to Striga Hermonthica Attack in Two Agricultural Divisions in The Gambia	1,050	1996
IPM	Allarangaye Moundibaye	Tchad	Influence de systemes culturaux sur l'evolution de la flore adventice	1,020	1996
IPM	Ekoue Tevi	Togo	Prospection du RYMV au Togo (Phase II)	1,200	1996
IRB	Dr. Selome Y. Dogbe	Togo	Application de la culture de tissus a l'amelioration de la productivite des varietes de riz possedant des grains de qualite et aromatiques	4,000	1996
RE	Kossi Sedzro	Togo	Ddoption de varietes ameliorees de riz les ecosystemes de bas-fond dans les prefectures d'Amou et de Sotouboua	3,739	1996
			<b>TOTAL</b>	<b>332,177</b>	

CS = Cropping System Task Force  
 IRB = Irrigated Rice Breeding  
 IPM = Integrated Pest Management  
 LRB = Lowland Rice Breeding  
 MSR = Mangorve Swamp Rice  
 PS = Problem Soils  
 RE = Rice Economics  
 SRCRM = Sahel Rice Crop and Resource Management  
 URB = Upland Rice Breeding

## Appendix VI: Rice Task Force Publications

List of WARDA Rice Task Force Documents (covering the Period Oct. 1993-Oct. 1996)  
submitted to the USAID Evaluation Team, November, 1996)

1. Proceedings of the First Meeting of the Problem Soils Task Force , 18-19 February 1993, M'bé, Côte d'Ivoire. WARDA, 1993.
2. Proceedings of the First Meeting of the Steering Committee of the Problem Soils Task Force, 8-9 April 1993. WARDA, 1993.
3. Proceedings of the Second Meeting of the Upland Rice Breeding Task Force, 22-23 February 1993, M'bé, Côte d'Ivoire. WARDA, 1993.
4. Proceedings of the Second Meeting of the Lowland Rice Breeding Task Force, 24-25 February 1993, M'bé, Côte d'Ivoire. WARDA, 1993.
5. Proceedings of the Second Meeting of the IPM Task Force, 24-25 February 1993, M'bé, Côte d'Ivoire. WARDA, 1993.
6. Proceedings of the First Joint steering Committee Meeting, 29-31 March 1993, M'bé, Côte d'Ivoire. WARDA, 1993.
7. Report of the Monitoring Tour of the Mangrove Swamp Rice Network to Guinea, 16-20 November 1993. WARDA, 1993.
8. Proceedings of the Final Review Meeting of the Mangrove Swamp Rice Network, 8-9 March 1993, Rokupr, Sierra Leone. WARDA, 1993.
9. Proceedings of the Third Meeting of the Steering Committee of the Mangrove Swamp Rice Network, 9 April 1993, Conakry, Guinea. WARDA, 1993.
10. Proceedings of the First Meeting of the Rice Economics Task Force 15-16 April 1993, M'bé, Côte d'Ivoire. WARDA, 1993.
11. Proceedings of the second Meeting of the Sahel Task Force, 10-12 May 1993, N'diaye, Senegal. WARDA, 1993.
12. Proceedings of the second Meeting of the Steering Committee of the Sahel Task Force, 13 May 1993. WARDA, 1993.
13. Report of the Monitoring Tour of the Joint Upland Breeding Task Force, Lowland Breeding Task Force, and Integrated Pest Management (IPM) Task Force Monitoring Tours to Mali and Burkina Faso, 13-18 September 1993. WARDA, 1993).
14. Proceedings of the First Meeting of the Steering Committee of the Rice Economics Task Force, 4-6 October 1993, M'bé, Côte d'Ivoire. WARDA, 1993.
15. Report of the Monitoring Tour of the Sahel Irrigated Rice Task Force, to Burkina Faso and Mali, 23-30 October 1993. WARDA, 1993.
16. Report of the Multi-Disciplinary Task Force Monitoring Tours to the Republics of Côte d'Ivoire and Ghana, 20-28 September 1993. WARDA, 1993).
17. Proceedings of the Second Meeting of the Rice Economics Task Force, 18-21 February 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
18. Proceedings of the Second Meeting of the problem Soils Task Force, 28 February to 1 March 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
19. Proceedings of the Second Meeting of the Cropping Systems Task Force, 2 to 4 March 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
20. Proceedings of the Third Meeting of the Upland Rice Breeding Task Force, 5 to 7 March 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
21. Proceedings of the Third Meeting of the Lowland Rice Breeding Task Force, 8 to 10 March 1994, M'bé, Côte d'Ivoire. WARDA, 1994.



22. Proceedings of the Fourth Meeting of the Mangrove Swamp Rice Task Force, 11 to 12 March 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
23. Proceedings of the Third Meeting of the Integrated Pest Management Task force, 13 to 15 March 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
24. Proceedings of the Joint Steering Committee Meeting of the Cropping Systems Task Force, and the Problem Soils Task Force, 6 to 8 April 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
25. Proceedings of the Second Meeting of the Steering Committee of the Rice Economics Task Force, 6 to 8 April 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
26. Proceedings of the Joint Steering Committee of the Upland Rice Breeding Task Force, Lowland Rice Breeding Task Force, Mangrove Task Force, and Integrated Pest Management Task Force, 11 to 13 April 1994, M'bé, Côte d'Ivoire. WARDA, 1994.
27. Proceedings of the Third Meeting of the Sahel Irrigated Rice Task Force, 21 to 24 March 1994, Segou, Mali.
28. Proceedings of the Third Meeting of the Steering Committee of the Sahel Irrigated Rice Task Force, May 1994, N'diaye, Senegal. WARDA, 1994.
29. Procès-verbal de la réunion des sélectionneurs du Groupe d'action sur le riz irrigué au Sahel, 24-26 Mai 1994, N'diaye, Sénégal. WARDA 1994.
30. Rapport sur la visite de suivi multi-disciplinaire des Groupes d'action au Cameroon, 4-9 September 1994. WARDA 1994.
31. Report on the Task Force Multi-disciplinary Monitoring Tours to Guinea and Sierra Leone, 4-9 September 1994. WARDA 1994.
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