Eastern and Southern Africa Network Coordinators' Review

Proceedings of a workshop held at Nairobi, Kenya, 9-12 May 1988
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EASTERN AND SOUTHERN AFRICA NETWORK COORDINATORS' REVIEW

Held at Nairobi, Kenya
9-12 May 1988

Editors
D. G. Faris and A. D. R. Ker

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OPENING SESSION

Chairman: J. Kategile
Rapporteurs: B. Dzowela, N. Alvarez
OPENING REMARKS
Issa Omari

Ladies and Gentlemen,

It is indeed an honour and privilege to be asked to make some brief remarks on behalf of IDRC at this meeting. IDRC places great importance on networks as mechanisms for improving the research climate and the quality of research and hence the power and impact of research results.

Some of you need a word of welcome to Nairobi and to IDRC but most of you are already familiar with this city and our programmes. All the same, welcome to this important meeting and the IDRC community of agricultural scientists who are behind this initiative of having network coordinators meet to exchange notes and plan together on how to fulfil your common mandate and mission. As most of you know, IDRC is an organization fully financed by the Canadian Parliament to support research in the developing countries of the Third World. This is an opportunity to highlight a few things which are of interest and importance to IDRC, and hopefully to you too.

This meeting is to review the functioning of several networks in order to improve their effectiveness. A review tacitly requires decisions to either terminate or continue some of the networks. You may also be contemplating initiating new networks for new crops and other areas of research. These goals are noble and challenging, and it is particularly encouraging to see an array of participants from networks only partially funded by IDRC or not funded by IDRC at all. This spirit of collaboration among donor agencies in supporting networks should be encouraged as it helps reduce unnecessary duplication of research activities and hopefully makes research projects more effective.

IDRC has been involved in more than one hundred research networks. This involvement is based on the connectedness of development issues and processes, both temporally and spatially. IDRC is well placed, mandated, and prepared to foster this process, making sure that research activities are likewise connected. Research can thus become a mirror image of the developmental issues and activities, with networks playing a decisive role.

For IDRC, connectedness means several things. There is the North-South linkage which is built into some of our cooperative programmes and networks. This connection is designed to primarily benefit the South, but then may benefit individuals and institutions in the North. Secondly, the South-South connection should be encouraged as there can be much inter-learning and exchange of appropriate scientific information. This complements recent political and economic developments in the region. Thirdly, IDRC has projects all over the world, irrespective of ideological and political boundaries. For example, it funds unique and important training activities in China through a network of fisheries projects. This creates an East-West connection which is rare in other organizations.

The most important, however, and of immediate interest to this meeting, is the connectedness of ideas and projects themselves over time and across locations. Projects tackling similar issues have been developed but are frequently distant from each other—even within the same country. This has often lead to a multiplicity of confusing projects which add more burden to recipients who are already over-worked and under-paid. It is hoped that networks will make projects more meaningful to scientists in developing countries through meetings, linkages, and consultations.

Connectedness, however, should have another dimension: persistent and intense research activities on deserving issues. Very often, networks have had hawkish and faddish characteristics, depending on the individual(s) initiating and shaping them and the funding sources. It is important that networks should be
relatively stable and permanent so as to survive the gestation periods that any research activity takes to give practical results. It is in this context that IDRC encourages research project design that is conducted over an extended time period, that is coherent and integrated, as opposed to compartmentalized and sectoral.

It is the intersectoral across-disciplinary research that approaches development issues as they emerge in the real world. It is this thinking which suggests that research should be designed to tackle themes and developmental thrusts rather than narrow concepts and isolated events. In this way, persistence and intensity can be rationalized and institutions in developing countries can get support which is integrated rather than in bits and pieces.

Greenland et al. (1987) articulate merits of networks in terms of information exchange, scientific consultation, and undertaking collaborative research involving more than one scientist. While these are quite legitimate justifications for the existence of networks, perhaps networks should be reviewed in the context of some mutually-agreed principles. These include:

• **Effectiveness of research in terms of quality, potential for practical use, and actual utility.** The question is whether networks achieve this goal better than other mechanisms.

• **Sustainable growth of knowledge, quality of life, and incomes.** Do networks contribute more to achieving this goal than other mechanisms?

• **Equity in access to national and global resources.** Do networks tend to be restrictive, exclusive, and elitist or instead play a catalytic role in opening up access to resources to both scientists and peasants?

• **Participation of people from developing countries.** Do networks restrict participation to a few people from developed countries, forming a closed club and occupying excellent conduits for penetrating Third World countries?

• **Responsiveness to needs of scientists, people in general, and rural communities in particular.** Are networks encouraging unnecessary red tape and thus increasing the response time taken to fund projects in developing countries?

• **Innovativeness and flexibility in experimenting with different approaches to solving problems in the context of changing circumstances and the state of knowledge.** Are networks being used to protect vested interests, and in the process block flexibility and innovations, which carry potential for conflict of interest either of scientists or donor agencies?

In light of the foregoing, networks need to be regularly and critically reviewed to make sure that they do not violate some of the fundamental principles of the funding and recipient institutions. Sometimes, there is a danger of networks becoming mechanisms for increasing overhead expenses unnecessarily and at times being hegemonic, repressive, and bureaucratic. In addition, they can easily be conduits for maintaining, if not increasing, the already existing asymmetrical power relations between scientists from developed and those from developing countries. The coordinators of networks must rise to the challenge of being either at the service of scientists from developing countries as their primary constituency, or being lackeys of the funding agencies—willingly or inadvertently.

This review will need to recognize the recent restatement of the mandate and mission of the Agriculture, Food and Nutrition Science Division of IDRC: "the main objective of the division is to develop improved production and post-production systems and technologies for food and cash crops, and to increase the efficiency with which national agricultural scientists conduct research to meet the needs of the rural communities... and gives the highest priority to projects which will benefit the poor rural communities of the semi-arid regions of the developing world" (IDRC, p. 37).

One advantage that networks have is the regular contact between their coordinators and the local scientists which can facilitate direct assessment of local problems and quick responses to solve them. With emphasis on local participation and a bottom-up approach, networks can be vital in our efforts to reach the rural communities rather than being passive observers in nests located in international research centres.

Finally, I would like to mention some concerns and resolutions of our recent staff meeting in this region with the hope that the networks may be able to relate to them. There was a collective feeling that all our projects and actions should relate to a few developmental themes and issues in order to increase our impact. In this respect, the following five issues were seen to deserve our collective attention.
• **Need for sustainable agriculture and land use systems.** This concern arose from the continued decline of per capita food production in most countries of the region, land degradation, desertification, deforestation, regression into mundane and less productive cultivation systems, and abandonment of some sound traditional land use systems. This situation needs thinking and actions which go beyond the narrow confines of science.

• **Strengthening the national research systems and the research climate.** Most countries have fragile and unstable research systems and infrastructure. It is no use having an excellent network without the national infrastructure for it to relate to. There is a need to strengthen linkages between research systems and structures, increase and diversify incentive systems, and improve management and mechanisms for setting priorities.

• **Mitigating population growth and urbanization and increasing employment opportunities and incomes of rural communities.** As Swaminathan (1988) says, we should not just think of "so many tonnes per hectare" produced. We should also think of the landless labourer families who produce these tonnes and build some diversification in opportunities for employment into research and development strategies in order to improve incomes and quality of life.

• **Managing national economies.** With deteriorating terms of trade and the debt crisis, all research actions should relate to the long term objectives of the national economies which are predominantly agricultural. In this way one can complement—and in the process, shape—these policies and objectives rather than having projects developed in opposition to national interests.

• **Financing public services including health, education, housing, and agricultural inputs.** This may not relate immediately to agricultural networks, however "science can help the small farm, but only public policy instruments can help a small farmer" (Swaminathan, 1988). While these concerns relate to efficiency and alternatives in financing public services, one also has to think of how public services relating to inputs accessible to small farmers are financed, such as subsidized fertilizers, seed, irrigation, farm surveys, and ownership.

We hope that, in your own ways, you will be able to relate to these regional concerns of IDRC. With these remarks, I wish you a very productive review and look forward to seeing your proceedings and recommendations.

**References**


PURPOSE OF THE REVIEW
A. D. R. Ker

Introduction

The review meeting of Eastern and Southern Africa Network Coordinators arose out of recent widespread interest in networking activities expressed by a number of people and organizations. These organizations include the Special Programme for African Agricultural Research (SPAAR), several International Agricultural Research Centres (IARCs), the Consultative Group for International Agricultural Research (CGIAR), the International Development Research Centre (IDRC), and other international and national agencies.

IDRC has supported over one hundred research networks of all types and sizes since its creation in 1970, and has a continuing interest in helping improve their operation. Thus, IDRC has brought together a number of experienced network coordinators to share their problems and ideas, and to try to reach a consensus on the characteristics and modes of operation of successful networks.

The visit by Dr. Faris also provided an opportunity for him to share with us his experiences in reviewing agricultural research networks worldwide. Some of the ideas from this review might also contribute to the book Dr. Faris is writing on networks.

What is a Network?

Gordon Banta (1982) has suggested that a research network is a "voluntary association of research organizations with sufficient common objectives to be willing to adjust current research programs and invest resources in network activities in the belief they will meet their objectives more efficiently than conducting all research alone."

If this, or a similar definition, is acceptable, we can then turn to the functions of networks.

Network Functions

Network functions may be grouped as follows:

- **Planning**: All participants agree on the objectives of the network and on their order of priority.
- **Cooperation**: All participants agree to provide the resources necessary for the activities to meet the objectives.
- **Coordination**: Activities of the various groups are organized so as to achieve the objectives efficiently.

Looking at these three headings in more detail, we can ask a number of questions:

**Planning**: What is the overall objective of networking in agricultural research? Is it to increase the well-being of farmers and their families? If so, can this objective be achieved by providing improved technologies adapted to farmers' needs and assisting farmers in using these technologies—and other resources available to them—more efficiently, thus achieving sustained increases in production? Every network will need to spend considerable time and effort in defining its own objectives, together with the ways to achieve them.
Cooperation: Can a network function effectively unless all full participants are sufficiently committed to agree to allocate some of their resources to networking activities?

Coordination: Coordination includes most of the practical details of running networks. Many questions come to mind regarding network structure and organization.

- In terms of structure, are networks appropriate mechanisms for strengthening national agricultural research systems (NARS), or are there other more cost-effective mechanisms? What are the conditions under which they are effective? What are the pros and cons of different networking models, e.g., when is a 'hub and spokes' model appropriate and when is a more interactive model needed?

Are networks seen primarily as an outreach mechanism for IARCs, or as a means to strengthen each NARS so that it may assume a full partnership in research? Are links with other NARS of equal (or greater) importance than links with the coordinating centre? What levels of interaction are appropriate for the proposed activities?

What are the different needs and expectations of small or weak versus large or strong NARS which participate in networks? Is it appropriate to have different levels of interaction in the same network? For example, can there be a full collaborative agricultural research network (CARNet) for some larger NARS, with smaller or weaker NARS participating but without collaborating much?

- Regarding NARS, how much time should be devoted to their network activities, and is there a danger of belonging to too many networks? Is there a danger of national research priorities being distorted by network activities? If so, how can this be avoided? What is the place of national networks, as opposed to regional or international networks? Finally, what aspects of networking are seen as the most valuable by different groups associated with networks?

- How shall we measure or estimate the benefits of networks—with different levels of interaction—and decide what levels of funding are appropriate?

- When is a steering committee more appropriate than an advisory committee? The functions of steering and advisory committees could be clarified. For example, who should control funding to NARS—steering or advisory committees, coordinators, or other participants?

- What is the role of a coordinator? What personal qualities do coordinators require?

- What types of communication are appropriate and cost-effective for different types of networks, and what are the criteria for planning them? Means of communication may include workshops, monitoring tours, meetings, information exchange, and consultancies.

- What levels and types of training are best organized or coordinated through networks?

These are just a few of the many questions which could be asked about networking. Many more will surely come up during discussions at the review meeting.

Reference

AGRICULTURAL RESEARCH NETWORKS: THEIR STRUCTURE AND FUNCTION

D. G. Faris

Summary

This paper describes how Collaborative Agricultural Research Networks (CARNets) can solve agricultural problems that require cooperation between different institutes, governments, donors, and research disciplines. The structure and function of any research network must be clearly related to the needs and goals of all these groups, while at the same time focusing on the farmer. Collaboration between scientists, central to any CARNet, is achieved through personal contact, workshops, training sessions, and sharing data, technology, and materials. A strong coordinating group and efficient information management are crucial for the network's success. Funding is required for running the network and ensuring that national programmes can participate in the network effectively. On-going evaluation and feedback, such as through steering committees and workshops, are essential to monitor the effectiveness of the network and suggest modifications.

Organizing and operating CARNets is a complicated process. As coordinators we have had to learn mainly from our own experiences. This meeting gives us a chance to share our experiences and learn from each other. The questions listed in the appendix and the questions each of us have will direct our discussions toward answers of mutual benefit.

Introduction

The International Development Research Centre (IDRC) has considerable interest in networks and has provided support for the author to study networks—particularly those networks in which IDRC is involved—during a sabbatical leave. The outcome of this study will be a handbook on network operation for the IDRC monograph series. In part, this review meeting will explore the problems faced by network coordinators and review means used to meet these problems. The number of participants has been kept small to facilitate the exchange of ideas possible in a small group of experienced people.

This presentation gives a general outline of network structure and function as a framework for further discussions during the brainstorming sessions. It considers a definition of networks, reviews the requirements for networks put forward by the Special Program for African Agricultural Research (SPAAR) Network Group, and examines some aspects of networks such as their start, coordination, operations, and evaluation. The presentation will focus on Collaborative Agricultural Research Networks (CARNets). Some specific points to consider later are provided in Appendix 1.
Background

Definitions

*Network* is a word that has evolved from describing an interrelated or interconnected chain, group, or system—such as radio network or hotel network—to describing an interconnected group of people. It is even used as a verb to indicate when two people are communicating or working together.

An *Agricultural Research Network* can be defined as a group of scientists, representing a variety of agencies, who commit themselves to coordinating their research efforts towards some aspect to increase the world’s food supply. Each network has a stated purpose—to share information, technology, research methodology, or research effort, or a combination of these—in order to solve identified problems of mutual concern. A network has a coordinating unit and a system for exchanging information and material among its members. It should have a good feedback mechanism to ensure that it addresses relevant research problems. Farmers are the ultimate clients of the technology developed by networks. Thus networks should at least consider how the technology developed will be adapted to farmers’ needs and given to them.

This paper focuses on *Collaborative Agricultural Research Networks* (CARNets) which undertake cooperative research efforts as well as share information and technology among network participants.

In this paper, the term *technology* refers to information and materials developed by the research process. This could include single components developed by research, such as a variety, method, practice, or technique, or a package of these components.

Using networks is a logical step in developing ways to disburse international aid for agricultural improvement in developing countries (Greenland et al., 1987; Plucknett and Smith, 1984, 1987). Networks bring together, in one package, the many elements that have been used in agricultural improvement over the years. They use technology developed in international and regional centres of excellence, and also use direct aid to strengthen National Agricultural Research Systems (NARS) so they can effectively conduct their own agricultural research and development (Remenyi, 1987). Networks provide mechanisms for NARS to determine regional research priorities and for information and material to be effectively shared among NARS scientists.

*The SPAAR model*

Networks fall into several categories depending on their purpose and organization. The classification developed by the Special Program for African Agricultural Research (SPAAR) Network Group (SPAAR, 1986; 1987a; 1987b) is worth reviewing. The SPAAR group divided agricultural research networks in Sub-Saharan Africa as follows:

1. *Information Exchange Networks* organize and facilitate exchange of ideas, methodologies, and results of research currently underway.
2. *Scientific Consultation Networks* involve country-by-country focus on common priority research conducted independently by participants who hold regular meetings and have other means to exchange information on research as in 1 above.
3. *Collaborative Research Networks* involve joint inter-country [inter-institute] planning and monitoring of research on problems of mutual concern within a region. These could include information exchange, technical collaboration, and sometimes training.

SPAAR has indicated that donors should place a high priority on supporting CARNets. However, they suggest that the CARNet should satisfy certain criteria before it is recommended for donor support. The network should:

- address an important subject
- have a well defined common theme or strategy
- have a coordinating organization to facilitate inter-country activity and provide technical back-stopping
- have an advisory committee of participating national scientists to provide technical leadership and direction to the network
• hold regular meetings to identify objectives, identify and prioritize technical problems, identify and assign research topics, and identify lead institutes and researchers.
• have an information exchange system including a newsletter and reproduction of research reports of general interest
• have free exchange of plant and animal material among participants
• provide education and training opportunities, including regular workshops
• receive in-country financial support from participating NARS. Donors may directly support NARS, the coordinator, and other network activities.

SPAAR considers NARS to be the basic units making up CARNets. National, regional, and international institutions can provide positive input but coordination is necessary to ensure a strong CARNet. The coordination entity, perhaps initially an International Agricultural Research Center (IARC), should provide technical backstopping, training, monitoring of trials, and guidance for effective information exchange.

The following additional points about networks were brought up at the SPAAR meeting:
• Expatriate scientists in the region do not form the network but can catalyze network development by collaborating in research with national scientists.
• While a network model which includes NARS, an advisory committee, and a coordinating institution is highly desirable, network organization should remain flexible to accommodate individual situations.
• Staff of the coordinating entity must be small and lean to operate efficiently.
• The coordinating unit should not be required to act as a donor to financially support regional trials or activities. This should come directly to network collaborators from within each country or to each country from donors.
• Donor support for network activities must include a component to ensure that NARS are capable of handling the extra work associated with the networks.

We may wish to look at these ideas in detail during this meeting as they come from a body that has influence on donor support of networks. This meeting will provide constructive suggestions to be used by SPAAR’s Network Working Group.

Network Start-up

Network purpose

Most networks start for one of two reasons. Either a pressing need is perceived for new technology that cannot be quickly developed at a single institution, or there is a body of useful technology available and networks can be an effective means for sharing it.

The need and interest in the proposed network is determined in the preliminary phase. This phase can involve a survey of the need for the network, meetings with NARS scientists and donors, and formal meetings (ICRISAT, 1984). Usually the best results are obtained if this phase is not rushed. Once the need for and interest in a proposed network has been clearly identified an organizing meeting is held (ICRISAT, 1987a).

At the network organizing meeting interested workers must formulate a clear statement of the network’s purpose. The statement provides an overall goal, such as “to fed hungry people” or “to provide better living and food for those who have inadequate nutrition.” Statements of purpose will clarify whether the technology is to be directed only to increasing the returns to farmers, or whether reducing the food cost to consumers is also expected. The level of inputs required to use the technology developed by the network should also be stated.

The statement of purpose should clarify whether the network will generate a general technology, possibly to be modified for specific sites, or only conduct site-specific research with the technology to be shared among sites. Likewise, the network should specify whether it will only generate technology for use
by the network participants or also work towards adapting the technology for farmers' use (Byerlee and Hesse de Polanco, 1986; Zandstra et al., 1981).

The organizing meeting must take an inventory of the extent and location of the available technology and decide whether more technology needs to be developed. The easiest case is where an IARC has developed technology that needs distribution (Faris, 1986; ICRISAT, 1987a). More difficult are situations where technology needs to be drawn together, such as with oilseeds, or where little technology exists and research groups have to be set up to develop technology, as with agroforestry in Africa (Torres, 1987). As well as in IARCs and other regional research institutes, technology can be available or generated in strong NARS and institutes in developed countries (McWilliams, 1987).

The organizing committee should consider whether it is more efficient for the technology to be developed by a well-endowed multi-disciplinary group (such as an IARC), to disburse the same funds among well developed NARS, to spread the funds across many researchers participating in a network, or a combination of these.

Network objectives and work plans

After the purpose has been clearly understood and defined, the ongoing objectives—indicating how the purpose of the network is to be attained—must be identified. These objectives must be carefully thought out. Each one should consist of a single behaviour or action that can be measured (Faris, 1986).

Under each objective (or module) will come the sub-objectives—descriptions of how the objectives are to be attained. Again, each sub-objective should consist of a single, measurable behaviour or action. As the network develops these sub-objectives will be adjusted but the main objectives should remain constant.

The work plan should prioritize technical problems, assign research topics, and identify lead institutes and researchers. Topics such as training, workshops, monitoring tours, equipment, data collection and analysis, exchange of technology, and possibly funding may need to be considered.

A carefully-worded statement of objectives provides a firm base for network operation and, properly done, can be used to evaluate the network's performance. Developing statements of purpose and objectives is not easy. Because of their importance, ample time is needed for discussing and writing them at the organizing meeting.

Coordination

Coordinator

The main actor in any network coordination is the coordinator. In a CARNet it is essential that the coordinator have good technical knowledge, good administrative ability, and command respect among the scientists in the network. The problem is finding a coordinator equally strong in all facets. It is interesting to see the varied abilities of the scientists who are acting as coordinators. They are individuals who bring to their positions their own personalities and ways of doing things. It would be a disaster if we developed the ideotype coordinator and tried to fit all coordinators into that mold. Yet our effectiveness as coordinators can be improved through discussions and meetings such as we are having here.

Most coordinators present are hired to work full time. The other extreme is a coordinator elected by a network, usually from a NARS, who does the job part time in addition to normal duties. In many networks, they conduct a research programme as well as act as coordinator. In fact many people insist that it is essential that a coordinator maintains at least a small research programme.

If the network coordinating unit is kept small, and has only one coordinator, what mechanisms are there to back-up the coordinator if he or she is away, indisposed, or leaves? The coordinator tends to be the only person who knows about all aspects of the network—its members, the past, and the future plans. An understudy (assistant coordinator), either in the Coordination Unit or somewhere in the network, and/or a computerized project management programme that can effectively retrieve information about every aspect of the network can support a sole coordinator. A management programme can provide the coordinator and staff with an effective way of keeping track of the multitude of details associated with network operation.
In any model, the important factor is whether the network clearly understands and responds to the research and development needs of its members. The needs of the large or most articulate members should not be allowed to dominate the network's activities. The network coordinator can play a critical role in ensuring that everyone has an equal opportunity to contribute.

Coordination within the network

The coordinating group should facilitate activities between countries and provide technical back-up to the network. The group thus has a combined technical and administrative role. It has been suggested that the group must be small and lean to operate efficiently. In fact, the administrative component is virtually always a small group, as is, in many cases, the technical component. Sometimes an entity such as an IARC has a multi-disciplinary team available which can effectively provide technical backstopping to network activities. The SPAAR document has stated that the coordinating unit should not be required to act as a donor to support regional trials and activities. It seems that the level to which the coordinating unit acts as such varies greatly.

Coordination between networks

Inter-network coordination should deal with the following problems:

• **Unnecessary duplication of effort:** this can be wasteful when two groups addressing the same problem could be more efficient working together, or when NARS should be spared situations such as having to grow two or more similar sets of trials of the same crop.

• **Lack of effort in an important field:** the effort taken to duplicate networks would be better used to work in important areas presently without support.

• **Too many networks:** often NARS scientists can be involved in several similar networks leading to conflicts for their time. Good inter-network coordination should prevent this while involving scientists not presently working in any network.

• **Sharing technology among networks:** often components of research required by one network, such as varieties or methods, can be provided by another network. Inter-network coordination can ensure that appropriate technology is shared.

SPAAR was organized in an effort to bring some much-needed order to the large number of 'networks' being started in Africa. The Southern African Development Coordination Conference (SADCC) has encouraged the development of a successful series of regional programmes through its research body the Southern African Centre for Cooperation in Agricultural Research (SACCAR). Although not formal networks, these regional programmes, such as the Sorghum and Millets Improvement Program and the Grain Legumes Improvement Program of SADCC and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), have virtually all the components of a network. Similarly, the Organization of African Unity's Scientific, Technical and Research Commission (OAU/STRC) has started a research and development programme, SAFGRAD, for organizing and coordinating networks for semi-arid food grains (OAU/STRC, 1987a; 1987b; Guiragossian, 1988).

SAFGRAD has contracted to IARCs the coordination of its various networks, except the new West African Farming Systems Network. The SAGRAD office considers all these networks as SAFGRAD networks and wants all network coordinators seconded to SAFGRAD. Apparently these network coordinators are expected to become part of the SAFGRAD Coordination Office. SAFGRAD also wants all funds allotted to support NARS network activities to be channelled through their office. This plan has strong support from the National Agricultural Research Directors Meeting under the OAU/STRC (OAU/STRC, 1987b) and the SAFGRAD Oversight Committee (OAU/STRC, 1987a). This situation is interesting because it seems to differ considerably from the SPAAR model and it represents the thinking of the majority of research directors in SAFGRAD member countries.
Network Components

Advisory committee

Every network needs some guiding body to advise the coordinator. Guidance can be given by a steering committee composed of NARS scientists, or by the network membership when they attend network workshops or meetings. The advantage of a steering committee is that it is relatively small and therefore can meet more easily, cheaply, and can conduct its business more efficiently than a full membership meeting. The size and composition of steering committees varies between networks, from a small group within the coordinating IARC to one with a representative from each of thirteen participating countries. In the latter case, the Director of Agriculture of each country is asked to appoint a representative. Most committees are elected at a network workshop for a given term.

National agricultural research systems

NARS are the basic units of any network, but in many networks they are the weakest part. It is important, therefore, to strengthen the role of NARS in networks so that eventually they will take over the network operation—including the back-up research, developing technology, adapting and testing the technology, training, information exchange (newsletter), and the coordination unit.

I have seen two proposals for national programmes to provide technology support to networks. One proposes a regional multi-disciplinary high-standard research centre staffed by highly-trained personnel from the national programmes. This will only happen after NARS are strong enough so that providing staff to the regional research centre will not weaken their own programmes. Presently, these regional research centres are run by internationally recruited staff.

The second proposes to identify those national programmes strongest in a certain discipline or with an advantage regarding research (such as having a disease "hot spot"). These NARS are appointed to develop components of a technology required by the other members of the networks. These NARS centres may or may not receive special funding to carry out the research required. This model disperses the research responsibility among national programmes and requires a strong network to effectively integrate the research.

Both approaches have advantages. The two models may be combined if a strong coordinating unit can remain in place. One can predict certain political difficulties that could develop in both of these systems when the international component is reduced. These difficulties might reduce the systems' effectiveness.

There are several administrative concerns when dealing with NARS. There should be a formal agreement with the appropriate body in each country. These agreements would include, among other things, an expression of the NARS' interest in working in the network, arrangements for exchanging material and technology, commitment of staff, clearances for travel, tax status, agreement on sharing information and material generated, and a work plan. In some cases all these can be arranged through an agreement with a regional organization such as OAU/SAFGRAD (Guiragossian, 1988) and SACCAR/SADCC. Because some of these regional organizations have political influence they can greatly facilitate network operation.

NARS scientists

If NARS are the basic units in a network, then the NARS scientists are the basic units of the NARS. The scientists are the ones who benefit directly from being involved in a network, especially if they are isolated and have poor research facilities. They have direct input into the network and they themselves benefit from attending workshops and training sessions. Their upgrading can have a direct beneficial effect on a network and hence on the NARS. Therefore, the needs of the network scientists must be clearly understood and every network must be designed to take these needs into consideration. How well the NARS scientists' requirements are met becomes a measure of the success of the network.

International Agricultural Research Centers

Most International Agricultural Research Centers (IARCs) have developed a wealth of technology because this was the emphasis of their mandates. The emphasis in the institutes of the Consultative Group on International Agricultural Research (CGIAR) is now shifting to find the best ways to make this
technology readily available to NARS (CGIAR, 1987; McWilliams, 1987). It has been generally accepted that the network is an effective way to do this.

In most cases, IARCs have provided the network coordinating groups—almost exclusively on a regional basis (IITA, 1987). The world-wide networks (Nestel and Cook, 1976) have mostly been abandoned as being too expensive and not meeting country needs as well as regional networks. Most IARC regional programmes contain all the elements of networks, although they may not match all of the SPAAR specifications. Several of these regional programmes in Africa are adjusting their organization and operation to meet the SPAAR specifications for CARNets.

**Network Operations**

**Funding**

Network funding falls into three major areas: network operation, strengthening NARS so that they can participate at the local level in network activities, and developing technology for testing by the network. SPAAR is recommending networks to donors in order to strengthen the NARS component so that the NARS can effectively contribute to the network. IDRC, other donor organizations, and IARCs have often funded the network component. The funding of technology development is much more varied and diffuse.

For funding purposes, network operations include the cost of the coordinator and staff and their travel; the costs of network meetings, workshops, and monitoring tours; short term training (less than one year) associated with network activities; network data processing; and network publications.

Funding of NARS activities within the network should come from within-country so that NARS indicate their commitment to the network and are encouraged to fit network activities into national research priorities. Unfortunately, the lack of funds for agricultural research is usually the major constraint to most networks operating effectively. If sufficient government funds are not available, some form of supplemental funding through a bilateral agreement between the NARS and a donor should be identified. This is being recommended to donors by SPAAR. Donors, such as IDRC, have had bilateral projects with NARS that have been strengthened by joining projects together in a network. Similarly, in-country donor programmes, such as those of the United States Agency for International Development (USAID), have directed funds to support in-country network activities.

In another model, the organization funding the network also provides funding for in-country network trials (such as for labour). Small amounts of money can have a dramatic effect on greatly upgrading network trials. However, it can create a whole new set of problems for network coordinators. These problems include developing agreements for disbursing funds and providing fund transfer and auditing procedures, deciding how funds should be apportioned, handling competition among networks that are using larger and larger payments to attract NARS participation, and distortion of country research priorities.

Funding of technology development is more diverse. Technology may be developed by well-funded international or regional research centres who then readily share it with the network. The SADCC/ICRISAT Sorghum and Millets Improvement Program is a good example. Alternatively, technology may be developed by national programmes either using their own funds or through special funding. Finally, the technology may be developed by the research of all the network participants, either as part of their network involvement or as a specially funded bilateral project.

Adequate funding for all aspects of network activities will continue to be a major problem. The consequences of having funds diverted through a regional organization, such as SPAAR, will need to be carefully considered.

**Communication**

The salient feature of a network is the communication between its parts. In general, the better the communication, the stronger the network. These contacts can take many forms, some indirect—through mail, newsletter, data or material exchange, or through the coordinating unit. Alternatively, direct contact can be made through person-to-person visits, meetings, workshops, training sessions, or monitoring tours.
Workshops and meetings

Networks should have workshops and other forms of meetings on a regular basis as they are one of the most effective ways for network participants to communicate.

Network activities—such as visits, meetings, or workshops—must be scheduled at the appropriate time. This may be when the crop is at the best stage for observation, when the data will be ready, when they will not conflict with other activities such as planting or harvesting, or so they come right before or after another meeting that will already bring many of the network members together. Scheduling should be done well ahead of time to allow network members to arrange their own schedules. All network events should be planned in detail so as to use time and resources effectively.

Meetings should be held often enough to accomplish the tasks and not so frequently that they interfere with the scientists' work. The scheduling of meetings can be complicated by the many other meetings outside the network which the scientists must attend.

Collaborative research

A major reason for a CARNet is for network members to conduct collaborative research and pool their results. Collaboration is a powerful tool in developing new technologies because it draws on many minds and provides research over a range of conditions. To be most effective, collaborative research should be well thought out so as to generate the information needed to make the technology adapted to a wide range of conditions.

In collaborative research, participants should feel that the research they are doing is part of their own programme and not just part of an imposed trial. To do this, the trial should answer a researcher's own problem, or include lines which he or she has bred.

Network research data management

It may be possible to have a data management programme to help handle the administrative details of a network. More importantly, however, there needs to be a system for effectively using the data generated by collaborative research. This requirement can vary depending on the purpose, organization, and facilities (e.g., computers) available to a network and the type of research being conducted. The responsibility for analyzing and publishing the data should be clearly spelled out.

Information exchange

An important function of networks is generating and sharing information. Published literature must be made available to network participants, many of whom do not have access to the literature. Information generated by the network should also be shared. This can be done in several ways, such as through workshops, meetings, and visits from the coordinator and among network participants. Networks should also support a newsletter and publish research results.

The network should provide assistance in making publishable graphs and figures so that the scientists will feel proud to present their results. High quality editing services should be provided since English is a second or third language for most network scientists. Without this assistance it is virtually impossible for them to publish their research results.

Material exchange

For a network to be effective, there must be a free exchange of improved or special plant and animal material as well as data, information, and technology developed in the network. Moving material between countries can pose special problems such as ownership of patented material, reluctance of governments to allow certain types of material out of their country, and varying quarantine regulations. Some network coordinators have special arrangements to have organizations such as the OAU and the Food and Agriculture Organization of the United Nations (FAO) facilitate the clearance of material. Some coordinators physically carry the seed to network test sites and even help with sowing the trial; others use courier services to ensure timely delivery of seed. Arrangements to ensure prompt material delivery are essential.

Training

The need to train network members is often one of the first things identified when starting a network. The need for personal career development vis-a-vis furthering network objectives must often be resolved.
From the beginning, the network members must determine fairly what training is required to allow the network to operate effectively.

Training covers a wide range of activities. The network should provide courses to upgrade or enhance skills needed to provide good data to the network. The network itself is rarely directly involved in providing long-term training for its members. This is usually done by agencies with a bilateral agreement with a country. When a network member is away for training it can create problems for the network. This problem generally diminishes as more researchers are trained.

On-farm research

The final use of the technology that will be tested and generated should be considered in the network's plans. There is no doubt that the ultimate aim of any network is to develop appropriate and effective technology which is widely adopted by farmers.

New technology developed by researchers is used to propose packages to be tried by the farmer. The on-farm trial is an essential step to ensure that these packages are appropriate for the farmer. No technology, no matter how well conceived, should be given to the farmer until it has received on-farm testing. There is much literature about on-farm research methods (Fresco and Poats, 1986; ICRISAT, 1987b; Zandstra et al., 1981) so it need not be discussed here.

Feedback

In setting up a network it is important to build in an appropriate feedback mechanism. A steering committee meeting, a workshop, or a monitoring tour are all appropriate times for feedback. The coordinator, in particular, must be able to ask the right questions and be able to listen carefully to ensure that the feedback mechanism works. If it works properly, the process can eliminate inappropriate research, speed the development of appropriate new technology and hasten its movement to the farmer.

Measuring network success

Carefully stated objectives can lead to setting up goals with measurable outcomes. Progress can then be evaluated according to the degree to which these expectations are met. A survey can determine how well a technology developed by a network is being accepted by farmers. Evaluation by national scientists in a network can also give a measure of effectiveness. Successful networks can be studied to identify factors for their success. Once identified, these factors can be used to strengthen other networks. Likewise, those with poor performance can suggest factors to be avoided when running a network.

Conclusions

The topic of CARNets is very large and this paper only touches on a few points. The presentations and the discussion that follow will provide invaluable material for the study on networks for IDRC. They may also be helpful for your networks and your role as coordinators. The recommendations resulting from this review will provide others interested in networks—coordinators, NARS, governments, regional and international organizations, and donors—with ways to strengthen the structure and functioning of CARNets in Africa and other continents.

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Appendix 1

Agricultural research networks

Discussion points

In-depth discussion about agricultural research networks can be based on the following points. A useful place for any discussion group to start is to clearly state the purpose and objectives—as the group understands them—of the organization or activity being considered. This exercise helps discussants clarify their concepts, providing a good structure for further discussion. Discussion should build understanding about a topic and identify problems. The group should draw on the experience of its members to provide possible solutions, and ideally produce recommendations. These recommendations should be specifically directed towards an appropriate person, persons, or organization.

Network objectives

- provide appropriate technology to farmers
- utilize existing personnel and facilities more efficiently
- coordinate research efforts
- provide a regional coordinated effort
- identify important research topics
- ensure that research remains focussed on important topics
- strengthen national programmes
- support weak national programmes
- provide training, technology, material and literature to members
- provide interchange among members (scientists, national programmes, centres)
- organize and support coordination, workshops, monitoring tours
- develop and provide access to data bases
- support funding activities
- provide outreach for IARCs

Advantages and limitations of networks

- cost effectiveness
- acceptance by scientists, donors, NARS, IARCs
- justification of effort involved

Network models and their effectiveness

- SPAAR classification
- generating and sharing research
- involvement and roles of NARS, IARCs, scientists
- inter-network linkages
- central versus dispersed research networks

Network coordination

- coordination mechanisms
- purpose, organization, and duties of coordination unit, steering committees, workshops, IARCs
- coordinator as administrator and scientist
- SAFGRAD model
- agreements with NARS

Research coordination

- problem identification
- data handling and analysis
- sharing and using results
- feedback mechanisms
Network activities
Examine purpose, organization, operation, output, frequency, funding and problems associated with:
• workshops
• monitoring tours
• steering committee meetings
• training
• publications
• travel
• movement of material

National programmes
• effects of network activities on national research programme priorities
• need for formal agreements
• responsibility of network
• need for financial support
• training
• distribution of technology to farmers
• ensuring NARS needs are heard and met
• changing role of NARS

Farmers
• responsibility of networks to ensure technology is appropriate and getting to farmers
• interface with national programme
• on-farm research

Funding
• components to be funded
• level of funding
• route of funding—via network or bilateral or regional organizations (e.g., SAFGRAD)
• control mechanisms

Measurement of network progress
• against objectives
• use of survey
• response of members
• response of donors
NETWORK REPORTS

Chairmen: J. Kategile, C. Zulberti, A.D.R. Ker
Rapporteurs: B. Dzwelwa, N. Alvarez
IMPLEMENTING AGRICULTURAL RESEARCH NETWORKS:
SOME PRINCIPLES AND ISSUES

Roger A. Kirkby

Introduction

Networks have become a widely accepted means of facilitating and supporting agricultural research across ecological zones, countries, and continents. The concept is applied to many situations and for various purposes.

A simple, centric ("hub and spokes") organizational model describes the series of two-way linkages between a main research or documentation centre and outer locations. For example, the initial phase of an international germplasm nurseries programme of an International Agricultural Research Center (IARC) may take this form. Later, links develop among the cooperating national programmes through workshops to review nursery results. This may be described diagrammatically by a wheel (CGIAR Secretariat, 1983).

Most networks are evolutionary in nature but are still in their early stages, at least in Africa. At present, many may show an inherent contradiction. On the one hand, they attempt to provide linkage mechanisms that enable a group of countries, institutions, or researchers to accomplish more through collaboration than they could hope to achieve individually. On the other hand, most networks have their origin and driving force in an institution, such as an IARC or a donor organization. This is markedly different from most collaborators in the network, e.g., national agricultural research systems (NARS).

A workshop is commonly used by the initiator to launch and gain support for a new network. Provided that there is enough common interest, some priorities among activities can be established at that time. Operating principles and mechanisms, however, do not necessarily arise from general debate and are more likely to be based on unilateral decisions.

Several principles were described by Plucknett and Smith (1987) as underlying successful networks. These may be summarized as follows:

• focus on a defined problem and research agenda
• widely-shared problem provides the strong self-interest among participants that is necessary for collaboration
• participants willing to commit resources
• outside funding usually required to establish linkage mechanisms
• participants with sufficient training and expertise to make a contribution—a network cannot substitute for training in order to develop strong national programmes
• guidance by strong and efficient leaders who have the confidence of participants to operate with flexibility and without coercion

From these principles arises the common practice of incorporating network development into the activities of a regional research programme. The programme can provide certain elements—training, locally relevant upstream research—which it is not intended for the networks to carry out.
The above analysis may, however, be unduly oriented to the interests of IARCs. Networks become stronger, and probably even more effective, when they serve wider interests of collaborating partners. Training does not need to be an IARC preserve, although a number of training-the-trainers programmes have been less than fully successful.

Peer-group planning, monitoring, and evaluation is often an effective form of informal training, and can be readily encouraged in network activities. This requires network members feeling that they have sufficient input in identifying, designing, and implementing those activities. Undoubtedly there will be occasional disagreements—for example, on relative priorities among potential research topics—so a degree of flexibility is also needed on the part of "centres of excellence" and donors.

Most of us try to learn from our mistakes, and may learn less if never given the opportunity to make them. This consideration is similar to that faced by expatriates within a NARS. They need to strike an appropriate balance between trying to make the fastest possible research progress and encouraging national scientist colleagues to take over decision-making in anticipation of their own departure.

Research cooperation among network members is often thought of as facilitating evaluation or adaptation of technology across a wider range of conditions. Less commonly mentioned is the potential for complementary activities among members. One example is the African Bean Network, reviewed in this workshop. Countries of the Great Lakes region (Burundi, Rwanda and Zaire) share similar sets of agroecological conditions, but their principal research stations are located in different zones and they have limited research manpower. They therefore agree on a common set of germplasm for disease screening. Each takes responsibility for screening against a different disease, selecting the disease best expressed under their station's conditions.

A second example concerns developing integrated pest management (IPM) for the beanfly. Various countries of Eastern, Central, and Southern Africa focus their research—according to their relative strengths in breeding and entomology—upon the IPM components of host-plant resistance screening, studies of pest ecology and the effects of crop management, and insecticide recommendations.

Some Issues

Too many meetings?

Undoubtedly, having many meetings can become a problem if it limits the time available for research. This is sometimes a matter of perception, however, aggravated by the extra time needed to obtain exit clearances. Coordination among networks would be helpful where scientists work on more than one commodity. More precisely defining the intended participation for each network activity also assists NARS in selecting the appropriate person. Certain disciplines have been relatively neglected and warrant increased attention within networks.

Overburdening national research capacity

Overburdening national research capacity is probably less of a problem than it used to be. This is particularly so as NARS become more genuine partners in networks and are more specifically consulted on their needs, such as for germplasm introductions. Greater use of segregating or other materials selected for specific conditions also helps, rather than IARCs relying on uniform nurseries.

Concentration on stronger members

Smaller NARS may have the most to gain from network participation (Plucknett and Smith, 1987), yet IARCs and donors often prefer to concentrate upon larger NARS because they are able to produce research results more quickly. Flexibility in form and extent of participation may help in assisting smaller or less developed NARS to close the gap. Benefits of a different type may accrue to the larger members, which, as key research sites, may be assisted in developing methodology or in conducting studies in greater depth (Carangal, 1988).

Decision-making

Active participants will want to help determine the network's activities and development. This will lend further professional motivation to participate, and argues in favour of a steering committee consisting of the network's key scientists. The more experienced the scientists, the better this works.

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Some networks prefer advisory panels of NARS directors and outside specialists. This may improve national commitment and lead to more policy feedback or, alternatively, discourage leadership by active scientists.

Cooperation among networks

A scientist or national programme may need to belong to more than one network. For example, there are separate networks and IARCs for beans, cowpeas, and groundnuts, whereas these crops are normally the responsibility of a NARS grain legumes programme. Agronomists involved in cropping systems research also work with several crop species.

Sustainability of networks

Sustainability may be the most crucial issue, requiring long-term planning by NARS, IARCs, and donors. If networks evolve as the strengths of NARS grow, what can Africa learn from Latin America and Asia? Should different management approaches be used for different networks in Africa, even for the same field of research?

At what stage should a network pass to local coordination or be phased out of existence? Who should provide coordination—would NARS agree to a scientist taking on this role temporarily or for longer? Who would provide the support services to ensure that the coordinator remains in touch with research—rather than becoming bogged down in making travel arrangements—must also be considered.

The issue of sustainability raises specific questions about the commitment of NARS to the long-term existence of networks and their future form and function. At present, some network coordination units are perceived primarily as donors, particularly by NARS that are poorly supported by their governments. Economic pressures are eroding the salaries of national researchers and funding for operational expenses in many countries. There may be little that a network can do to influence this situation, beyond emphasizing applied research and its impacts on production, farmers, and consumers. Collectively, agricultural research networks, their participants, and donors may be able to draw more attention to this problem.

Future role of IARCs in networks

The future role of international organizations in networks is likely to be greatly influenced by the sustainability issue. They need to choose between maintaining a long-term coordination role, and changing to a liaison role with an indigenous network in order to ensure its continued access to results of upstream research (Ampuero, 1981).

How would upstream research that requires specific agroecological conditions be conducted? In an environment of indigenous networks, should IARCs develop key research locations or contract this type of research to network participants?

While some of this may still appear far off, present planning decisions within networks may well influence network evolution.

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References


THE AFRICAN RESEARCH NETWORK
FOR AGRICULTURAL BY-PRODUCTS

Abdullah N. Said

Introduction

Much has been written advocating networking in agricultural research. Plucknett and Smith (1984) provide a comprehensive discussion in their "Networking in international agricultural research." Network aspirations of the African Research Network for Agricultural By-products (ARNAB) have been documented by Kategile (1986).

There could be a thousand and one definitions of a "network". The wider and deeper the aspirations for a successful network, the more complex the definition. In the context of agricultural science the definition quoted by Kategile is probably the simplest and neatest. He suggests that a network is a "cluster of scientists or institutions linked together by a common interest in working independently or interdependently on an identified shared problem or problems."

Government machinery and good will, extension agents, and the farmer must all be involved to achieve the goals of ARNAB. The components of problem-solving should be the scientists, problems (abundant yet inefficiently utilized agricultural by-products, land scarcity, low food crop yields, poor nutritional status of livestock and people, high feed costs, faulty national development targets, etc.), and research programmes. These components must relate to one another to successfully resolve the problems.

Historical Background

The germ for some form of collaborative efforts on agricultural by-products work has been very fertile among African scientists and the international scientific community. Actual collaboration began at the Workshop on Agricultural, Industrial and Farm Yard Wastes in Douala, Cameroun, organized jointly by the International Livestock Centre for Africa (ILCA) and the Association for the Advancement of Agricultural Sciences in Africa (AAASA) in 1980. Among the recommendations were that ARNAB should be assisted by ILCA. That recommendation was implemented by ILCA in 1981 by assigning the first scientific secretary and the publication of the first ARNAB Newsletter.

ILCA was aware that a similar initiative on by-products work had been launched by the Food and Agriculture Organization of the United Nations (FAO) in some West African institutes. Therefore, in September 1981, ILCA and FAO organized a joint workshop on Crop Residues and Agro-Industrial By-products in Animal Feeding held in Dakar, Senegal. At the Dakar workshop it was agreed that "leadership of ARNAB should reside with ILCA." Workshops on related themes were also held in Tanzania in 1981, Kenya in 1982, and Egypt in 1983. These were jointly organized by the Universities of Dar es Salaam, Nairobi, and Alexandria, and the Agricultural University of Norway. The Norwegian Agency for International Development (NORAD) sponsored the workshop in Tanzania and the International Development Research Centre (IDRC) funded the workshops in Kenya and Egypt.
In March 1984, ILCA and FAO organized an Expert Consultative Meeting in Addis Ababa, Ethiopia, to "develop guidelines for research on the utilization of crop residues and agro-industrial by-products." The majority of ARNAB nucleus members attended, plus overseas scientists working on by-products. At this meeting, ILCA's proposal for IDRC to fund ARNAB was discussed. The final document was drawn up between IDRC and ILCA, and the memorandum of grant conditions was signed by both parties in September 1984.

**Institutional Structure**

Membership of ARNAB is not defined by its constitution. Anybody who is interested in effective utilization of crop residues and agro-industrial by-products is welcome to become a member by requesting to be put on the ARNAB mailing list. The current institutional structure discussed and agreed upon by participating ARNAB members consists of a secretariat and steering committee.

**ARNAB**

The secretariat is based at ILCA Headquarters in Addis Ababa. It consists of the coordinator and the head of the Nutrition Unit. The steering committee consists of four ex-officio members (the head of the Nutrition Unit ILCA, the ARNAB Coordinator, the coordinator for the Pastures Network for Eastern and Southern Africa (PANESA), and the programme officer for Crop and Animal Production Systems, IDRC, Nairobi) and four regional representatives for Northern, Western, Eastern, and Southern Africa elected biennially at the annual workshops or general meetings.

The steering committee is required to do the following:

- participate in formulating sub-regional research programmes and in developing standard research methodologies
- discuss and approve requests by national agricultural research systems (NARS) for small amounts of financial and material support on sub-regional research programmes, and review the progress of the funded activities
- help in planning annual programmes agreed upon by the annual general meetings
- review ARNAB activities (newsletter, workshops, and annual meetings)
- assist the coordinator in organizing workshops

The daily activities of ARNAB are run by the coordinator in consultation with the head of the Nutrition Unit, with guidance from the Deputy Director General (Research) and the Animal Feed Resources Thrust Coordinator to ensure it has a collaborative and complimentary role within the other ILCA programmes. ARNAB and other related ILCA networks are under the Coordinator of the Animal Resources Thrust and under the Animal Nutrition and Management Section.

**Aspirations and Objectives**

ARNAB's objectives are to develop and strengthen an African network to support research on crop residue and agro-industrial by-product utilization through collaborative research. Some of the more specific aspirations are to:

- stimulate and strengthen research on crop residue and agro-industrial by-product utilization through collaborative research
- collect, analyze, and disseminate literature on agricultural by-product utilization, processing methods, and data bases
- prepare and distribute critical reviews of literature on by-products
- develop standard evaluation methodologies (analytical and feeding trial criteria) and terminology for accurately describing by-product feeds and on-farm study methods
• conduct and analyze quantitative surveys and collect samples of important agricultural by-products in member countries
• provide fora for exchanging information among scientists from national institutes and for planning future research activities
• develop technologies which improve the nutritive value of agricultural by-products suitable for smallholders in member countries, support national institutions in such studies, and assess the economic and social impact of such technologies
• provide training at technical and MSc levels in areas related to improving by-product utilization
• produce and distribute ARNAB newsletters to enhance the above objectives, and produce proceedings of workshops organized by ARNAB and collaborating institutions

These objectives were achieved to varying degrees in Phase I which was financed by IDRC and ILCA. In the Phase II proposal, under review by IDRC for partial funding, the broad objective is to test and evaluate on-farm animal feeding technologies and strengthen national research programmes. This will be achieved by:
• developing sub-regional research programmes on agricultural by-product utilization
• introducing and evaluating by-product feeding technologies on farm
• assessing the economic and social impacts of the technologies introduced in the Ethiopian Highlands and other target areas
• training scientists and technicians from national programmes in agreed, standardized, on-station methods and on-farm testing
• providing fora for exchanging information among scientists from national programmes and reviewing the collaborative research programmes
• producing and disseminating ARNAB newsletters and proceedings of ARNAB workshops

<table>
<thead>
<tr>
<th>Staple/Cereal &amp; Agro-ecological Zone</th>
<th>Type of Livestock Production System</th>
<th>Target Class of Livestock and Feeding Season</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize in sub-humid areas</td>
<td>Agropastoral</td>
<td>Young stock, cows in lactation, and draught animals in dry seasons. Small ruminants fattening.</td>
</tr>
<tr>
<td>Sorghum/millet in semi-arid areas</td>
<td>Agropastoral</td>
<td>Young stock, cows in lactation, and draught animals in dry seasons. Small ruminants fattening.</td>
</tr>
<tr>
<td>Cassava/yams in humid areas</td>
<td>Agroforestry and root crops</td>
<td>Small ruminants (reproduction rate and fattening) all year round. Dairy cattle.</td>
</tr>
<tr>
<td>Rice in irrigated and humid areas</td>
<td>Agropastoral and intensive production</td>
<td>Draught animals and small ruminants fattening in dry seasons. Dairy cattle.</td>
</tr>
<tr>
<td>Maize/wheat/barley in highlands</td>
<td>Agropastoral and intensive production</td>
<td>Draught animals and dairy cattle all year round. Small ruminants fattening.</td>
</tr>
</tbody>
</table>

TABLE 1
Sub-regional Programmes
Methodology

The ARNAB Steering Committee, the coordinator, and the head of the Nutrition Unit at ILCA, and will jointly develop sub-regional research programmes in Sub-Saharan Africa. Each sub-region’s approach will be based on the staple/cereal and agro-ecological zone, the livestock production system, and the target class of livestock. The sub-regional groups which have been tentatively identified are shown in Table 1.

The sub-regional research programmes will be developed based on national priorities, lean periods, previous research experiences, and scientific merit. They will give specific guidelines on experimental designs for on-station and on-farm studies; optimal combinations of crop residues with oil meals, cereal brans, urea, molasses, legume haulms or forage legumes for maintenance, lactation, and fattening; data collection; and statistical analyses. The guidelines will also include methods of assessing economic viability and social acceptance of the introduced technologies.

ILCA’s Ethiopian Highlands Programme identified animal feed shortage as a major constraint affecting milk production and performance of sheep and draught oxen. In Phase I, the beneficial effects of supplementing teff straw and other roughages with noug cake, molasses/urea, and Trifolium hay were shown on milk yield, growth rate of sheep, and oxen performance. In Phase II, it is planned that on-farm experiments will be designed to appraise these technologies in smallholder dairy units, draught animals, and sheep. The coordinator will work with other ILCA programmes at Debre Zeit and Debre Berhan and with the NARS to implement on-farm research.


ARNAB, in conjunction with collaborating NARS scientists and technicians, will develop training programmes to meet their specific training needs. Several post-graduate students registered with African universities will continue to undertake their MSc and PhD research on by-products at ILCA, under joint supervision of ILCA staff and their national universities. This will enhance and strengthen NARS research capabilities.

The coordinator will prepare a quarterly newsletter and distribute it to African national institutions and scientists. Contributions from African scientists will continue to be sought for the newsletter.

The coordinator will organize annual workshops during which scientists will present research results and also review the progress and plans of the sub-regional research programmes. The papers will be edited by the coordinator and the members of the steering committee. The proceedings will be distributed to ARNAB members.

The coordinator and steering committee will encourage and help national scientists and extension personnel to write simple manuals and posters for use by farmers. Researchers will contribute in farmers' magazines and participate in seminars at farmers' training centres and field days. On request by NARS, the coordinator will compile bibliographies and publish review articles on crop residues and agricultural by-products.

Output

Despite some setbacks, modest progress has been made thanks to the preceding ARNAB secretariats, IDRC, ILCA management, other ILCA scientists, and cooperation from NARS. ARNAB’s achievements are described below.
Publications

Newsletters

The first ARNAB Newsletter came out in July 1981. Since then, there have been fairly regular quarterly issues. Some of the major topics that have been covered in the newsletters are:

- Home-made urea molasses blocks (Newsletter 4 (3), 1984)
- Literature reviews on molasses-urea (Newsletter 4 (3), 1984)
- Inexpensive detergent fibre analysis using a micro-system (Newsletter 4 (4), 1984)
- ARNAB/ILCA and Ethiopian Government joint "on farm" research projects (Newsletter 4 (4), 1984)
- Importance of rumen anaerobic phycomycetous fungi in fibre digestion (Newsletter 5 (2), 1985)
- Collaboration among agronomists, plant breeders and animal nutritionists to solve part of the human and ruminant livestock food problems in developing countries (Newsletter 5 (2), 1985).
- _Leucaena leucocephala_: A useful feed may become even more useful (Newsletter 5 (4), 1985)
- Development and production of rumen canulae (Newsletter 5 (2), 1985)
- The effects of tannins on animal nutrition (Newsletter 6 (1 & 2), 1986)
- The nutritional evaluation of dried poultry waste as feed ingredient for broiler chickens (Newsletter 6 (4), 1986)

Workshop proceedings

In 1984, scientists were invited to ILCA from various countries to participate in the Expert Consultation on Crop Residues. The main objectives were to discuss the prevailing situation on crop residues and the kind of research methodologies to be developed and followed by national scientists. The proceedings came out as FAO Publication No. 50, "Better utilization of crop residues and by-products in animal feeding: research guidelines: 1. State of Knowledge."

In 1985, another workshop—Towards Optimal Feeding of Agricultural By-products to Livestock in Africa—was held at the University of Alexandria, Egypt. As a result, contacts are being made with the International Network on Feed Information Centre for member countries to adopt their feed descriptions. 1500 copies of the proceedings were produced and distributed to all ARNAB members. A few are available for distribution on request from new members.

A third workshop was held in 1986 on the Utilization of Agricultural By-products as Livestock Feeds in Africa, in Blantyre, Malawi. 1500 copies of the proceedings have been printed.

October 1987 saw the fourth workshop, in Bamenda, Cameroun, on Overcoming Constraints to the Efficient Utilization of Agricultural By-products as Animal Feed. As with the other workshops, recommendations for future work on crop residues and agricultural by-products were discussed and agreed on. Papers are being edited now for the proceedings, with 1500 to 1800 copies to be printed.

The most recent workshop was held December 1987 on the theme Plant Breeding and the Nutritive Value of Crop Residues. This workshop was organized by ILCA, the British Overseas Development Administration (ODA), and the Tropical Development and Research Institute (TDRI).

Research

A number of experiments on nutritive evaluation of crop residues and agro-industrial by-products, and on the supplementary effects of forage legumes, browses, and multipurpose trees have been conducted. Some have ended while others are in progress at ILCA headquarters, ILCA research stations in Ethiopia, at other ILCA field programmes, and in collaboration with NARS in Ethiopia and in other member countries in Africa. Under ILCA's reorganized research approach, strategic supplementation of crop residues and feeding systems development work will slot into the Cattle Milk and Meat and the Small Ruminants Meat and Milk Commodity Thrusts. Some of this work has been published in ILCA Annual Reports, in workshop proceedings, and in refereed scientific journals.
Collaborative research

Within the objectives spelled out earlier, ARNAB has developed and continues to develop collaborative research with NARS in Ethiopia, Egypt, and West, and East, and Southern Africa. The planned research focus is to develop sub-regional research programmes for on-station and on-farm research, as described earlier.

The research priorities on which ARNAB members should concentrate are discussed at workshops. These are written in workshop proceedings as recommendations. At the last annual workshop in Bamenda, Cameroun, the following recommendations were discussed and agreed upon.

• The role of small ruminants as important utilizers of by-products should be recognized and re-emphasized.

• Caution should be exercised in extrapolating research data among goats, sheep, and cattle. It was stressed that more production studies be conducted using these different species at different physiological stages.

• Simple machinery, such as choppers and chaff cutters, needs to be developed, for which collaboration with agricultural engineers should be sought.

• ARNAB should address itself to the question of transferring technology to farmers and extension agents through NARS.

• Members should review the number of nutritive analyses in any experimental design as there is a tendency to overdo analyses. This unnecessarily increase the cost of experiments.

• Members should adopt the INFIC system (International Network of Feed Information Centres) to avoid confusion in feed nomenclature.

• Work on anti-nutritional factors in crop residues, legumes, browse, and agricultural by-products should be continued.

• Through ARNAB, NARS could, and should, use the expertise of ILCA biometricians in designing their experiments.

Training

Several technicians have been given laboratory and animal barn training over the past three years. More applications are being received from Kenya, Tanzania, Malawi, Botswana, Ethiopia, Côte d'Ivoire, Gambia, Sierra Leone, and Senegal. Graduate (MSc level), post-graduate (PhD level) and post-doctorate personnel have been and are working on by-product research in collaboration with ARNAB and other scientists in the Nutrition Unit. Further requests are being processed.

Effectiveness and Constraints

The lack of both research funds and flexibility in moving the money within the projected research activities is constraining effective research at the NARS level. In many situations, it is much easier to solicit funds from donor agencies if the requests go in as regional or national network cum NARS research proposals, rather than for NARS alone. Donor agencies are more comfortable in supporting regional research goals that will have a multiplier effect.

A network is in a good position to collaborate in producing newsletters, organizing workshops at a regional or continental level, and soliciting a sub-regional research approach. It can pool both personnel and financial resources on common research problems. It is not uncommon to find research efforts duplicated at both the national level and at the sub-regional level. A lot of money, time, and effort could be saved if research priorities were approached at the regional or sub-regional level.

A probable flaw in the sub-regional approach, however, is that it can compromise national research policies and priorities. Some NARS may not be amenable to this. The other probable flaw—which should not be seen out of proportion—is the need for ILCA-run networks to work with NARS in research areas that are not ILCA priorities but are, instead, national priorities. For example, some national scientists are under pressure to work on large-scale commercialization of crop residues and agricultural by-products, as in beef feedlots and dairy enterprises, or to work on monogastric species. On the other hand, ILCA, with its meagre financial and personnel resources, has carefully deliberated and decided—together with prominent scientists—

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from NARS—to concentrate research efforts only on specified and prioritized animal species, target groups, zones, and animal products.

Many NARS expect some ARNAB financial support for their research efforts. At the moment, ARNAB has no budget for collaborative research but could be catalytic in soliciting funds from donor agencies for mutually agreed upon projects. Regional representatives feel that they should be supported by small sums of money to travel internally to solicit collaboration and involvement in the ARNAB Network. The coordinator’s budget for international travel is also too restrictive to properly cover ARNAB mandate countries.

Ideally, networks should have a bottom-up structure with NARS exercising a greater control on network activities. My experience as a NARS scientist, and now as coordinator, is that it is not very easy to institute this bottom-up approach effectively. People vary in their levels of enthusiasm and dedication. National scientists are almost invariably subject to inter-station transfers and reassignment of responsibilities. It is not uncommon for a national scientists to be shunted from one research area to another unrelated discipline, or even transferred to an administrative post.

As long as this situation exists, a NARS-ILCA bottom-up structure for running networks become rather ineffective and is bound to give networks using it a disjointed progression. On the other hand, it is vitally important that network coordinators be very tactful in their collaborative efforts with NARS. Knowing the administrative undercurrents in NARS is essential for ideas and research efforts to be successfully merged and implemented. Being able to tap the goodwill of NARS administrators and scientists and establish tangible mutual respect of each others' responsibilities will enhance speedy and fruitful collaboration.

One further point to consider regarding effectiveness and constraints is how much effort networks take to collaborate with NARS in extension work and the degree of its vertical and horizontal involvement, if any. Many past ARNAB efforts have been on research to study feed constraints or to develop feed packages. ARNAB should now address to what extent these packages have been extended to the consumers. We should have no illusions about the constraints on the network going into extension, both in terms of personnel and finances. Neither are networks potent in formulating and executing national extension policies.

We also need to look at NARS capacities to enhance crop residue and agricultural by-product utilization. How best, within the network’s constricted resources, can we collaborate with NARS in extending packages that are viable and sustainable? There are many examples where extension has had a remarkable impact, achieved through donor support to NARS. Recent successes in donor-supported extension in Kenya—one the Smallholder Dairy Development Project, the Cockerel and Pullet Exchange Programme, and the Teach and Visit Crops Production Project—are good examples of what can be achieved. Network effectiveness and the constraints of available resources should be a priority area for discussion.

References


A REGIONAL NETWORK TO IMPROVE SORGHUM AND MILLETS IN EASTERN AFRICA

Vartan Guiragossian

Introduction

The Eastern Africa Regional Sorghum and Millets Network (EARSAM) is a project of the Semi-Arid Food Grain Research and Development Project (SAFGRAD) and includes eight countries—Burundi, Ethiopia, Kenya, Rwanda, Tanzania, Somalia, Sudan, and Uganda. EARSAM is a response to the growing concern in Eastern Africa that food production is not keeping pace with population growth. Shortages of basic foods have become commonplace, and the region is now a net importer of food grains. Increases in food production will have to come from improved cultivars and improved farming practices.

Sorghum is the first or second most important cereal in most of the countries of the region (see Table I). Sorghum and millets are grown on marginal agricultural land where the cereals—maize, wheat and rice—do not consistently produce a reasonable harvest. The principal millet grown in the region is finger millet (Eleusine africana), while pearl millet (Pennisetum glaucum) is mainly grown in the Sudan, Eastern Kenya, and Central Tanzania in harsh conditions with less than 500 mm rainfall annually.

EARSAM's research priorities are to develop sorghum and millet cultivars with high and stable yields, with genetic resistance to biotic and abiotic stresses. Cultivars with these traits developed at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Center in India and other places have been introduced into the regional programme for further improvement by incorporating the above traits into the local land races. Thus, the challenge for the future is enormous. We believe that SAFGRAD/ICRISAT's efforts in the EARSAM network will better equip the region to deal with some of these challenges.

This paper presents EARSAM as an example of a SAFGRAD network, and outlines SAFGRAD’s role and approach to sorghum and millets research in Eastern Africa. The regional network’s general objectives and approach are shown below. The structure, responsibilities of the regional coordinator and of the national agricultural research systems (NARS), the priority production constraints in the region, existing and potential research strengths within NARS, and the future research strategies of the network are described in this paper.

EARSAM's objectives are to:

• improve the production of sorghum and millets, thereby contributing to stabilizing food supplies in the region, leading to improved nutrition and income for the farmers in drier areas
• assist and strengthen national sorghum and millet programmes in the semi-arid zones

These objectives are achieved by:

• assisting in the development of improved varieties and hybrids along with agronomic practices that will result in higher and more stable economic yields in the semi-arid environments
• organizing and promoting systematic regional testing of available elite breeding materials and technology in all important ecological zones
• assisting in training and manpower development
• providing supplies and facilities needed to upgrade research capabilities
TABLE 1
Agricultural Development Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Burundi</th>
<th>Ethiopia</th>
<th>Kenya</th>
<th>Rwanda</th>
<th>Tanzania</th>
<th>Somalia</th>
<th>Sudan</th>
<th>Uganda</th>
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</thead>
<tbody>
<tr>
<td>Population, 1985(^1) (millions)</td>
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<td></td>
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<tr>
<td></td>
<td>4.5</td>
<td>40.9</td>
<td>18.9</td>
<td>5.7</td>
<td>19.0</td>
<td>5.1</td>
<td>20.8</td>
<td>13.9</td>
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<tr>
<td>Major cereal crops(^2) in order of production</td>
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<td></td>
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</tr>
<tr>
<td>Sorghum area(^3) (’000 ha)</td>
<td>S M R W</td>
<td>T B S M W</td>
<td>M S W R</td>
<td>S M R W</td>
<td>M S R</td>
<td>S M R</td>
<td>S R M W</td>
<td>S M R W</td>
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<td></td>
<td>180</td>
<td>910</td>
<td>160</td>
<td>145</td>
<td>800</td>
<td>500</td>
<td>4,896</td>
<td>200</td>
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<td>Sorghum production(^3) (’000 tons)</td>
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<td>130</td>
<td>184</td>
<td>670</td>
<td>251</td>
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<td>50</td>
<td>231</td>
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<tr>
<td>Millet production(^3) (’000 tons)</td>
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<td></td>
<td>50</td>
<td>200</td>
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<td>Maize area(^3) (’000 ha)</td>
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<td>1,398</td>
<td>87</td>
<td>1,905</td>
<td>350</td>
<td>70</td>
<td>280</td>
</tr>
<tr>
<td>Maize production(^3) (’000 tons)</td>
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<tr>
<td></td>
<td>160</td>
<td>1,500</td>
<td>2,650</td>
<td>121</td>
<td>2,210</td>
<td>382</td>
<td>30</td>
<td>400</td>
</tr>
</tbody>
</table>

Notes: M = Maize; S = Sorghum and millets; R = Rice; W = Wheat; B = Barley; T = Teff

2. Ministry of Agriculture of each country.
organizing regional workshops and monitoring tours in order to report research findings, to interchange ideas and breeding material, and to foster closer national programme cooperation

SAFGRAD

Regional network structure

The Semi-Arid Food Grain Research and Development project (SAFGRAD) is a regional research project with headquarters in Ouagadougou, Burkina Faso. It is implemented by the coordination office of the Scientific, Technical, and Research Commission of the Organization of African Unity (OAU/STRC). SAFGRAD's collaborative research with ICRISAT serves as a backstop for generating production technology and developing sorghum and millet genotypes relevant to small and intermediate farming conditions (see Figure 1).

Oversight committee

SAFGRAD has a new focus on networking and developing leadership within NARS to manage collaborative research networks. An oversight committee for all of SAFGRAD's networks has been selected to fulfill these functions. The committee has seven members consisting of national agricultural research scientists, administrators, and university academicians of participating NARS. The oversight committee:

- provides guidance in SAFGRAD's management and policy issues
- reviews work plans and provides guidance on how SAFGRAD can give effective technical services to national programmes of OAU/SAFGRAD member countries
- emphasizes the importance of food grain crops and other related networks
- reviews annual technical progress of network activities

Sponsoring group

The main role of the sponsoring group will be to generate funds to enable SAFGRAD to fully play its role as an African coordinating organization. Its members will be representatives of OAU/STRC, donor agencies, a few member countries, the SAFGRAD coordination office, and the chairman of the oversight committee.

EARSAM

Steering committee and regional coordinator

SAFGRAD provides funds from the United States Agency for International Development (USAID) to ICRISAT to implement sorghum and millet improvement in Eastern Africa through the Eastern Africa Regional Sorghum and Millets (EARSAM) network. EARSAM includes the regional coordinator and a steering committee with one representative from each national programme. Other representatives of existing institutions—the International Centre of Insect Physiology and Ecology (ICIPE), USAID, INTSORMIL, the International Development Research Centre (IDRC), and universities—may join as observers and contribute ideas in executing the research projects.

The steering committee has six elected members—one from each of the national programmes in the region—and aims to represent different disciplines to provide general guidance to the network. Steering committee members serve for two consecutive years. New members are elected at the regional workshop held every other year. The chairperson of the previous steering committee overlaps with the newly elected members in order to maintain continuity of decision-making and avoid duplication of effort. The steering committee provides overall guidance to the regional coordinator concerning networking activities.
FIGURE 1
EARSAM Network Structure

OAU/STRC/SAFGRAD/ICRISAT

Oversight Committee

Maize Cowpea Farming System Others

EARSAM
Steering Committee and SAFGRAD Regional Coordinator

Universities
ICRISAT
ICIPE
USAID
INTSORMIL

Burundi Ethiopia Kenya Rwanda Somalia Sudan Tanzania Uganda
The regional coordinator develops priority research projects together with NARS and makes sure each project is properly executed by providing the necessary funds and equipment. After the technology or genetic material is developed, the regional coordinator follows up by organizing and promoting the systematic regional testing of genetic material and technology in other countries in the network or in the region outside the network.

The steering committee members, with the assistance of the SAFGRAD/ICRISAT regional coordinator, fulfill the following functions:

- prepare long- and short-term network action plans based on regional priorities
- monitor implementation of workshop recommendations
- facilitate implementation of the research network programme components in their respective countries and in the region
- determine themes for regional and short course workshops
- provide overall guidance for the networking activities

EARSAM receives the following support from the ICRISAT Center:

- production technologies and improved sorghum and pearl millet breeding material developed by ICRISAT scientists for NARS in the region
- strengthened research capabilities of NARS by providing in-service and degree training to scientists and technicians in the region
- Highly qualified ICRISAT scientists made available to assist NARS in conducting research aimed at developing simple and relevant technologies for the region
- specialized services for research that require scientific expertise and equipment or materials not available in the region
- basic research that is still outside the competence of NARS that will contribute to the objectives of the EARSAM network
- scientific information for national programmes

**Activities of the regional coordinator**

The following are the past, current, and future activities of the SAFGRAD/ICRISAT regional coordinator:

- Initially visited each country in the region with a questionnaire and identified the major constraints to sorghum and millet production that have regional significance. This was done under each discipline with the help of national programme scientists, and identified the following:

  **Sorghum production constraints:**
  1. Plant improvement
  2. Pests
  3. Diseases
  4. Grain quality
  5. Environmental stress
  6. Agronomy

  **Priority Areas:**
  - Varietal improvement
  - Stem borer (chilo), shootfly, storage pests, birds
  - Ergot, grain mold, anthracnose, striga
  - Food products and brewing
  - Drought and stand establishment
  - Soil fertility and management

  **Millets production constraints:**
  1. Plant improvement
  2. Pests
  3. Diseases (pearl millet)
  4. Grain quality
  5. Environmental stress
  6. Agronomy

  **Priority Areas:**
  - Varietal improvement
  - Birds
  - Ergot and smuts (pearl millet), head blast (finger millet)
  - Food products and brewing
  - Drought and stand establishment
  - Soil fertility, soil management

- Identified the existing and potential in-country strengths for the different research problems during field visits (see Table 2). This was done to capitalize on existing in-country facilities and scientific experience to strengthen the network in the region.

- Organized a regional meeting together with the NARS to identify the common sorghum production constraints. During this meeting the NARS elected the steering committee members.
• A steering committee meeting to decide on the common priority research problems within each agro-ecological zone was held in Ethiopia in 1986. For each research problem the following points were discussed and reported: definition, description, current status, future research approach to tackle the problem, and identification of "Lead Research Centres" (see Table 3).

• Developed collaborative research projects with Lead Research Centres in NARS. After approval of the projects, the coordinator made available the necessary inputs to execute each project.

• Organized regional workshops every other year in order to review and present progress reports and achievements for each project.

• Organized monitoring tours and in-country or in-region short course training on specific issues requested by NARS.

• Will uniformly test the technology generated or the genetic material developed in hot spots in the region.

• Will characterize and group different sets of sorghum growing environments in Eastern Africa and identify similar zones of adaptation in different agro-ecological zones within the region. This will be done through collecting agro-climatic data for analysis with ICRISAT's assistance.

Collaborative projects with NARS

The visits to each country in the region by the regional coordinator to identify the constraints to sorghum and millet production was done with the help of the national programme scientists. The steering committee, together with the regional coordinator, identified the common priority problems and the Lead Research Centres for each research problem. ICRISAT project format was used to develop collaborative research projects with the Lead Research Centres. After the approval of these projects by NARS and ICRISAT, the regional coordinator has made available the inputs necessary to implement the projects. In addition to common priority projects, the SAFGRAD/ICRISAT coordinator developed collaborative projects on country-specific problems with Kenya (long smut), and with Rwanda (downy mildew). Achievements of all the collaborative projects will be presented during the Sixth Regional Workshop in Somalia.

There are other important problems related to sorghum and millet improvement which have not been tackled at this stage because of lack of funds, facilities, and qualified scientists.

EARSAM network strengths

The strong points of the EARSAM network follow.

• Sorghum and millet are the first or second most important cereal crops in most countries in Eastern Africa.

• Few of the national programmes in the region alone have sufficiently diverse disciplinary strengths to be exploited for the regional effort.

• EARSAM network scientists have developed close cooperation as a result of annual workshops and meetings over the past six years.

• High priority research problems have been identified and are being answered through collaborative research projects with NARS.

• Germplasm movement has been facilitated by the network operating under the OAU umbrella.

• Scientific information exchange among network scientists has been initiated through development of a depository of annual and progress reports and research highlights in the EARSAM coordinating office in Nairobi and ICRISAT Center in India.

• Biennial regional workshops and short courses (in alternating years) on topics identified by national programme scientists are being offered.

Future requirements

In order to further strengthen network activities, the network will need additional funds to obtain research supplies which are not available in-country, build or upgrade research facilities, provide station development, and meet transport needs. Finding opportunities for graduate training to strengthen national research skills will also be important.
<table>
<thead>
<tr>
<th>Strengths</th>
<th>Burundi</th>
<th>Ethiopia</th>
<th>Kenya</th>
<th>Rwanda</th>
<th>Somalia</th>
<th>Uganda</th>
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<tbody>
<tr>
<td><strong>Existing</strong></td>
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<tr>
<td>Germplasm bank</td>
<td>PGRC</td>
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<tr>
<td>Strong sorghum improvement</td>
<td>IAR</td>
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<tr>
<td>Entomology</td>
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<td>ICIPE</td>
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<tr>
<td>Cereal nutrition and utilization</td>
<td>ENI</td>
<td></td>
<td>KIRDI</td>
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<tr>
<td>Cold tolerance</td>
<td>Kisozi</td>
<td></td>
<td>Katumani, Nanyuki</td>
<td></td>
<td>Rwerere</td>
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<tr>
<td>Drought</td>
<td>Kobo</td>
<td></td>
<td>Kiboko</td>
<td></td>
<td>Baidoa</td>
<td>Kotido</td>
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<tr>
<td><strong>Potential</strong></td>
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<tr>
<td>Seed technology and production</td>
<td>ESC</td>
<td>ISABU</td>
<td>Striga Team</td>
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<tr>
<td>Crop protection</td>
<td>IAR</td>
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<tr>
<td>Socio-economics</td>
<td>IAR</td>
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</tbody>
</table>

Notes: ENI: Ethiopian Nutrition Institute  
IAR: Institute for Agricultural Research  
ICIZE: International Centre of Insect Physiology and Ecology  
ISAR: Institute Scientifique pour la Recherche Agricole  
KIRDI: Kenya Industrial Research and Development Institute  
PGRC: Plant Genetic Resource Center

Source: EARSAM Regional Coordinator, based on data gathered in travel through the region.
### TABLE 3

Priority Problems and Lead Research Centres

<table>
<thead>
<tr>
<th>Varietal</th>
<th>Agronomy</th>
<th>Striga</th>
<th>Drought</th>
<th>Stalk Borer</th>
<th>Shootfly</th>
<th>Mold</th>
<th>Ergot</th>
<th>Pearl</th>
<th>Finger</th>
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<tr>
<td>Ethiopia</td>
<td>Ethiopia</td>
<td>Kenya</td>
<td>Somalia</td>
<td>Uganda</td>
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Burundi, Tanzania, and the Yemens have no Lead Research Centres.

*Source*: EARSAM Regional Coordinator and Steering Committee Members.
A highly qualified team of multi-disciplinary scientists is needed to solve problems which are still outside the competence of NARS, and to conduct research that would contribute to the objectives of the network.

**Training activities**

Two types of training services have been offered to NARS by EARSAM during the last six years: in-service training, and in-country or in-region training. Each year one to three scientists from NARS are identified to receive in-service training at the ICRISAT Center in India for a period of six months.

For in-country or in-region training, specific short course training sessions are offered to NARS on sorghum and millet improvement. Specific technologies developed at the ICRISAT Center are being transferred to national programme scientists through these courses. Short courses have been organized in response to requests made by national programme scientists and the steering committee, for example in seed production. Such in-region short courses are being offered every other year on topics identified by national programme scientists.

**Regional workshops**

One facet of the EARSAM regional programme activities that has grown markedly in the last six years is the annual sorghum and millet workshop. From 1982 to 1986, the EARSAM Network organized five successful regional workshops, the proceedings available on request in the SAFGRAD/ICRISAT coordinating office in Nairobi. During the Fifth Regional Workshop, the steering committee and the regional coordinator agreed to organize regional workshops every other year. In those years where there will be no regional workshops, it was agreed to organize a regional short course on topics identified by national programme scientists and the steering committee.

**EARSAM regional uniform trials**

Regional uniform yield trials have been conducted within each agro-ecological zone and the results have been reported in the workshop proceedings.

**Collaboration with other institutes**

The EARSAM Network has identified other institutes in the region to cooperate with in order to benefit from each other's activities and avoid duplication of effort. These institutes include ICIPE, the Kenya Industrial Research Development Institute (KIRDI), Global 2000, the International Board for Plant Genetic Resources (IBPGR), the Southern African Development Coordination Conference (SADCC), and universities.

**Current status and future strategies**

The EARSAM Network was established by sorghum researchers in the Eastern Africa region. ICRISAT played a catalytic role in its formation by training scientists from national programmes and bringing them together to discuss common production constraints in the region. At the outset it was recognized that the only viable long-term approach for the region was for researchers in and from the national programmes to eventually manage all aspects of sorghum research. Initially, however, ICRISAT was requested by OAU/SAFGRAD to implement the mission by coordinating the network activities. ICRISAT/SAFGRAD appointed a regional coordinator for 1982-83 to develop a regional network. ICRISAT is committed to strengthening and expanding the network so that it will include a highly qualified multi-disciplinary team of scientists to assist NARS in research and training activities. This team will operate until national programmes are self-sufficient. Other existing institutes in the region with specific strengths, such as ICIPE, IDRC, and USAID missions, may also collaborate in the regional activities.

Since 1982, SAFGRAD, through ICRISAT, has made remarkable progress in training scientists from national programmes. It has succeeded in bringing together various national programmes through scientist-to-scientist interaction during regional workshops and field tours. As a result of these interactions, scientists have shared their research results, exchanged germplasm, and evaluated their elite genotypes on a regional basis with the help of the regional coordinator. Phase I activities established the ground work on which Phase II network activities can be developed.

A further effort is needed to expand and strengthen sorghum and millet research in Eastern Africa by developing a strong and efficient networking model. This should be designed in such a way that it strengthens each national programme in the region in all possible ways. This would include training at all levels in different disciplines, and making available, where needed, labour, research, and field supplies for properly executing the research projects. Strong national programmes are necessary to bring about significant improvements in
sorghum and millet production in each country of the region. Networking is also important to strengthen the ties among the national programmes. This is not only to exchange scientific ideas, experiences, and crop germplasm, but also to share responsibilities on common and specific problems in the region so as to avoid unnecessary duplication of efforts.

In Phase III, after the network is fully established, ICRISAT headquarters will collaborate with the network activities by carrying out long-term and basic research. By this time, national programmes will be more self-sufficient, and ICRISAT's headquarters in the region will be able to provide a highly qualified team of multidisciplinary scientists located in a suitable location.

Conclusion

Although the EARSAM Network is still young, it has generated many significant accomplishments. Problems have been identified, research priorities formulated, and Lead Research Centres appointed to carry out research projects in the region.

The network's job is not finished until the products of research reach the farmer and stabilize food supplies in the region. When this happens, it will lead to improved nutrition and income for the poorer farmers in the region's drier areas.

Over the years, we have seen gains from research and many more people trained and involved. However, it is still critical that NARS have efficient research capability so they can improve sorghum and millet crops. The road in front of us is still a long one.
THE EAST AND SOUTHERN AFRICA ROOT CROPS RESEARCH NETWORK

M. N. Alvarez

Abstract

The current megatrend of establishing and using networks is becoming of great practical importance. The East and Southern Africa root Crops Network (ESARRN) is helping to force changes, especially in legitimating research on root crops, previously held in low esteem. ESARRN has been catalytic in stimulating government interest in developing favourable policies, and stimulating donors to provide bilateral support to national programmes. It has resulted in a considerable increase in cooperation among participants. Factors which may increase effectiveness of the network are examined.

Background

The birth

For the past several years, the Root and Tuber Improvement Program (TRIP) of the International Institute of Tropical Agriculture (IITA) has encouraged the development of national root crops research programmes in Africa. The aim was to develop collaboration so that the scientists in East and Southern Africa could benefit from, and contribute to, a cooperative regional research network. Collaborators in several meetings and regional workshops voiced support for such a network.

The vital role that root crops have played as food security crops in severe droughts and other disasters, such as wars, has spread concern about constraints to their production. Fifteen Eastern and Southern African countries unanimously agreed in 1984 that their common problems with root crops warranted a regional approach to supplement their national programme activities.

In 1985, the heads of national root crops programmes in East and Southern Africa established priorities and agreed on operating procedures for the East and Southern Africa Root Crops Research Network (ESARRN). They also agreed that IITA should appoint a coordinator and draw up a proposal to present to donors for financial support.

Both the International Development Research Centre (IDRC) and the United States Agency for International Development (USAID) were approached to fund ESARRN. In December 1986, IDRC signed a Grant Agreement with IITA to confirm its support. In 1987 another agreement was signed by USAID to provide further support for ESARRN. The signing of these agreements marked the official birth of ESARRN.

The ESARRN covenant is a regional inter-country working partnership. Participants can exploit limited resources and the expertise of scientists—within the region and from other organizations—to fulfil the objectives of their national root crops programmes.
How ESARRN Works

ESARRN works with the national root crops scientists of all participating countries. It also works with the national, regional, and international organizations concerned with improving root and tuber crops and promoting development and manpower training for related research. It serves as a link between national programmes and other agencies in such areas as information and germplasm exchange. It also provides a forum for regional discussions, planning, and guidance on directing root crops research.

ESARRN addresses specific, practical, regional root crops problems through technical and financial assistance. It mobilizes national and regional experts and makes full use of backstopping support from IITA. Upon request from national programmes, ESARRN helps prepare root crops projects and introduce new root crop technologies.

To further strengthen national programmes, ESARRN supports short and medium-term training to improve scientists' skills in various areas of root crops research.

The Aims of ESARRN

Establishing a network of researchers in tropical root crops fosters collaboration in research and continues to develop the skills of participants. This strengthens their research abilities for improving root crops at home and throughout the region.

The network's specific objectives are to:

• encourage rigorous collaborative planning and evaluation of root crops research in the region. Root crops researchers in the region contribute to planning related to specific research problems and become involved in setting research priorities.
• increase the genetic base of the principal root crops and enhance their use in regional improvement programmes
• facilitate improvement of root crops-based cropping systems through surveys and methodology development
• develop improved techniques for drying, processing, and utilizing cassava
• foster the establishment of effective systems to exchange information and to deliver improved technology to farmers

These objectives are based on needs of the region's various national programmes and can be implemented with available resources.

ESARRN's Structure and Coordination

IITA is responsible for coordinating ESARRN activities and has appointed a full-time coordinator. The coordinator is responsible for:

• coordination among various international, regional, and national root crops research programmes
• assisting participating countries identify and discuss their needs and accomplishments
• providing technical assistance directly or by appointing regional scientists as consultants to advise national programmes
• organizing meetings, workshops, in-country training, monitoring trips, and evaluation

The coordinator works with the steering committee of four persons representing ESARRN member countries. This team, along with donor representatives, IITA/TRIP, and ICP representatives, review work plans and budgets, and provide guidance on policy matters relating to the network.
Not all national programmes that participate in the network have equal capabilities. The network has identified each national programme’s ability to address certain problems of common interest and exploit this for the benefit of the region. The research topic assigned to each programme is shown in Table 1.

**TABLE 1**

Projects Assigned to Collaborating National Root Crops Programmes

<table>
<thead>
<tr>
<th>Country</th>
<th>Project Title</th>
<th>Objective</th>
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<tr>
<td>Burundi</td>
<td>Multiplication system of the production of healthy planting material</td>
<td>Establish multiplication system and management techniques needed to maintain material with vigor, health, and rapid regrowth.</td>
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<tr>
<td>Ethiopia</td>
<td>Selecting early bulking sweet potatoes for drought resistance</td>
<td>Evaluate sweet potato lines for earliness, and adaptability to major drought-prone production areas.</td>
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<tr>
<td>Kenya</td>
<td>Trans-agroecology studies</td>
<td>Evaluate sweet potato and cassava lines for adaptability to high altitude, dry, cool areas.</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Generating improved root crops populations</td>
<td>Generate improved populations of both sweet potato and cassava by recombining selected clones with specific desired characteristics.</td>
</tr>
<tr>
<td>Tanzania/Zanzibar</td>
<td>Improvement of cassava-based intercropping systems Technology transfer</td>
<td>Identify cassava-based intercropping systems in the region which are economically profitable. Establish a system for disseminating root crops technology to farmers.</td>
</tr>
<tr>
<td>Uganda/Malawi</td>
<td>Post-harvest technology of cassava</td>
<td>Identify efficient cassava processing methods and design efficient drying systems. Improve utilization by developing suitable composite flours (cassava/maize, sorghum, or millet) with acceptable quality.</td>
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<tr>
<td>Zambia</td>
<td>Cassava screening for mealybug (CMB)</td>
<td>Identify cassava varieties with resistance to CMB and monitor the impact of CMB on farming systems in affected areas.</td>
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**Planning and Review**

The heads of participating national programmes are involved in planning collaborative projects during meetings of programme heads. Progress on the project activities is jointly monitored at regular intervals by donor representatives, the IITA/TRIP and ICP representatives, and the steering committee. The monitoring team reviews work plans and progress on the network research activities.

The donors and IITA are continuously reviewing the activities to check if inputs, work schedules, and targeted outputs are proceeding according to plan. Technical reports on network activities are sent to the parties concerned and are reviewed during the evaluation. Two evaluations will be conducted during the first three years of the project (Phase I). A mid-term in-house review and a final evaluation will be conducted by donors
and IITA in conjunction with participating country officials, such as chief agricultural research officers and national research coordinators.

**Financing and Consultants**

ESARRN is funded jointly by USAID and IDRC, while IITA makes in-kind contributions. National programmes also make contributions towards specific research topics undertaken by the network. All funds for the network activities are managed by IITA. Disbursements are made according to the approved budget and in instalments following receipt of financial statements on expenses previously incurred.

The network coordinator is responsible for the day-to-day management of operating and research funds by means of an imprest account. Based on the submission of expense claims, IITA replenishes the funds.

IITA disburses the IDRC funds allocated to directly supporting the national root crop research programme activities. The disbursements are made according to the budget approved by the steering committee and instalments follow receipt of financial statements on expenses incurred. Recipients account for expenditures to IDRC through IITA.

All funds to national programmes are to supplement collaborative efforts and the recipients manifest their commitment by making needed contributions. Furthermore, because of having a common stake in network activities, there is a commitment by members to strive for success.

In cases where a national programme does not have the expertise for a specific problem, the network assists in recruiting and appointing consultants in consultation with the donors. Much of IITA's in-kind contributions cover consultancy services to the network.

**Linkages**

IITA has collaborated in developing national root crops research programmes in Eastern and Southern Africa. For this reason, a strong link exists between these programmes and IITA. With the formation of the network, new linkages have developed among the programmes within the region and, recently, with other networks. These linkages aim at supporting a sustainable information system compatible with the needs of the national programmes.

Linkages are in the form of:

- correspondence from coordinator to national programmes and vice-versa
- exchange visits by researchers to other programmes, visits by the coordinator to collaborating programmes, and vice-versa
- monitoring tours, traveling seminars, and workshops
- planning meetings by heads of programmes and the steering committee
- germplasm exchange and international trials
- training researchers and technicians

**Output**

*Developing, adapting, and disseminating technology*

The network has worked with national programmes in adapting new root crops varieties introduced by tissue culture from IITA. While some programmes have introduced these to their farmers, others have used them as source material to develop new varieties.

The programme has enhanced the professional capacity of researchers to evaluate and select from seed population lines of special interest to their programmes. At the same time, the network has helped some national programmes gain the capacity to disseminate root crops technology to farmers.
Technology and information have been disseminated to farmers through extension services, on-farm testing in collaboration with farming system research teams, and by seed multiplication and distribution.

Generating information
In response to users' needs, multi-disciplinary information on root crops is being produced. Relevant subject matter is redistributed and shared through the network linkages.

Newsletters, network update notes and correspondence, workshop proceedings, and collaborator's meetings are used to disseminate information.

Training
Agricultural scientists and technicians have undergone short and medium-term training. Short-term training is in the form of in-country courses of two weeks and production technology courses of six weeks at IITA. The network also sponsors exchange visits and post-graduate training at regional universities or at IITA, in collaboration with a university.

Assisting national programme development
Assisting national programmes has a "legitimating" effect making the programmes worthy or attractive for further support by donor agencies and by governments in terms of developing favourable policies. This helps to upgrade research capability and absorptive capacity of the programmes. This is another area in which the ESARRN network has made a major contribution.

Network Effectiveness

One of the major forces that led to the formation of the network was that members agreed on a set of common goals and objectives. It was also realized that the problems to be tackled were widely shared. Once the problems were clearly defined, they were strategically divided among the participants based on the experience that already existed at the national programmes. Donor support was also an important factor. The funding made available by USAID and IDRC gave the network its initial impetus and has helped to consolidate it.

These factors continue to fuel the network. With ESARRN in existence, the national programme expects some benefits in terms of improved skills, more information, more funds for their activities, germplasm exchange, and increased interaction in charting out future research.

Similarly, the centres and donors expect that participating programmes, and the region as a whole, will grow in strength and scope. The centre expects that its mandate is being fulfilled by having improved technology adapted at national programmes for the benefit of local farmers. Centres expect that this will be done in the most efficient manner. On the other hand, the donors are concerned about cost-benefit ratios and saving time and money. ESARRN is addressing these different expectations and succeeding in some.

Continuing changes in attitudes about root crops in the region indicate the network's progress. In some cases, ESARRN has been catalytic in stimulating interest. This has been brought about through support for in-country training, post-graduate training, workshops, resolutions, and recommendations.

At this point it is important to touch on some of the strengths of the network with respect to its activities and orientation. ESARRN encourages members to fully participate in assessing the need for change at national and regional levels, and to critically assess feed-back information. This participation provides an opportunity for creativity and productivity.

One of the basic weaknesses of the network which needs to be addressed is its professional human resource. This weakness has been voiced repeatedly by researchers who have felt that more problem-solving research is needed in the field. The general image of root crops does not attract enough people to fill the vital positions.

Another area of concern is policy issues in national programmes. National programmes do not get sufficiently involved with issues beyond the immediate interest of their programmes. There is almost complete indifference to the problems of other programmes in the region. For these and other reasons the network is not moving as fast as it should.
Conclusion

The network system is proving to be appropriate to the current environment of limited resources for broad-based research. The ESARRN network will continue to play a role in shaping the trend of regional root crops research. Its contribution to training, workshops, and germplasm exchange provides a great opportunity for national programmes to benefit. The network encourages more interaction, which will in turn facilitate achieving a regional, interdisciplinary, problem-solving perspective. If we work at it, ESARRN will be a positive force in developing national programmes which address the needs of farmers.
Edible oilseeds are the second most important food crops in developing countries, after cereals. However, they have been largely neglected by the international scientific community. While soybean and groundnut have received considerable attention, sunflower, rapeseed, and cottonseed have received only moderate attention. The third group—sesame, safflower, niger seed, castor, and linseed—have received little attention from developed or developing countries. This third group contains key crops for millions of small-scale farming families in developing countries.

Recognizing this situation, the International Development Research Centre (IDRC) has devoted considerable effort to supporting national programmes on annual edible oilcrops in China, Sri Lanka, India, Pakistan, Egypt, Ethiopia, Sudan, Tanzania, Malawi, and Mozambique. It was realized that there could be considerable benefit from linking the efforts of the various projects in a research network. Thus, IDRC has taken the lead in establishing this international oilcrops network for scientists in Eastern Africa and South Asia.

After two phases of hard work, the network is starting to achieve many of its original objectives. Contacts among scientists in the IDRC-supported oilseed projects are established through a newsletter, workshops, and some visits between them. However, many scientists in self-supported national projects are still working in remote stations facing scientific as well as psychological isolation.

When the concept of the network started to reach these isolated scientists their response was great. When the network advisor visited many of these scientists, they then started to feel a part of the world again. Through the network they started contacting their colleagues in the same disciplines and those working on the same crops elsewhere.

Network participants have started to realize that this is their network. The advisor is trying to encourage and guide the young scientists, and they now have a strong voice in the workshops and the newsletter. Most of the advisor's activities start from participants' recommendations.

Phase I (1981-84)

Objective and achievements

The objective of Phase I was to establish effective, practical liaison between the IDRC oilseeds projects in India, Pakistan, East Africa, Egypt, the Sudan, Ethiopia, and Sri Lanka, and assist the Ethiopian oilseeds projects.

The first phase had a number of achievements. The network advisor helped to develop and start up the Ethiopian Highland Oilcrops Project (niger seed, linseed, rapeseed, with related *Brassica* and sunflower) until
it was firmly under the direction and control of the national project leader. The advisor then continued as a plant breeder in aspects of the project as the project leader saw fit. The advisor also helped to formulate and start up the Ethiopian Lowland Oilcrops Project (groundnuts, sesame, safflower and castor) and participated in collecting Ethiopian oilseed germplasm.

During Phase I an oilcrops library was developed, and computer references on oilcrops are being regularly received. The advisor visited every project in the network at least once annually, established correspondence with the project leaders, and provided both critical and encouraging comments on the annual reports of each project. Exchange visits between project scientists were started, and visits by consultants and specialists to a number of the projects were arranged. Visits were arranged for oilcrops project scientists in International Agricultural Research Centers (IARCs) and strong oilseeds research programmes in other countries.

An Oilcrops Workshop was held in Cairo for the project leaders in September 1983. Three specialists on sesame, sunflower, and Brassica oilcrops also attended. The value of this workshop was recognized by all participants.

Phase II (1984-87)

Objectives and achievements

The general objectives for the second phase remained the same as for Phase I, but the emphasis shifted from establishing the network to servicing and operating it. Specifically, the project advisor aimed to continue working with the Ethiopian Highland and Ethiopian Lowland Oilcrops Projects, visit each project of the network, and maintain close contact with programme officers. He also planned to publish an annual newsletter, arrange for visits between scientists, help in germplasm exchange, and organize small workshops.

An Oilcrops Workshop was held in Cairo for the project leaders in September 1983. Three specialists on sesame, sunflower, and Brassica oilcrops also attended. The value of this workshop was recognized by all participants.

Phase II (1984-87)

Objectives and achievements

The general objectives for the second phase remained the same as for Phase I, but the emphasis shifted from establishing the network to servicing and operating it. Specifically, the project advisor aimed to continue working with the Ethiopian Highland and Ethiopian Lowland Oilcrops Projects, visit each project of the network, and maintain close contact with programme officers. He also planned to publish an annual newsletter, arrange for visits between scientists, help in germplasm exchange, and organize small workshops.

The advisor continuously helped the research activities of the Ethiopian Highland and Lowland Oilcrops projects. He offered courses in statistics and experimental design to research officers and technicians of the Institute of Agricultural Research and to graduate students of Alemaya University of Agricultural Sciences.

The network distributed cover pages of the most important international journals to all research stations and filled requests for photocopies of papers on oilseed and non-oilseed crops. Computer printouts of references, abstracts, and papers for the use of oilseed researchers were also arranged and classified. The network, with the help of the IDRC programme officers concerned, arranged for a consultant (Dr. Hugh Doggett) to visit Ethiopia, Sudan, Egypt, and Nepal to advise and assess project development.

The network helped to link together scientists from different projects who share the same crops and same problems. This included a visit of Dr. Thangavelu (working on sesame in India) with Mr. Yebio Woldemariam (working on lowland oilcrops in Ethiopia) and Dr. H. Ishag (working on oilseeds in Sudan), which proved very fruitful in strengthening links.

The advisor coordinated two workshops and edited the proceedings which were published as IDRC Manuscript Reports, as follows. The Second Workshop on Sesame and Safflower was held in Hyderabad, India in February 1985. Present were participants from India, Ethiopia, Nepal, Egypt, Sudan, Uganda, and Tanzania, and guest speakers from the UK, Canada, the USA, and the Philippines (IDRC-MR 105e). The Third Workshop on Rapeseed, Mustard and Niger Seed was held in Addis Ababa, Ethiopia in October 1986.
Participants were from Ethiopia, Egypt, Sudan, India, Nepal, Pakistan, and the People's Republic of China, with guest speakers from Canada, the U.K., and Sweden.

*Oilcrops Newsletter*

The advisor edited and published the newsletter for 1984, 1985, 1986 and 1987. More than 600 copies of each issue were dispatched to oilseed workers around the world.


*Objectives*

The overall objective of Phase III of the network is to strengthen the oilseed research carried out in Eastern Africa and South Asia by establishing effective, practical liaison between the national oilseed programmes. The specific objectives are to:

- continue support so as to increase the effectiveness of national oilcrops programmes in the region
- establish the most effective mechanisms for exchanging oilcrop germplasm within the network
- continue the flow of information to national oilseed programmes
- provide middle-level technical training on oilseeds
- evaluate new, more effective, forms of networks

*Achievements*

*Workshop*

The Fourth Oilcrops Workshop was held at Egerton University, Njoro, Kenya, in January 1988. More than sixty participants from twenty-one countries attended, with guest speakers from Canada and Israel. The Food and Agriculture Organization of the United Nations (FAO), representatives from the international development agencies of Sweden (SIDA), Canada (CIDA), the USA (USAID), Britain (ODA), and the European Economic Community (EEC), among others, participated in the workshop. The future of the network was discussed and laid out.

*National programme support*

The advisor is continuing to devote thirty to forty percent of his time to working with the Ethiopian Oilcrops Program. More emphasis will be going to supporting the lowland oilcrops and sunflower programmes.

Annual technical reports from projects are being reviewed by the advisor. He is also visiting programmes regularly to keep in touch with national oilcrops scientists and discuss oilcrop improvement programmes with them. National scientists are encouraged to visit each others' projects. The use of consultants from within the network region is being considered.

More emphasis is being given to interacting with programmes which do not have IDRC support. In collaboration with the IDRC programme officer, the advisor will pursue possible further IDRC support for national programmes. Where necessary, National Programme Support funds will be allocated from the project.

*Germplasm exchange*

The dialogue between Indian and Ethiopian germplasm officials is being followed up by the advisor to ensure that bilateral exchange continues between these two countries. Other network countries with fewer constraints to exchanging germplasm are encouraged to exchange on a bilateral basis.

The collaborative nursery has been instituted, as recommended at the Third Workshop on Rapeseed, Mustard and Niger Seed, using Ethiopia as a base for receiving the seed samples and for distribution by the nursery. Nursery receipt and dispatch will be continuous. In some cases, seed will need to be multiplied in Ethiopia before dispatch. All network members are being urged to participate.

The feasibility of three-way germplasm exchange—with a third country, such as Canada, involved to ensure that mutual and fair exchange occurs—will be pursued.
Information

The network advisor ensures that the flow of relevant information continues. This includes:

- compiling the annual oilcrops newsletter
- making sure that national programmes receive oilseeds abstracts, computer profiles, and searches when needed
- organizing the network and sub-network workshops
- reviewing books and journals received by the network for relevant articles to distribute
- organizing for a multi-authored monograph on nigerseed (in the future), possibly followed by sesame or safflower monographs
- negotiating the publication of a bibliography on sesame diseases for 1988

Training

The network is emphasizing developing oilseed technician training. Training in one or more countries at a time, training of trainers, as well as training in a single crop, will be considered. The trainees at the recently-concluded training in Hyderabad recommended a course with longer duration and with more time for practical field-based training. This will be considered for future courses. The oilseed projects are advised as to where to send their trainees.

As recommended by the Brassica Committee, Mme. Zhang Yan suggested a training course on Brassica species' oil quality in China. More details will be presented by the Brassica Sub-Network chairperson.

New network forms and activities

Several new approaches and activities were recommended at the Third and Fourth Oilseeds Workshops, including establishing oilcrops committees and collaboration with FAO.

Oilcrops Committees: Three sub-networks under the umbrella of the mother Oilcrops Network were formed. These were the Brassica Sub-network, the Sesame Sub-network, and the Sunflower Sub-network. A fourth sub-network for other oilcrops (linseed, niger, safflower, and castor) will be formed next January during the International Safflower Conference.

The four sub-committees decide upon their activities and meetings. It is suggested that each can meet once every eighteen months, with the chairperson and co-chairperson participating in the common workshops with relevant members from each sub-committee.

Support was provided for members of the Brassica Sub-network to attend the Seventh International Rapeseed Congress (May 1987, Poland). Similarly, members of the Sunflower Sub-network have support to attend the Twelfth International Sunflower Conference (25-29 July 1988, Yugoslavia) in order to establish relations with these associations and coordinate publication of research papers and articles in existing journals.

The steering committee of the network will include ten members—two from each sub-network, plus the network advisor as secretary and the IDRC programme officer responsible for the network. Meetings were scheduled so that the network's steering committee can meet annually with any of the sub-networks' meetings.

Collaboration with FAO: FAO has agreed to coordinate publications on sesame and safflower between the network's Oilcrops Newsletter and FAO's Sesame and Safflower Newsletter.

FAO has also formulated an international sesame project. The main objective is to support sesame-producing countries in their efforts to improve the agricultural production and socio-economic status of their populations through sesame improvement. The project also aims to strengthen national institutes, build a strong genetic basis for sesame, and build an efficient network for information and material exchange. Negotiations are going on between IDRC and FAO on how this project and the proposed Oilseeds Unit (described below) can be coordinated.
The Far Future: Possibly Phase IV

The Proposed Oilcrops Unit

Some oilcrops are receiving considerably more attention from international organizations than others. For example, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) works on groundnut, and International Soybean Project (INTSOY), and the International Institute of Tropical Agriculture (IITA) are involved in soybean research. Some oilcrops receive moderate attention, for example, the Group Consultative International de Recherche sur la Colza (GCIRC) works with rapeseed and mustard seed, and the International Sunflower Association of Australia and FAO are interested in sunflower.

Yet some crops are receiving little or no attention. These are sesame, linseed, niger seed, safflower, and castor. These crops have generally been neglected and should become the focus of promotion as they remain the "farmer's crop" in many areas.

After contacting several other donors, IDRC started the nucleus of an International Oilcrops Research Unit. The objective is to develop a small, flexible research unit supported by multiple donors. The unit will provide scientific and technical backstopping to researchers working on annual oilcrops—primarily in Eastern and Southern Africa and South Asia—and facilitate coordination among them.

Initially the Unit will concentrate its research activities on neglected oilseed crops. Support for these and other annual oilcrops will expand as additional resources became available.

In addition to the coordinator, the unit will initially consist of a full-time plant breeder and a post-doctoral fellow. Other positions, supported by additional donors, will be added later. The unit will also employ short and medium-term consultants.

The initial efforts of the Oilcrops Unit will be to:

- screen germplasm and generate more genetic variability for national projects
- incorporate important resistances into good national material
- distribute germplasm to nurseries for testing, and to non-governmental organizations (NGOs) where appropriate
- develop male-steriles and breeding populations, and, in due course, assess the practicability of hybrids
- develop and use tissue-culture technology as needed to facilitate the above
- study the possibility of resistance breeding against Orobanche and Cuscuta weed (dodder)
- continue training as one of the main activities once the unit is well established

With the establishment of the network steering committee and the four sub-networks, the network's activities will be better organized. It has been proposed that the oilseeds network be attached to the proposed Oilcrops Unit which would provide it with a satisfactory base while helping the Unit in its regional activities. The advisor could participate in research as a member of the Unit.
THE PASTURES NETWORK
FOR EASTERN AND SOUTHERN AFRICA

B. H. Dzowela

Background

Networking in agricultural research has been defined as a cluster of scientists or institutions linked together by a common interest in working dependently or inter-dependently on an identified shared problem or problems (Plucknett and Smith, 1984). The concept of networking is not new in Africa. Under colonialism, networks were organized by colonial research institutions in their respective territories. After independence, these networks ceased to operate.

With the emergence of independent African nations, agricultural research was generally conducted within countries, with a very limited link to regional and international research institutions. Consequently, the research carried out in one country was often not known in neighbouring countries, and problems and research results were not shared. This often led to duplication of effort in spite of the limited resources available. Funding for research in the developing world is generally becoming more limited, while the pressure to obtain rapid answers to agricultural production problems has been increasing.

More economical and faster approaches to agricultural research need to be found which utilize local and regional expertise. Several networks are currently operating in Africa, through the initiative of international organizations and the donor community. One main reason for the renewed interest in networking is the desire to break down linguistic and political barriers. Another reason is to judiciously pool human, infrastructural, material, and financial resources of member countries to tackle common problems of agricultural production and productivity. Networks are therefore designed to integrate and complement national programmes, reduce costs and time, and cover more of the various combinations of environmental and farming system situations.

Types of Networks

The many agriculture networks operating in Sub-Saharan Africa have been classified by the technical working group on networking of the Special Program for African Agricultural Research (SPAAR). The three basic categories are outlined in the paper by D. G. Faris earlier in this review.

Most of the cooperation has been developed in crop commodities linked to networks administered by the International Agricultural Research Centers (IARCs). In the area of livestock research, the Pastures Network for Eastern and Southern Africa (PANESA) is one of the three collaborative research networks operating under the administrative umbrella of the International Livestock Centre for Africa (ILCA). The other two networks are the African Trypanotolerant Livestock Network and the African Research Network for Agricultural By-products (ARNAB). PANESA (together with these two sister networks involved with livestock research) successfully links activities in various countries working on similar problems. These links coordinate research programmes, avoid duplication of effort, and help enhance information sharing across borders.
Rationale for PANESA

The Eastern and Southern Africa region holds 51 per cent of Africa's cattle population. However, the increase in productivity of these cattle and other livestock is falling behind human population growth. Inadequate cattle nutrition is one of the major factors accounting for the low levels of production in the region. Production is largely dependent on traditional systems in which natural pastures contribute 80 to 100 per cent of the total available livestock feed supplies. The supply of feeds throughout the year is dismally uneven.

Several basic climatic, social, and ecological factors affect the potential for increasing feed resource productivity. By far the most important are increasing human pressure on land, seasonal moisture regimes, and frequent droughts which have resulted in inadequate feed supplies and degradation of natural grazing lands. Adopting improved feed technologies—including pastures and forages—in the traditional sector could improve feed availability and thus improve livestock productivity.

The idea to form the pastures network was conceived by national scientists from eleven Eastern and Southern African countries and international and regional research organizations at a workshop on Pastures Research in Eastern and Southern Africa in September 1984. The conference was held in Harare, Zimbabwe and was sponsored by the International Development Research Centre (IDRC) and the Southern African Development Coordination Conference (SADCC).

The pastures network was formed to enhance the development of pasture improvement technologies for small-scale producers. This is important because pasture research has tended to be restricted to a few countries and the information applied only by large-scale livestock producers. Through the network literature and forage germplasm is disseminated to national institutions. Scientists meet to exchange experience and thereby reduce unnecessary duplication of research. Regional and sub-regional experimental programmes are planned and implemented in collaboration with national agricultural research systems (NARS), streamlining research. A training programme for young scientists and technicians within the network is increasing national institutions' research capabilities.

PANESA's formation is an important development in African agriculture, expected to have a wide-ranging impact on farming systems in the Sub-Saharan region. It is the first formalized regional network involving forage production on the continent. Network membership is restricted to the Eastern and Southern Africa region. Nineteen countries are members: Angola, Botswana, Burundi, Ethiopia, Djibouti, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Somalia, Sudan, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe.

PANESA Structure

PANESA has a steering committee of elected members representing NARS, IDRC, the coordinating agency (ILCA) and ex-officio members (PANESA and ARNAB coordinators). The committee is vital in fostering the bottom-up quality of the network. The steering committee makes most of the decisions and advises the coordinator, both formally and informally, in planning and implementing PANESA activities and NARS involvement at the country membership level.

Ideally, the committee meets with the coordinator every six months to review past work and to discuss the project proposals for the forthcoming year. The review is presented as a draft report by the coordinator, to precede the annual review of the ILCA programmes. The chairperson of the committee subsequently presents a technical report which contains a critique of PANESA's activities of the past year, and recommendations for the coming year. These recommendations are debated, accepted or rejected or else reserved for review and further reporting. Deviations by the coordinator from these recommendations are accountable. The chairperson of the committee has the right of access to the ILCA Director General should there be important reservations about the coordinator's activities or PANESA's operations.

The network coordinator is selected and appointed by the steering committee and is linked administratively to ILCA in order to take full advantage of the international organization. These advantages are not only technical, but also in soliciting financial support for the network's research collaboration.
Research Allocation Among Participants

PANESA is founded on a strong desire to enhance research in pastures and forages. The research is on range, browse herbs and trees, and crop residues, all of which contribute to the feed resources of ruminant livestock. The network therefore has specific research mandates as opposed to simply facilitating information flow. The research mandates are to:

- further the evaluation of promising pasture, forage, and browse plant germplasm to be adapted and produced in different representative agro-ecological zones and/or agricultural-livestock production systems of the member countries
- develop appropriate pasture or forage production technologies that could be integrated into the prevailing crop-livestock production systems. These technologies should contribute to improved livestock nutrition (cattle, milk, and meat production) and maintaining or building soil fertility.

To effectively meet these objectives the network has systematically planned the implementation of its regional collaborative research programmes. The steering committee members and scientists from the NARS have identified regional problems constraining forage production. Goals and objectives for addressing these problems were identified in the three ecological zones: semi-arid, subhumid/humid, and highlands. Research priorities using the regional network approach were highlighted based upon this group analysis of the regional problems and goals. This approach emphasizes the network's bottom-up decision-making structure. Individual country research programmes were matched with regional aspirations of the network and thus with ILCA's core research in the Animal Feed Resources Thrust and the Cattle, Milk and Meat Thrust.

Source of Funds

ILCA, the coordinating agency of the network, had provided financial, administrative, and technical support for the network's collaborative research activities. This it did with core funding from IDRC (CD 400,000) for network activities in the first two years. A major core component has been to organize and implement network activities, annual conferences and workshops, to train national programme scientists, provide technical backstopping, and implement specialized research of regional concern to the network. It is in national programme support that more funds are needed to overcome the inadequate financial and technical support available for implementing collaborative research projects in partner countries.

As PANESA activities expand throughout the partner countries, financial support for its activities is likely to be deficient. The network therefore needs continued donor support for in-country research. ILCA has approached the working group on networking of SPAAR asking them to provide these funds. Once funds are available, how to channel them to collaborative research projects will be worked out with NARS to facilitate accountability.

Information Exchange Within PANESA

Workshops and symposia

A major way of encouraging information flow within the PANESA region is through annual scientific workshops and symposia. These meetings review progress on chosen research themes and plan future activities. Papers on forage research and development are invited from scientists in national research organizations and international centres. Papers presented at the workshops are edited and published as proceedings. To date three workshops have been held:


Plans are underway to hold a combined ARNAB-PANESA workshop during October 1988. The theme for the workshop will be "The Utilization of Research Results on Forages and By-products in Africa."

These workshops also serve to cement cooperation among the many individuals with diverse interests who attend. At the annual general meetings, held at the end of the annual workshops, participants elect new steering committee members. As the collaborative research projects develop, the workshop will also hear annual reports from researchers from partner countries and from the PANESA coordinator.

**Newsletter**

PANESA publishes its own newsletter to facilitate information flow, with five issues to date. The newsletter is intended to be a quarterly, although this has not always been possible due to a shortage of articles and delays in publication at ILCA. The newsletter publishes short articles and notices and news of meetings, conferences, and workshops. Articles present research results, descriptions of research underway or completed, and opinions on topics related to forages.

**Training**

The network steering committee has set out a training programme to strengthen the research capability of member countries. In October 1986 one course was conducted through a fellowship grant from IDRC and the logistical support of ILCA's Forage Agronomy Group (FLAG) and the Ethiopian Ministry of Agriculture. Another was held in January, 1987 with FLAG. Both courses exposed young scientists and technicians to collecting, acquiring, and handling forage germplasm with emphasis on initial evaluation and forage evaluation techniques. FLAG also assisted with a course in French on the same topics in January 1988.

Course participants so far have come from Angola (1), Botswana (2), Burundi (3), Djibouti (1), Ethiopia (6), Kenya (1), Madagascar (3), Malawi (2), Mauritius (1), Somalia (2), Swaziland (2), Tanzania (4), and Zimbabwe (2). Arrangements are underway to conduct a network course on "Pasture Seed Production Technology" with a fellowship grant from IDRC at the Marondera Grasslands Research Station in Zimbabwe in June 1988. Since the shortage of low-cost, good quality seed is a major limitation in growing improved pastures, the course will teach pasture seed production methods and quality control techniques. Participants will be junior management personnel, production technicians, research agronomists, and technicians involved in seed production and certification services in the network region. All these training courses have used local expertise to cut costs.

**Network Linkages**

It was envisaged that the network would facilitate group monitoring visits to allow national scientists to exchange expertise. So far, however, this has only taken the form of workshops. It will be possible to implement monitoring tours when a regional research programme is fully developed. The coordinator has traveled extensively to member countries to talk to national forage networks, to cultivate areas of collaboration, and to give technical advice where necessary. A majority of the contacts have been through correspondence to share expertise on forage-related topics.

**Network Effectiveness**

PANESA has far-reaching implications for farming systems of Sub-Saharan Africa. It has helped to improve the cooperation and trust between NARS and ILCA, the network's coordinating agency. The NARS see the network as an avenue for available to them for criticizing the shortcomings of ILCA in having a direct impact on NARS. Secondly, they see it as a way for them to attract the attention of the donor community to support research programmes in feed resources which cannot be tackled by any country alone. Thirdly, and most importantly, they see the network as a way to exchange research information and ideas of national importance without necessarily having to publish this information in international journals.
The potential for utilizing the network for ILCA core programme outreach has yet to be fully tapped. To do this, the network must establish a coordinated regional research programme that will use ILCA's technology-generating ability together with the NARS partnership in testing and delivering that technology to the small-scale farming community. This is an important area from which the donor community will judge the network's success.

Reference

AGROFORESTRY RESEARCH NETWORKS FOR AFRICA:
EASTERN AND SOUTHERN AFRICA

David N. Ngugi

Background

Eastern and Southern Africa are faced with problems of food and fodder shortage, degradation of non-renewable resources, and decreasing access to fuelwood supplies. In the Southern Africa Development Coordination Conference (SADCC) region, for instance, cereal imports have increased four-fold in the last decade. This is due to rapidly growing population and declining soil fertility, not to mention the effect of failing rains. Declining soil fertility has been caused by soil degradation through erosion and continuous cultivation coupled with a lack of fertilizer or manure application, low inherent soil fertility, high soil acidity, and other factors.

Household firewood use has been the main cause of deforestation in most of the region. In some areas, e.g., Shinyanga and Mwanza regions of Tanzania, an acute shortage of fuelwood has led to cattle dung being used as domestic fuel—thereby depriving the farmer of a key fertilizer. The region is also facing a shortage of other tree products such as building timber and fencing poles.

The severity of these land use problems varies from country to country. For example, Zambia still has extensive forest cover whereas in most countries in Eastern Africa the shortage of fuelwood and other wood products is more acute. The problem in Zambia, however, is a decreasing accessibility of woodland to the users.

One important feature of agriculture in the region is that small-holder farmers dominate food production. In general, over eighty per cent of food is produced by the small-scale farmers (farmers generally at subsistence level, or slightly above, who have little marketable surplus).

Agricultural research policy in the region is geared towards food production. For a long time, however, commercially-oriented producers—who rely heavily on purchased seed, fertilizers, and mechanization—have been emphasized.

Agroforestry has the potential for solving or ameliorating land use problems such as those facing the Eastern and Southern Africa region (see Table 1). Incorporating woody perennials (trees and shrubs) into existing farming systems may be a sound practice given the potential of trees to produce food or fodder simultaneously with fuel or timber, as well as to protect the soil and even restore its fertility. Unfortunately, there are very few agroforestry technologies available to extend to farmers. This is despite agroforestry having been practised by farmers in Africa for a long time, as in the home gardens of the Chaggas in Tanzania or the Chitemene system of the Bembas of Zambia. Full understanding of traditional agroforestry systems is lacking, thus wider dissemination or improvement of these systems is limited. Hence the need for research in agroforestry to generate technologies to solve identified land use problems.
TABLE I  
Land Use Problems and Agroforestry Potential in Africa

<table>
<thead>
<tr>
<th>Problem</th>
<th>Agroforestry alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degradation of hilly lands</td>
<td>Multipurpose trees on terraces,</td>
</tr>
<tr>
<td></td>
<td>Hedgerows along contours</td>
</tr>
<tr>
<td>Weak draught animals</td>
<td>Living fences, Fodder trees and shrubs</td>
</tr>
<tr>
<td>Shifting cultivation</td>
<td>Improved fallows, Hedgerow intercropping,</td>
</tr>
<tr>
<td></td>
<td>Multistrata systems</td>
</tr>
<tr>
<td>Degradation of semi-arid lands</td>
<td>Windbreaks, Multipurpose trees on croplands</td>
</tr>
</tbody>
</table>

**Agroforestry research**

Agroforestry research in the region is scarce and suffers the following problems:

- lack of multidisciplinarity exacerbated by research organized by discipline and few education curricula incorporating agroforestry
- lack of a body of knowledge and methods
- lack of institutional infrastructure or "niche" where concerted development can take place. Instead, research is scattered in various government and non-governmental institutions without much linkage or coordination.

Collaborative agroforestry research programmes have been developed by the International Council for Research in Agroforestry (ICRAF) and countries in Eastern and Southern Africa under the Agroforestry Research Networks for Africa (AFRENA) programme. These are intended to generate agroforestry technologies by addressing problems unique to agroforestry research.

**Agroforestry Research Networks for Africa**

Four ecozone-based networks are planned by ICRAF for Sub-Saharan Africa under the AFRENA programme (see Figure 1):

1. unimodal rainfall plateau region in Southern Africa characterized by miombo/savanna vegetation (Malawi, Tanzania, Zambia, and Zimbabwe)
2. bimodal rainfall highlands of East Africa (Kenya, Rwanda, Burundi, and Uganda)
3. humid lowlands in the rainforest zone of Central and West Africa (Cameroun, Ghana, Côte d’Ivoire)
4. semi-arid lowlands in the sahelio-sudanian zone of West Africa, extending to parts of Eastern and Southern Africa (initially to include Burkina Faso, Mali, and Senegal)

The networks are being phased in as resources become available. Three networks are now operational:

- **Southern Africa AFRENA** based on the unimodal upland plateau ecozone of Southern Africa, initially encompassing Malawi, Tanzania, Zambia, and Zimbabwe
- **East Africa AFRENA** covering the bimodal rainfall highlands ecozone now including Kenya, Rwanda, Burundi, and Uganda
- **Tropical Humid Lowlands AFRENA** presently operational in Cameroun, but later to include Ghana and Côte d’Ivoire

The main objectives of the AFRENA programmes are, first, to collaborate with national institutions to generate agroforestry technologies to address identified constraints to production and sustainability. Second, is
to strengthen national capacity and capability to carry out agroforestry research to address land use problems confronting smallholders.

In order to achieve these objectives, each AFRENA programme has been developed in close collaboration between ICRAF and national scientists (including policy makers) from the conceptual stage through research implementation. Each AFRENA is developed in three stages: planning, research formulation and design, and research implementation (see Figure 2).

The planning phase

The main AFRENA planning activities are to:

• collate background data on the selected ecozone and countries involved
• hold discussions between ICRAF and senior policy makers in each AFRENA country on ICRAF’s land use diagnosis approach to designing agroforestry research to address identified land use constraints
• identify potential collaborating institutions in each country
• form national steering committees on agroforestry of senior policy makers from relevant institutions—agriculture, forestry, livestock, national scientific councils, and universities
• form national agroforestry task forces of multidisciplinary teams of four scientists—representing agronomy, livestock, socio-economics, and forestry
• have task force/ICRAF team conduct a field survey in the delineated ecozone with ICRAF’s Diagnosis and Design methodology (D&D). Land use systems are then described in terms of components and operation, constraints, development strategies, and agroforestry potentials. Task force members, in collaboration with ICRAF scientists, write up the foregoing in country “blueprints” on agroforestry research.
• discuss Blueprint recommendations with each national steering committee, and receive their endorsement
• hold a regional workshop to present and discuss each country’s findings. Policy makers, task force members from each collaborating country, ICRAF, and donors attending workshop agree on areas for research collaboration and mode of collaboration.
• workshop participants agree on lines for zonal and location-specific research, country contribution and commitments to the regional programme, and the line or mandate of research each collaborating country will take

Research formulation and design phase

Training is undertaken in the research formulation and design phase. This includes a six month hands-on course for country task force leaders at ICRAF on diagnosis and design methodology, and a regional training course on research formulation and design for all task force members (four per country). Subsequently, each national task force carries out in-depth study and analysis (“micro-diagnosis”) of a priority land use system in its own country.

Location-specific national projects are formulated. These are to be implemented at the same time as the regional project, but on national budget or bilateral funding. ICRAF assists in identifying donor support for national projects. Finally, a regional research design workshop is held to discuss the national location-specific projects regarding experimental designs, with ICRAF providing technical backstopping.

Research implementation phase

During the research implementation phase, experiments are planned and laid out at zonal research sites in accordance with the research mandate of each site. ICRAF assigns an internationally-recruited scientist to each site according to its research mandate. These scientists join two national scientists assigned to the project by the host country to carry out the research. Both East and Southern Africa AFRENA programmes have entered the research implementation phase, having completed the planning and research formulation stages.

The research mandate of each country in Eastern and Southern Africa AFRENA is shown in Table 2.
### TABLE 2
Zonal Research Mandates

<table>
<thead>
<tr>
<th>Country</th>
<th>Zonal Research</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>East Africa AFRENA</strong></td>
<td></td>
</tr>
<tr>
<td>Kenya</td>
<td>Soil fertility for crop yield improvement, altitude 1000-1500 m.</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Soil fertility for crop yield improvement, altitude 2000 m and over.</td>
</tr>
<tr>
<td>Burundi</td>
<td>Soil fertility for crop yield improvement, altitude 1500-2000 m.</td>
</tr>
<tr>
<td>Uganda</td>
<td>Multipurpose tree (MPT) species research for boundary planting, whole altitude range.</td>
</tr>
<tr>
<td><strong>Southern Africa AFRENA</strong></td>
<td></td>
</tr>
<tr>
<td>Malawi</td>
<td>MPT selection to fit technologies of zonal relevance.</td>
</tr>
<tr>
<td>Tanzania</td>
<td>MPT management for fodder.</td>
</tr>
<tr>
<td>Zambia</td>
<td>MPT management for improving soil fertility.</td>
</tr>
<tr>
<td>Zimbabwea</td>
<td>On-farm research.</td>
</tr>
</tbody>
</table>

* a. Not fully in the network.

**Organization and Operation**

The East and Southern AFRENA programmes are based on ecozones, i.e., the bimodal highlands and the unimodal upland plateau, respectively. Ecozones were chosen as a basis for inter-country cooperation in order to provide common problems around which research collaboration can take place which is of mutual benefit. This will ensure more efficient use of scarce resources.

The ecozone focus also increases the chances of transferring biological components of technologies among the collaborating countries, as well as to adjoining countries having similar ecological conditions. Indeed, with regard to the Southern Africa AFRENA it is envisaged that Zaire, Angola, and Mozambique could be drawn into the network gradually, by sharing information and participating in training activities. Similarly, Ethiopia is expected to link up with the East Africa programme at a later date. Other factors considered in selecting the ecozones for the networks were:

- they represent areas of high population in the respective countries
- they have serious land use problems which agroforestry could address
- they are priority areas for government development policies and strategies
- the countries in the unimodal upland plateau network are also members of SADCC, which has organizational structures which can enhance research coordination
- donor funds were available—the Canadian International Development Agency (CIDA) was ready to support a project in the SADCC region, while the United States Agency for International Development (USAID) was interested in Eastern Africa
Coordination

The two networks each have a zonal coordinator (ZC) who is an ICRAF scientist. The ZC for the Southern Africa AFRENA is based at Makoka Research Station, Zomba, Malawi, while the coordinator for the East Africa programme is based at the ICRAF headquarters in Nairobi. The ZC acts as secretary to the zonal steering committee (ZSC), preparing the agenda, annual progress reports, and annual programme of work and budget. The coordinator provides progress and financial reports to the Director of the Collaborative Programmes at ICRAF to be sent to donors. He or she also executes the zonal programme approved by the ZSC, and supervises ICRAF scientists attached to the programme.

Each network has a regional (zonal) steering committee (ZSC) which meets once a year to discuss and review:

- research priorities with regional application
- regional training and education programmes
- workshops and monitoring tours
- regional needs for technical input from ICRAF and other IARCs and specialized institutes
- annual research plans and financial resource allocation for the regional programme
- applicability of research results to countries outside the network but within the ecozones
- programmes to disseminate research results
- linkages between the regional and national programmes

For the Southern Africa network, the ZSC is chaired by the Director of SACCAR (Southern African Centre for Cooperation in Agricultural Research) a project of SADCC. The ZSC membership consists of the chairmen of national steering committees in the respective countries, donor representative, and the ZC.

The national agroforestry research programmes address location-specific problems in a priority land use system in the respective countries. However, the project is an integrated part of the network in terms of information and germplasm exchange, participation in training courses, workshops, and monitoring tours, etc. Furthermore, ICRAF scientists at project sites are expected to backstop national programmes according to their specialization. In this regard, ICRAF is working in concert with the countries to secure donor funds for country research projects. It is hoped that when the networks are fully operational, the regional programme will generate research methodologies which will be shared with national programmes.

Agreements

ICRAF is required to sign a Memorandum of Understanding with each collaborating country within the two networks to facilitate project implementation. In the Southern Africa network, ICRAF must also sign a memorandum with SACCAR on behalf of SADCC. Thus far, the memoranda with Malawi and Zambia have been signed, while the others are at an advanced stage of being processed. In Eastern Africa, the memorandum with Rwanda has already been signed while the others are being processed.

Planning and review

Research planning will be initiated by scientists on site, according to the mandate for the site, under the zonal coordinator. The budget provides for an annual meeting at the headquarters to review and finalize research plans. From there they are submitted to the ZSC for discussion and approval before implementation. At the same time, the Collaborative Programmes Division at ICRAF is developing criteria and indicators to evaluate the research programmes in the future. The projects provide for mid-term donor evaluation involving the steering committee.

Financing and consultants

CIDA and USAID are financing the Southern and East Africa networks, respectively. Donors provide financing for AFRENA directly to ICRAF. ICRAF in tum releases the funds to the project sites according to the budget approved by the ZSC.

In each country, national governments provide land, office space, and laboratory facilities, as well as seconding two scientists (a forester and an agronomist) to the zonal project. The government also exempts salaries of ICRAF scientists, vehicles, and research equipment related to the projects from tax and duty.
Programme budgets provide for hiring consultants, both internationally and locally, including technical backstopping from ICRAF headquarters.

**Linkages**

The ZC facilitates linkages within each network through workshops (for 3-5 days, once a year), short courses within the zone (for 2-3 weeks, once a year), monitoring tours (at least once a year), an annual planning workshop at the headquarters, publications, e.g., *AFRENA Reports*, and internships for national scientists at network project sites (for 3-6 months, one per country per year). The ZC also organizes ICRAF backstopping, thus providing both regional and national institutions immediate access to the scientific expertise and technical databases at ICRAF.

Individual scientists also maintain contact with other international and regional organizations with common interests. For example, there is much consultation on germplasm with such organizations as the International Livestock Centre for Africa (ILCA), the Nitrogen Fixing Tree Association (NFTA), and CSIRO.

**Outputs**

The two AFRENA networks are expected to generate appropriate agroforestry technologies to solve identified production constraints, provide trained manpower in each participating country, institutionalize agroforestry in national research systems, and result in improved and sustainable agricultural production.

The main outputs to date are country agroforestry research blueprints for the selected ecozone, and national location-specific research projects, some of which have already received donor support for implementation. At least four scientists per country have been trained in formulating and designing agroforestry research following land use system diagnosis. Finally, multidisciplinary national steering committees and task forces have been formed in each country.

**Information dissemination and use**

Scientific information will be disseminated through scientific journals and ICRAF publications. The *AFRENA Reports Series* has been initiated for this purpose. SACCAR has adopted the *Zimbabwe Journal of Agricultural Science* for publishing research information in agriculture and related fields. The AFRENA networks will use this journal and the *SACCAR Newsletter* for certain materials. In the future, an *AFRENA Newsletter* will be launched to quickly disseminate information from the various networks.

Extension to farmers will remain the responsibility of extension services in the respective countries. Much information will also reach the farmer when the on-farm research commences. Farmer field days centred around on-farm trials at project sites will play an important role in reaching the farmers. Already, country extension departments have begun using AFRENA field sites as focal points for farmer field days.

ICRAF is embarking on a research project on agroforestry extension to lay the groundwork for extension when collaborative programmes start producing technologies for adoption by farmers.

**Network effectiveness**

Both the East and Southern Africa networks are young, having just planted their first experiments in November/December 1987. Both the donors and national scientists expect that regional collaboration and training national participants will strengthen agroforestry research and generate appropriate agroforestry technologies. The detailed planning of these networks—involving consultation with policymakers at critical stages—has ensured that the networks do not distort national research priorities. In addition, many of the countries already had some agroforestry activities when AFRENA was launched—albeit in an uncoordinated manner.

The problems being addressed by research—soil fertility, fodder, training—are a priority of both farmers and policymakers. Progress and national commitment to the networks are indicated by the following achievements:

- national steering committees formed
- task forces formed and participated in the detailed planning exercise
- material support provided during research implementation, e.g., vehicles for field survey, many man-days of scientists' time, land, and laboratory facilities
- research scientists assigned to the regional research programmes
• land use diagnosis approach adopted by some countries to inventory agroforestry potentials in areas outside the selected ecozone for networking

• agroforestry incorporated in the national development plans of several of the networking countries

The strengths of these networks derive partly from the joint planning between ICRAF and the countries involved, with nationals identifying the problems and designing research programmes. The financing for planning, research, and training activity implementation provided is also partly responsible. Inter-institutional cooperation has strengthened the networks. For example, forestry departments in some countries have provided nursery facilities while the field trials are implemented by agriculture departments.

The networks face some problems, including research infrastructure—such that national systems might not be able to fully meet their commitments—and delays in processing Memoranda of Understanding. It is imperative that donors incorporate funds for national station support to cover such things as buildings and water. In both the East and Southern Africa networks there is some—but not enough—donor funds for national station support.

The Future

No changes are planned in the organization or direction of the networks. The Southern Africa AFRENA is currently funded for five years, up to 1992, but has plans for a second phase of another five years. The East Africa AFRENA is funded for five years, up to 1991, but can be extended to ten years.
SADCC REGIONAL SORGHUM AND MILLETS IMPROVEMENT PROGRAM

Leyland R. House

Historical Background

The Southern African Development Coordination Conference (SADCC) Regional Sorghum and Millets Improvement Program was established in 1984, with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) as the implementing agency. The programme's primary goal is to strengthen national capability for improving sorghum and pearl and finger millet.

In March 1980, ICRISAT was requested by the heads of the SADCC states to establish a research institute in Botswana. ICRISAT sent a mission to the region in November of that year and recommended that teams be established in appropriate locations in the region rather than in a centre in Botswana. The Matopos station near Bulawayo, Zimbabwe, was recommended as the base for the regional team for sorghum and millet improvement. The mission report was accepted by the Council of Ministers in their February 1982 meeting.

The United States Agency for International Development (USAID) indicated interest in funding the programme, and a project document was produced at the ICRISAT Center and submitted to USAID in July 1982. The proposal was directed at sorghum and millet crop improvement and suggested a team of scientists, all based at Matopos, that would bring together a critical mass of scientific talent. USAID approved the project and provided funds in September 1983. By early 1984 an agreement was signed with the Government of Zimbabwe to host the programme.

The first ICRISAT staff—the project manager cum sorghum breeder, and an experiment station development and operations officer—arrived in May 1984. Since then, staff members have been employed on close to the original schedule, with some increase from the number originally proposed. Currently there is a project manager, regional administrative officer, station development and management officer, sorghum breeder, millet breeder, agronomist, entomologist, pathologist, food technologist, and economist. These are all international positions within ICRISAT. A training officer will be employed shortly, and possibly an information officer and agroclimatologist, to be employed at the SADCC regional level.

ICRISAT is thus serving as the implementing agency for the SADCC Regional Sorghum and Millets Improvement Program. It is estimated that ICRISAT should serve in this capacity for some twenty-five years, with the objective of leaving a strong programme in place.

Objectives

The primary objectives of the Regional Sorghum and Millets Improvement Program is to strengthen national research capability. This objective is approached through research, education and training, and service.
Research

Research is undertaken collaboratively by the national and regional programmes. The objective is to improve both varieties and hybrids with resistance to important pests, keeping end product uses in mind, e.g., food, beverage, and feed. The regional programme generally focuses on introduction, crossing, preliminary evaluation, and identifying resistance and quality traits. The regional programme will be primarily concerned with identifying useful variability and enhancing germplasm, while national programmes will focus on exploiting variability in developing varieties and hybrids. The regional programme also develops elite varieties and hybrids, primarily for national programmes that have not fully developed this capability.

Education and training

The programme provides extensive education and training. The educational programme is sub-contracted to the Collaborative Research Support Program on Sorghum and Pearl Millet (INTSORMIL), a consortium of five universities in the USA. Currently there are twenty-five students at various universities, with another fifteen to begin this year. This programme will continue—even expand—in the next five year grant period beginning May 1989. Individuals from the region are also sent to the six-month in-service training programme at the ICRISAT Center.

Two short-term training programmes have been conducted at the regional centre for research technicians and two for station superintendents. Several individuals have also come to the programme for training.

In the next grant period, training in food technology/crop utilization and experimental design will be added. A research associate programme is planned in which national scientists are seconded to the regional programme for a 6-12 month period, there is short-term (3-5 month) interaction at the regional centre for individuals returning from degree programmes, and funds are provided for national scientists to undertake regional research.

Service

The programme has three important service areas: station development, off-season nursery opportunity, and operational supplies. It has helped develop field facilities, provided farm equipment, and assist with housing for staff, field shelters, and seed stores. This important activity has just begun, and is expected to expand.

The programme has a 6.5 hectare station at Mzarabani in the Zambezi Valley in Zimbabwe. The station is on an estate of the Agricultural Rural Development Authority (ARDA). An additional 30 hectares have just been acquired from the Mzarabani Rural Council. Several of the SADCC countries have used this facility. The programme provides items such as pollinating bags, seed envelopes, and field books. This has been useful in situations where such supplies are not otherwise available.

Countries and institutions involved

The nine countries of SADCC are involved in the programme: Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe. Contacts are primarily with stations in ministries of agriculture involved with sorghum and millets improvement. In Zimbabwe, we have provided training for some of the students from the University of Zimbabwe and participated in one of their field days. The programme is also beginning to make contact with some industries. These activities are expected to expand.

National programmes and priorities

The regional programme attempts to address each national programme according to its strength. Regional programme technicians assist national programmes while their staff are away for further education. Principal regional staff also attempt to backstop national programmes when senior staff are away for training.

The annual reporting and planning meeting is an important forum for communication. The project manager presents an annual update of the programme to the Southern African Centre for Cooperation in Agricultural Research (SACCAR) board of SADCC. In addition, the director of SACCAR is chairperson of the programme’s Technical Advisory Panel. Each scientist spends about thirty per cent of his or her time with national programmes. The above methods of communication have helped the programme strengthen—rather than compete with—the national programmes. The regional programme also contributes material, research techniques, education and training, and station strengthening to national programmes.
Organization and Operation

General model and membership

The regional programme consists of a team of scientists focusing on crop improvement and utilization. The staff have a high level of interaction with staff members of national programmes as working colleagues. ICRISAT implements the programme for SADCC with the long term objective of leaving a strengthened capability for research on sorghum and millets in the region.

There is a close working relationship between the ICRISAT Center and the regional programme. Both these groups interact closely with national staff, usually within ministries of agriculture. There has been a little interaction with the University of Zimbabwe and some commercial concerns in the region.

Extent of national involvement

Regional work is primarily on national research stations. The host country therefore provides land and, to varying degrees, farm operations and input into operations. Zimbabwe hosts the programme and provides land and water and exempts the programme from custom duties and taxes. It is anticipated that national programmes will increasingly enter their varieties and hybrids in regional nurseries and trials. The programme looks forward to highly interactive research and development with local agencies and industries regarding crop utilization.

Coordination

The annual reporting and planning workshops are the primary means of coordination. Opportunities for coordination with SADCC exist through the annual review to its SACCAR board and the annual meeting of the technical advisory panel. The Regional Programme coordinates with ICRISAT through its periodic in-house reviews. There is no coordinator as such.

Agreements and financing

A memorandum of understanding to host the programme has been signed with the Government of Zimbabwe. Separate agreements have been made with several national programmes but this is no longer necessary. There is also an agreement between SADCC and each donor and between ICRISAT and each donor.

The regional programme is supported as a special project by USAID, GTZ (German Agency for Technical Cooperation) and the Canadian International Development Agency (CIDA). Most of the funds are spent by the regional programme and some by the Center. Regionally-administered funds are subject to local audit.

The ICRISAT Center makes a modest contribution from its core funds. National programmes support their crop improvement programmes which include varieties and hybrids from the regional programme, ICRISAT Center, and elsewhere. Equipment for their programmes is allowed to enter without duty.

Consultants

Consultants to this programme have been primarily from the ICRISAT Center. The four training programmes have been run by staff from the Center's training unit and the ICRISAT station superintendent. Center staff have participated in all of the programme's reporting and planning meetings and monitoring tours. The programme has also participated with the Center in collecting and evaluating germplasm.

The regional programme has placed a millet breeder in Zambia for the 1986-87 season, a Center pathologist in Zambia for the 1987-88 season, and another pathologist with the regional centre for the 1986-87 season.

Outside ICRISAT, the programme supported an INTSORMIL consultancy to evaluate the acid soil situation in Northern Zambia. The programme has just completed a six-month consultancy on food technology, and another in agroclimatology. We have had two short term consultancies by pathologists from Texas A & M University, USA.

Linkages

In addition to the regional programme's interactions with the ICRISAT Center in India, interactions with ICRISAT's Sahelian Center are strengthening. Activities with INTSORMIL have been both for education and research. For example, a virus found primarily in Zambia was identified—in collaboration with Texas A & M University—as a dwarf maize mosaic. The regional programme is hosting a scientist from the International
Fertilizer Development Corporation (IFDC), and interactions with the International Livestock Centre for Africa (ILCA) in the area of forage are being increased.

Projects are being generated jointly with Carlsberg Research Laboratories. The programme is assisting with the degree research of two students in pathology from the University of London, one in economics with the Hoeinheim University in West Germany, and two PhD students (breeding and entomology) with the University of Zimbabwe. The programme assisted a student’s thesis research from Old Dominion University, West Virginia, USA, on *Siriga* weed.

Two meetings were conducted in 1988 on crop utilization and food technology, one international and one regional. The programme has also hosted an international meeting on sorghum and millet pathology. For the past three years the programme has been conducting cross-discipline monitoring tours for sorghum, millets, and recently, for crop utilization.

The programmes for sorghum and millets improvement were initiated with large introduction nurseries. Some twenty-five breeders contributed to sorghum and pearl millet germplasm. Introduction from all over the world is continuing. The programme has exchanged seed with SADCC countries and has evaluated locally-used varieties for a range of traits.

**Output**

*Examples of results*

One sorghum hybrid, two varieties of sorghum, pearl millet, and finger millet have been released or are at pre-release stage in Zambia. These have been developed/evaluated by the breeder in Zambia based on material introduced from the ICRISAT Center or the regional programme. The quantity of seed of varieties of sorghum in Malawi, Mozambique, and Swaziland has been increased for wide-scale country testing. Most of the entries are from the ICRISAT Center, some from the regional centre.

A technique to evaluate resistance to downy mildew has been adapted from the centre and transferred to the Zambia and Zimbabwe national programmes. A technique to rear and infest the *Chilo* stemborer has been adapted and transferred to the Zimbabwe national programme.

The regional programme has assisted with establishing and strengthening sorghum improvement programmes in Lesotho and Swaziland. It has also contributed to station improvement at Golden Valley in Zambia, Sebele and Pandamatenga in Botswana, Ngabu in Malawi, Panmure in Zimbabwe, and Ilonga in Tanzania. This activity has just begun and will continue in the future.

**Mechanisms for dissemination**

Mechanisms for dissemination include visits by regional staff to national programmes, monitoring tours, and reporting and planning meetings with the proceedings distributed within and outside of the region. Results and products from the regional programme are distributed to farmers via national programmes. The programme will assist with on-farm testing and is exploring contributing to seed production.

**Network Effectiveness**

*Distortion of national research priorities*

The regional programme has activities on twelve research stations in the region. The regional programme has, or will soon place, a technician at six of these. The cost of operations are paid for by the regional programme. The primary purpose of these locations is to evaluate introductions and early generation material where both numbers and disease rates are high. Some of these locations are used to screen for resistance to various diseases, insect pests, and weeds (*Siriga*).

The idea is to have effective regional evaluation in the range of environments found in the region. By doing these evaluation and screening activities the programme hopes to reduce the burden on national programmes. It is hoped that the annual reporting and planning meeting will keep the regional programme relevant to national programmes.
The driving force

The driving force of the programme is the contribution of plant material, education and training, and efforts to improve research stations. These activities are undertaken with frequent regional-national staff interaction and are generally perceived as contributing.

Strengths and weaknesses

Strengths have been adequately described above. Weaknesses include insufficient trained manpower and poor conditions for field research. There is concern about the efficient spread of seed of improved varieties. Financial constraints can also be severe. Crop utilization and developing sorghum and millets as "convenience foods" need more investigation.

The Future

Training activities will continue, as described earlier. The input into experiment station development and management will continue to grow. The aspects of crop improvement and service activities will go on, the first five years having focussed on establishment. Over the remaining twenty-five years of the programme, its many activities will be able to fully develop.

The programme anticipates a large increase in manpower development in the second grant period. In addition, a major activity will be added: crop utilization and food technology. A contribution to seed production is in a preliminary study phase. The programme expects more results in crop improvement in the second five-year period.
WEST AFRICAN FARMING SYSTEMS RESEARCH NETWORK:
ACTIVITIES AND WORK PROGRAMME FOR 1988-89

Jacques Faye

Summary

The West African Farming Systems Research Network (WAFSRN) is a professional association of researchers created in 1982 at a workshop in Ibadan, Nigeria. It is composed of a steering committee and a secretariat, and holds biennial symposia. The secretariat is headed by a coordinator who has been posted since November 1987 within the Semi-Arid Food Grain Research And Development Project (SAFGRAD) through a protocol of agreement signed with the Scientific, Technical and Research Commission of the Organization of African Unity (OAU/STRC).

This report describes the network, its organization, its resources, and the activities planned for 1988-89. These activities include establishing a scientific and technical information system, holding training activities and technical workshops, a symposium, and supporting national research systems.

Background

Rapid population growth and consequent pressure on arable land are some of the underlying causes of the economic and food production crisis in most of Sub-Saharan Africa, particularly West Africa. The drought which this region has been experiencing for almost two decades, as well as other factors, have worsened the situation. Although farmers have tried to adapt their traditional farming systems by adopting some improved technologies, the resulting increase in production and productivity remains far behind the rate required to meet the increase in population. Paradoxically, results obtained from plant, animal, and forestry research in research stations have seldom been adopted by most farmers.

As a result, in the 1970s there was a clear trend towards conducting research in farmers' fields in a multi-disciplinary manner and with the participation of the farmers themselves. Among these farmers, special attention has been given to small farmers. This has enabled the real constraints of farmers to be identified and efforts made to adapt research results to their conditions and needs. This has also enabled researchers to have a better understanding of farmers' priorities in order to modify and redefine their research programmes accordingly. Towards the late 1970s, a few West African countries had gained some experience in farming systems research (FSR) which led the donors to support an increasing number of projects aimed at integrating FSR into the national agricultural research systems (NARS).

Although the importance of FSR in improving farming in West Africa was generally accepted, opinions diverged between national and international research institutes and between researchers concerning the goals, sphere of operation, and methodology of FSR.

In November 1982 a workshop was organized at the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria, to create a West African Farming Systems Research Network. The workshop was organized on the initiative of IITA, the French Institute for Tropical Crops Research (IRAT), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and the German Agency for Technical Coop-
eration (GTZ). Its objective was "to facilitate the exchange of information, communications and meetings, mainly to achieve a better understanding between scientists, technicians and development agents through closer communication, methodologies and strategies" (letter of invitation to participants). A steering committee, chairperson, and coordinator were elected and commissioned to define the network's organization and work programme, and to look for the resources required for its implementation. Three working groups were set up: to collect and disseminate information; to harmonize the FSR key-concepts; and to organize a workshop to be held in 1983.

These objectives could not be fulfilled as stated as the network had neither the legal status necessary for accepting donor grants linked to the professional character of the network nor a full-time coordinator.

In March 1986 a symposium was held in Dakar, Senegal, on the theme "FSR in West Africa". Sixteen out of the seventeen countries in the region participated, as well as researchers from the international institutes concerned. The steering committee was elected and requested to define a work programme to be implemented by a permanent secretariat established at the Organization of African Unity/Semi-Arid Food Grain Research and Development Consultative Advisory Committee (OAU-SAFGRAD), and to seek financial support.

Objectives

The general objective of WAFSRN is to promote and facilitate cooperation among researchers and among national, international, and external research programmes and institutions working in the field of farming systems research in West Africa. This collaboration should make it possible to support researchers and strengthen NARS experience in research methodologies, compare results, and provide better access to information.

The specific objectives are to:

• enhance collaboration in planning and evaluating FSR in West Africa
• improve research practices through exchanging experiences, particularly through meetings, monitoring tours for researchers, and any other activity which meets the needs of members
• organize, or assist in organizing, and institutionalize training in FSR for researchers and other rural development agents
• collect, process, and disseminate relevant FSR results. In particular, it aims to encourage researchers to publish their results and make them available to all interested parties, e.g., researchers, research institutes, extension agencies, producers' and professional organizations, policy makers.
• assist national researchers, programmes and institutions, when requested, in planning, implementing, and evaluating FSR and, possibly, in preparing funding requests

In the course of implementing its objectives, WAFSRN may collaborate with other networks with more specific fields of interest. WAFSRN should avoid competing with other networks, but rather explore the possibility of welcoming them as sub-networks.

The network expects to rely on the International Agricultural Research Centers (IARCs), external agricultural research organizations, and schools of agriculture in the region. The network also hopes to gain from the experiences of similar networks in Africa and elsewhere. The network programme will first benefit the researchers and, to some extent, the extension agents who collaborate with researchers. Finally, the farmers, particularly small farmers of the region, will benefit from the improved technologies which researchers will have contributed to developing.

Status and Organization

During the Ibadan workshop in 1982, it was agreed that farming systems research did not correspond to the exclusive mandate of any of the IARCs. The objectives and implications of FSR methodology indicated that the NARS should be its main instigators while recognizing the important role for the IARCs because of their expertise and training capacity. Because of the limited development of FSR in West Africa, collaboration between researchers is a priority.
Efficiency and the dynamism are indispensable to a network having a vast scope of activities overlapping several disciplines. It should thus be animated by researchers known for their competence and dedication who have been freely selected by their colleagues. It was therefore decided to make the network a professional association of researchers, with membership as individuals, linked to a steering body elected by all the members. This was not a question of ignoring existing national, international, and foreign institutions but rather recognizing that beside these institutions, there is room for complementary professional associations.

The network is open to all researchers interested in farming systems research in West Africa, whether they belong to the region or not, whether dependent on national, international, or foreign organizations. The membership procedure is simply registration at the network secretariat; currently there are no membership nor annual subscription fees.

A Network Charter is being prepared by the steering committee and will be proposed for adoption by members during the next symposium in 1989.

The network has no legal status of its own. In accordance with the decision of the March 1986 symposium, a Protocol of Agreement has been signed with the Scientific, Technical and Research Commission of the OAU (OAU/STRC). This agreement provides OAU legal status to the network. Thus the STRC Executive Secretary performs all WAFSRN official actions. Except for some aspects, WAFSRN staff members are recruited and managed according to the same regulations as at SAFGRAD. WAFSRN pays ten per cent of its funds to SAFGRAD in return for SAFGRAD's management support and supplying some services.

**Network entities**

**Symposium**

The symposium is held every two years in one of the countries of the region and has two major purposes. First, the symposium brings together a maximum number of researchers for in-depth discussions on FSR. The steering committee selects a general theme on which presentations and discussions are focused. The documents presented and the discussions are published. Second, participants constitute the general assembly of the network. Part of the symposium is therefore used to review the activities, define guidelines, and elect the steering committee.

**Steering committee**

The steering committee is entrusted with implementing the guidelines defined by the symposium. It draws up the network's work programme and controls its implementation by the secretariat. The steering committee has nine members: seven elected as individuals, four of whom come from the NARS of the region (only one member can be elected per member country), and two from non-national organizations, in addition to the Director of Research of SAFGRAD and the coordinator. It elects its chairperson and selects the WAFSRN coordinator and meets at least once a year.

**Network secretariat**

The network secretariat is responsible for preparing and implementing network activities. It is headed by the coordinator, who was recruited in November 1987.

**National correspondents**

The 1982 workshop had provided for designating national network correspondents in consultation with the research leaders of member countries. The original idea was to have, in each country, a correspondent who could relay messages to the coordinator, and promote and activate a national sub-network having its own activities. This idea has not materialized and almost all the countries have since then institutionalized their farming systems research. Some countries have an official who is responsible for coordinating the work of various research institutes (such as Nigeria and Côte d’Ivoire). Others have created one FSR directorate or division (Senegal, Mali, Burkina Faso). Designating separate correspondents might not be efficient and the steering committee has decided to start with a thorough dialogue with these officials.

**Meeting of national FSR leaders**

A meeting of national FSR leaders will be held 25-26 October 1988 in Ouagadougou, Burkina Faso. The main objectives will be to present and discuss the WAFSRN programme, and to take stock of researcher participation and the information available, country by country. This will make it possible to consider ways to strengthen them and work out a programme of support and country visits to examine needs and conditions for reflection, support, and training regarding FSR organization and management.
The IARCs will be invited to this meeting to present their activities and assistance to national structures. The FSR leaders may eventually form sub-networks with specific activities if the precise needs are identified.

Financial Resources

From the very start, several donors have supported the network, such as GTZ, IDRC, the Ford Foundation, ITTA, IRAT, and the French Ministry for Cooperation. Three donors have approved or promised a contribution to the 1988-89 work programme, as follows:

• IDRC has approved two funding requests. The first request of a two-year duration essentially supports creating the secretariat, its operations and those of the steering committee, as well as organizing the next symposium. The second request for two years also supports creating a scientific information and documentation system at the level of the secretariat.

• The French Ministry for cooperation has decided to support the network activities, except for the operations of the secretariat.

• The Ford Foundation will provide financial support for the secretariat and to publish a scientific journal.

Work Programmes

The need to start network activities rapidly has not permitted extensive consultation with members. Furthermore, the funds obtained so far cover only a two-year period, which is too short. A five-year programme, 1990-94, will therefore be prepared in 1989 in close collaboration with members, and funds for the same period will be requested from donors.

The 1988-89 work programme adopted by the steering committee in April 1988 is neither closed nor definitive. It is up to WAFSRN members to improve it through their own initiatives. Some proposed activities, and the organization of the next symposium with working groups for each major agro-ecological zone, already suggest that researchers should form sub-networks with their own activities and one animator designated by them. Other working groups might be also created on collaborative research or other technical matters.

The committee feels that collaborative research programmes can be developed and implemented at the level of sub-networks which regroup a limited number of practitioners.

The 1988-89 work programme has several components: creating a scientific and technical information system; training activities; technical workshops and monitoring tours; the biennial symposium; and supporting national programmes and information visits.

Scientific and technical information system

The scientific and technical information system is designed to collect, process, and disseminate useful information for FSR. The clients will be not only the systems researchers, even if they have priority. Those collaborating with them and FSR users will also be taken into consideration.

There is a mass of information already available yet the network has limited financial and human resources. The logical approach will be to first compile an inventory of whatever is achieved in this field and inform members and help them, if necessary, to have access to it. Second, collaboration will need to be established with the information sources for documentation exchange. Thus, duplication of effort will be avoided. The scientific and technical information unit may focus on information which is not collected, processed, or disseminated by other units.

The network plans to recruit a documentalist for the secretariat. Within a short time a scientific editor and a secretary/editorial assistant will complete the team. A data-processing system will also be acquired to manage databases, micro-edit, and micro-film material. This should contribute to producing and disseminating a number of publications and services, as described below.
Publications

Annual catalogue of FSR Institutions, programmes and scientists in West Africa: The objective is to produce a practical publication with useful information on research and institutions of higher education which carry out research or training on farming systems. It will include information on their programmes and the relevant researchers. A good deal of information is already available but is scattered. It should be possible to compile it into a form that meets network members' needs. The information will be computerized and regularly updated. The first catalogue is scheduled for the second quarter of 1988.

Annual FSR Bibliography: Some institutions are currently engaged in bibliographic collecting, processing, and disseminating in areas of interest to the network. Kansas State University is involved within the framework of the Farming Systems Support Project (FSSP), and the Centre International de Documentation sur l'Agriculture des Regions Chaudes (CIDARC, part of CIRAD), the French Research-Development Network, and the IARCs are also involved in bibliographic work. Collaboration and exchanges will be sought in order to avoid duplication.

It is not possible for the network to create a documentation service and to systematically acquire and store all documents. Thus, only indispensable documents will be collected. On the other hand, the location of all documents will be identified so that those wishing to have them can apply to the source. Priority will be given to the so-called "fugitive" or "unconventional" literature produced by national structures which is usually less valued. The first bibliography should be issued during the second quarter of 1989.

WAFRSN Bulletin: Publication of the Network Bulletin started in January 1986 with the assistance of IITA and the Ford Foundation. Its twenty pages include information on FSR activities (training and technical workshops, seminars, etc.), research notes and reports, notes on methodology and information on research activities.

The content and number of pages of the bulletin may change. It must give researchers the opportunity of publishing their research activities and even provisional results. Emphasis will be placed on methodologies and techniques of survey, testing, and analysis. The information on the training courses offered to researchers should also be an important aspect.

Scientific Journal: There is no journal devoted to agricultural sciences in West Africa. Attempts to create scientific journals at national level have encountered, or are encountering, many difficulties: lack of funding, insufficient high-quality articles, narrowness of the national scientific community. Thus, most scientific articles concerning the region are published in journals of western countries and are mostly the product of researchers from those countries.

In order to provide scientists with the opportunity to publish their work in a regional journal, the steering committee has decided to create a scientific journal. This will be done in two stages with a preliminary feasibility study to be conducted by late 1988. In the first stage a semi-annual journal will be published for two years (1989-90). In the second stage, a quarterly journal will be published which complies with the requirements of an international scientific journal.

The coordinator and the scientific editor (to be recruited) will implement the journal's publication, assisted by a scientific committee. The topics will go beyond farming systems and will cover all activities which can promote contact between researchers and producers. This will include activities involving diagnosing constraints specific to family farms or related to their physical, technical, and socio-economic environment, and/or disciplinary or multi-disciplinary activities to adapt improved technologies in the rural community.

Series on "Research Results and Documents": The network plans to systematically publish the proceedings of its workshops, seminars, and symposia. It is also hoped that within the five year programme, the important work performed by the researcher teams can be published and made known at a regional level.

Information on Request: At their request, users—researchers, teachers and institutions—may receive any information included in the databases in the form of photocopies, microfilms, and diskettes.

The documentation services of research and higher education organizations which have a data processing system may receive bibliographic information in the form of disquettes which can be inserted into their own databases.
Training activities

The principle adopted by the network is, as far as possible, not to design and implement training activities alone. Rather, the network identifies the needs of members, and encourages and participates in training activities with existing institutions when they are being implemented. The following training activities are suggested subject to the agreement of the organizations identified. The objectives, content, and conditions of these training courses are therefore only outlined.

Workshop on systems research approach

Until now, the FSR training workshops in West Africa have been conducted by the Farming Systems Support Project (FSSP) and IITA. Although the FSSP has since come to an end, the network is willing to ensure the continuity of such training in the region. It has been agreed to propose to Dschang University Centre an annual workshop on training in farming systems research. This workshop would last from three weeks to one month, and would be open to beginning researchers and students completing their training. It would combine field work and classroom work, following the training model developed by FSSP and IITA. However, an effort will be made to improve Francophone contributions and integrate them better.

WAFSRN, the French Research/Development Network, CIRAD, IITA, and the University of Florida would support Dschang University Centre in organizing this workshop and seeking the funding required. It is hoped that the first workshop will be held in 1989.

Workshop on scientific writing

In order to help and stimulate researchers to write and publish their findings holding an annual workshop on scientific writing is one of the committee's priority activities. A training module of seven to ten days will introduce researchers to writing notes, reports, and scientific articles for various audiences: scientists, decision-makers, extension agents, etc. The workshop will alternately be given in French and in English with groups of a maximum of twenty participants. Participants will be selected on the basis of written reports which they will have previously sent to the organizers and on which they will work during the session.

The supervisor of this workshop will be the network scientific editor. The collaboration and support of the IDRC Communication Science Division and those of the French Research/Development Network will also be sought.

There are two possible venues for the workshop. Either the Dschang University Centre can be approached to host the workshop, or the researchers can be grouped by neighbouring countries and one of the research or training institutes of these countries selected to host the workshop. It is hoped that the first workshop can be held in 1989.

Technical workshops and monitoring tours

In 1988 and during the first half of 1989 the secretariat will be setting up the network structures, the scientific and technical information system, and training workshops. It will also be preparing for and holding the symposium in 1989. Only two workshops and one monitoring tour are planned for 1989.

Workshop on irrigated crop production systems: This workshop will regroup some twenty researchers working on improving farming systems in irrigated perimeters designed for family farms. The objective is to achieve exchange and comparisons between programmes and researchers working effectively in the field on the following points: constraints diagnosed; improved technologies tested with farmers; methodologies implemented; results and the implications for research programmes, the research institution, the producers and extension services, and for agricultural policy.

Preparation of documented reports, discussions in the conference room, and field visits should contribute to striking a precise balance of FSR under irrigated farming. A designated coordinator will be responsible for preparing the discussions and editing the workshop proceedings.

The Senegalese Institute for Agricultural Research (ISRA) has been contacted to host the workshop, tentatively scheduled for August 1989 at the Agricultural Research Centre of St. Louis in Senegal. A farming systems research team and an irrigated rice research team from the West Africa Rice Development Association (WARDA) are based there and are working in the Senegal River Valley. They can assist in preparing and holding the workshop. It is also expected that the workshop may form a sub-network and establish its own programme of exchanges and collaborative research.
Workshop on the adaptation of farming systems to drought: The Network for Research on Drought Resistance in the Sahel proposes to organize this workshop jointly with WAFSRN in 1988 or 1989, to be held in Burkina Faso. The objective is to make a "comparative analysis of the adaptation strategies of farming systems to drought within each of the major types of agricultural situations in Sudano-Sahelian Africa with a view to define for each region priority research themes in the area of drought control".

Monitoring tour in Mali—Farming systems in the savanna zone: This tour will take place in the South-East of Mali in the Sudan Savanna region of Sikasso. The objective will be similar to that of the workshop on irrigated farming systems in Senegal and would gather a limited number of researchers working on the field in the Sudan Savanna Zone.

Biennial symposium

It has not been possible to hold the planned symposium of the network two years after that of Dakar (1986) due to the delay in establishing the secretariat. The new date is 28 August to 2 September 1989. The theme will be "The Contribution of Farming Systems Research to the Development of Improved Technologies for the Agro-Ecological Zones of West Africa".

It is proposed that the symposium provide a critical assessment of FSR in the region, with well-supported answers to the following questions:

- Has FSR made it possible to accelerate the technology adaptation and transfer process?
- Has it enabled research to be better oriented towards the priority problems of farmers?
- Which improved technologies have benefited the farmers?
- Has the elaboration of agricultural policies and extension programmes benefited this research?

An attempt will be made to strike a balance between the usefulness and efficiency of FSR in comparison with the traditional methodologies. The symposium will mostly be held in working groups based on agro-ecological zones (forest, Sudan Savanna, Sudano-Sahelian and irrigated zones). Leading scientists will be invited to introduce the theme. Animators will select the reports to be presented in working groups, direct the discussions, and prepare the symposium proceedings. The coordinator will be initiating contacts to select the host country with the following order of priority: Cameroun, Ghana, Liberia, Sierra Leone, and Nigeria.

Support to member countries

During the 1982 workshop and the 1986 symposium, information visits by the coordinator to member countries and specific support to national researchers, programmes, and organizations were seen to be an important part of the network's activities. After careful consideration, the Committee had decided to give visits and support missions less priority in the present work programme. This is due to the implications in terms of funding, availability of experienced researchers, and availability of the coordinator for implementing these support missions and visits. The training component, preparation of technical workshops and the symposium, and the feasibility study of the scientific journal will already bring the coordinator to several West African countries. These visits will be used to get information and examine the requests of the researchers and institutions.

The coordinator may also respond to invitations and requests for technical support if he or she is in a position to do so. Specific technical support in the form of expert consultancies will be examined later in the framework of the network's five-year programme, especially since SAPGRAD is planning to provide this type of support.

Conclusion

Establishing WAFSRN and starting up its activities has been long and difficult because of the nature of professional association adopted by WAFSRN. However, the agreement with the OAU's Scientific, Technical and Research Commission has overcome these legal obstacles and the initial reluctance encountered. It has also enabled donors to give the necessary support.

The WAFSRN network is also unusual in that it is one of the few networks which is not coordinated by an IARC. This deliberate choice of members makes their participation essential to achieving the objectives since technical support from international centres will not be automatic. Finally, the objective of the network—which deals with a research methodology and not with a crop or a technique—may easily lead to duplication of effort. In order to avoid this, consultation and collaboration will be systematically sought.
REVIEW OF THE AFRICAN BEAN NETWORK

Roger A. Kirkby

Background

Origin

The African Bean Network is formed from the activities of three interlinked regional research programmes for the improvement of the bean—an important agricultural commodity in Africa. These programmes were developed to help implement the priorities identified at a first meeting of bean researchers in Africa, held in Lilongwe, Malawi, in March 1980. After some years of negotiation, it became apparent that no single donor was prepared to support a programme for the entire region of Eastern and Southern Africa. The Centro Internacional de Agricultura Tropical (CIAT) therefore sought to establish projects in geographical subregions—based on agroecological and/or political-economic factors—for which funding could be found.

By 1983, CIAT was able to set up a regional programme for the Great Lakes Region of Burundi, Rwanda and Zaire with Swiss Government support, with a coordinating centre in Rwanda. Towards the end of 1984, funds from the Canadian International Development Agency (CIDA) and the United States Agency for International Development (USAID) became available for establishing operations in the rest of Eastern Africa, including Kenya, Uganda, Ethiopia, and Somalia. A coordination centre for Eastern Africa is now established in Ethiopia.

Further funding from CIDA enabled CIAT to establish a third regional programme based in Arusha, Tanzania to serve the countries of the Southern African Development Coordination Conference (SADCC), and a regional coordinator was posted there in July 1986. Each of the three regional programmes is located, by agreement with the respective national research institution, with a national bean improvement programme. The Southern Africa programme is a joint programme with the Southern Africa Centre for Cooperation in Agricultural Research (SACCAR).

Bean production in Africa

Production of the common bean, Phaseolus vulgaris L., in Eastern, Central, and Southern Africa is estimated to be between 2.0 and 2.5 million tons annually. The bean is grown primarily in cooler highland areas of Eastern and Central Africa, particularly in Burundi, Kenya, Rwanda, Tanzania, Uganda, and Zaire, although the crop is also important in other countries and in semi-arid environments.

Beans play a critical role in human nutrition in the region. About forty-five per cent of total dietary protein in Burundi and Rwanda is derived from bean consumption (an importance exceeding that found in any country of Latin America, the crop's centre of diversity). Dietary complementarity of beans with staple starch crops is important in maize/bean and sorghum/bean cropping systems. It is crucial where, as in Uganda, diets based on cassava or banana have been associated with severe protein deficiency symptoms.

Small farmers are the principal producers of beans, most of which are intercropped with maize, sorghum, or banana. Most production is for subsistence consumption coupled with some production for sale to urban populations, for whom beans normally constitute a relatively low-cost source of protein. Fertilizers and pesticides are seldom used in bean production in this region. Yields are low, usually less than one tonne per hectare, and increases in production are being achieved primarily through expansion in the area cropped (CIAT, 1981).
Diseases and insects, low soil fertility, and, in some areas, soil moisture deficits are the principal natural constraints associated with low average yields. Anthracnose (Colletotrichum lindemuthianum), bacterial blight (Xanthomonas phaseoli), angular leaf spot (Isariopsis griseola), bean common mosaic virus, and rust (Uromyces phaseoli) are the most important diseases across countries. The beanfly (Ophiomyia spp.) is the principal insect problem.

Although sources of genetic resistance to the above problems have been identified, they often occur in materials with grain types lacking consumer acceptance, or are in poorly adapted materials. For example, the most important released cultivar in Ethiopia, Mexican-142, is susceptible to most of the above pathogens. To reduce disease pressure, farmers in many countries plant at suboptimal densities and accept a lower potential yield by planting beans dangerously close to the next dry season.

The impact of bean improvement research has been mixed. The variety K20, released in Uganda in 1986, now accounts for up to forty per cent of bean production in Kabale District of Southwest Uganda, according to a recent farmer survey. Not all varieties have proven so popular, and the factors determining adoption of bean technology are less well understood than for principal cereal crops.

Large red, mottled, or speckled seed types are preferred in many areas, but seed colour preferences seem less stringent than in Latin America. Short cooking time is very important where, as in Rwanda, the firewood problem is acute. Beans, being slower to cook than most other common foodstuffs in the diet, largely determine the amount of firewood used (CIAT, 1986b). Taste is also important in helping to determine acceptance of a new variety although, here too, generalization is difficult: a commercially non-preferred, small-grained variety was found to be popular with the poorest sector of the rural population of Kirinyaga in Kenya, because seed for planting was less expensive (Franzel, 1983).

National research programmes on beans tend to be stronger in Eastern Africa than elsewhere. Access to, and utilization of, new germplasm has been uneven within the region. Opportunities for exchange of research methodologies, germplasm, and other results among national bean programmes have been lacking in general until recently. A questionnaire survey of bean researchers in Africa in 1985 also identified a critical need for improved access to information and documentation. One bright spot was the emergence in 1983 of the Phaseolus Bean Newsletter for Eastern Africa, compiled and published by Kenya's national bean research programme at Thika.

More recent meetings of national bean research coordinators have emphasized two particular needs: training of research staff, both graduates and technical assistants, and infrastructure to effectively deploy the available research manpower. Infrastructure is especially needed for seed storage, transportation, on-farm research, and field equipment not available for local purchase.

Objectives

The objectives of the African Bean Network are to support national efforts to:

• increase the productivity and production of food beans by breeding and selecting higher yielding genotypes identified from among a more diverse germplasm base. Such cultivars are selected for yield stability, relying on resistance to biotic and abiotic stresses, and for consumer acceptability.

• develop more productive systems of cropping utilizing promising new cultivars and varietal mixtures when appropriate, ensuring that cropping system and cultivar innovations are acceptable to producers and consumers and do not disrupt existing farming systems adversely.

• assist in strengthening national research programmes, to a degree that is both appropriate and sustainable nationally, through giving substantial emphasis to training. Opportunities are offered for postgraduate study at universities within or outside the region, with thesis research often being conducted with CIAT programmes. Short-term training is provided within Africa and outside the region. On-the-job training for the preceding two objectives is an important role for regional staff who are attached to regional networks and who all together cover a range of disciplines.
FIGURE 1
African Bean Network

Eastern Africa

Great Lakes

Regional Research

National Network

Southern Africa (SADCC)

Other Collaborative Research

CIAT-Palmira
Latin American Networks
Organization and Operation

General model and membership

The general operation of the African Bean Network may be illustrated by a series of interacting wheel rims (Figure 1). The first-order rim is pan-African; second-order rims are regional; and third-order rims are national. The national level is encouraged whenever several institutions share responsibility for bean research, such as universities and parastatal research organizations operating in different ecological zones within a large country. Direct cross-linkages between two or more member countries allows them to concentrate limited research and opportunities upon a specific, shared problem.

All countries within a region are eligible for membership if they so desire, although their levels of participation vary with interest and the importance of the crop. For example, beans are scarcely grown in Botswana, which has indicated an intention to withdraw progressively from the Southern Africa network as a proposed regional cowpea network is developed by the International Institute of Tropical Agriculture (IITA). On the other hand, bean-producing countries at the periphery of present regional networks, such as Madagascar, have asked to participate in some activities and are being incorporated gradually.

Coordination mechanism

The management of each regional programme is guided by a steering committee, which includes the coordinator of each national programme in the region and CIAT’s regional coordinator. A representative of SACCAR is also a member of the Southern Africa steering committee, and donor representation on committees is common. Meeting venues rotate among countries, and each national coordinator serves as chairman for one complete year, and is available for consultation with the regional coordinator.

The specific functions of the steering committee are to:

1. consider an annual workplan for the region
2. approve and monitor regional research
3. approve the use of regional budgets for collaborative research projects, workshops and visits, training, and equipment for national programmes
4. advise on consultancy visits

Regional research is conducted through national programmes. Scientific staff of the regional programmes are attached to four national programmes in Africa (Ethiopia, Rwanda, Tanzania, and Uganda) where much of the preliminary research is conducted. However, each regional scientist retains regional responsibilities in his or her discipline for working with national programmes outside the base country. Field research of an agreed regional importance that is conducted by regional staff normally passes through the review process of one or more national programmes. In this way most regional trials or studies are integrated, rather than standing alone as "CIAT" activities. This strategy strengthens the points along the wheel rim.

Funding for the regional programmes and network activities are provided to CIAT by the Swiss Development Co-operation (for the Great Lakes region), by CIDA for Southern Africa, and by CIDA and USAID jointly for Eastern Africa. Certain budget line items in each project are specifically managed by the steering committee. Contributions of national programmes to regional research vary according to local circumstances, from providing local scientists’ time and research facilities to almost complete funding for local costs of regional research. Foreign currency requirements for small equipment and training are generally the most difficult to meet without external support.

CIAT’s inputs include germplasm, research methods, some consultancy visits from headquarters on its core budget (some are also met from special project funds), literature, and assistance in producing a French language edition of the Kenya network’s newsletter. Consultants hired from the region or elsewhere are currently being considered to carry out specific assignments, such as assembling and interpreting base-line data on soil fertility and production/marketing statistics.
Collaborative research

In order to encourage stronger national programmes—which are more likely to remain effective after external support is withdrawn—CIAT's regional programmes do not usually run separate field trials. Instead, every effort is made to support national teams conceptualize, plan, and carry out field research.

As neighbouring countries often share similar agroecological zones and production constraints at the farm level, a regional network may also encourage purposeful collaboration among national programmes towards solving common research problems. Limited resources are used more efficiently through concentrating effort by different national programmes upon complementary aspects. The planning and analytical abilities of national programme scientists are enhanced through collaborative planning sessions and peer group review of research progress.

Three kinds of collaborative research have been recognized by the regional steering committees, and are being supported technically and (in part) financially.

Across-countries evaluation: the African Bean Yield and Adaption Nursery (AFBYAN). This regional variety trial permits each national programme to evaluate promising or released varieties from other national programmes. It also enables homologous locations or agroecological zones to be identified for future transfer of varieties and research information.

Division of effort on a common research topic: the regional strategy for beanfly research. National programmes vary in their current abilities to tackle integrated control through host-plant resistance breeding, ecological research for cultural and/or biological control, and use of insecticides. National programmes have agreed to specialize effort and pool results to some degree.

Regional leadership roles on selected priority topics: bean breeding for disease resistance. National programmes are hard-pressed to devote adequate attention to all the important bean diseases. In addition, ideal conditions for specific screening of germplasm are found only in certain locations. Within Eastern Africa, Uganda is taking a leading role in ascochyta blight, while Ethiopia is doing the same for bean rust. Key research techniques are developed or tested by the leading programme, which initially screens germplasm to identify effective sources of resistance, and will assist with training in other programmes. Other interested national programmes are encouraged or assisted in conducting yield loss assessments and in using resistance sources in their own breeding efforts.

Linkage mechanisms

Africa-wide strategic workshops

A workshop on beanfly was organized in Tanzania in November 1986. This workshop brought together bean entomologists and other scientists to assess the state of knowledge of the principal insect pest of beans in Africa, and to design a strategy for collaborative research leading to its control. Participants were invited for their experience and research interest rather than to represent a particular country or institution. The proceedings of the workshop are expected to serve several purposes, including training in species identification and for planning research strategies.

A second workshop in the series, on bean diseases, was held under the auspices of the Great Lakes bean programme in Rwanda in November 1987. A third workshop, dealing with issues in agronomy, is planned for 1988. The 1989 meeting will focus on bean breeding needs, strategies, and methods.

Multi-disciplinary regional workshops

A regional workshop for scientists working on beans in Eastern Africa was held in June 1987, and will be repeated after two years. A similar francophone workshop for the Great Lakes region is held annually. Researchers from all member countries are invited, and about thirty-five usually attend in each region.

Monitoring tours

Three members of the Uganda programme visited the Rwanda programme to take advantage of the similarity in environmental conditions between the two countries. Germplasm was selected in the field and approaches to varietal improvement and on-farm research were discussed. Selected germplasm was sent to Uganda after harvest. Other tours focus on collaborative research projects undertaken by national programme scientists on behalf of a region. Some tours also serve a formal or informal training function. Regional visits by small groups of scientists working on related aspects of a single problem are to receive particular attention.
Travel by regional staff

Extensive travel by regional staff, both within the host country and elsewhere in the region, serves many functions including research, assistance in planning new activities, coordination, and training. Travel across regional boundaries within Africa, by both regional staff and national scientists, is often necessary to adequately address certain widespread problems, and particularly to ensure coverage by crop protection, nutrition, and social science disciplines.

Bean information services

CIAT operates a Bean Information Centre at its headquarters, utilizing core funding and special project funds from IDRC. In addition to publishing Abstracts on Field Beans, the centre has compiled and distributed three bibliographies on bean research in Africa (Lopez, 1983; CIAT, 1984; CIAT, 1986a). The most recent volume includes "fugitive" literature obtained by means of personal visits by a consultant to bean researchers throughout the region.

A free monthly literature service provides researchers and libraries with current contents lists for a wide range of agricultural journals. Regional coordinators update mailing lists and distribute coupons for buying photocopies. Regional publishing opportunities are offered by the Phaseolus Beans Newsletter for Eastern Africa, produced at low cost by the Kenya national programme. A French language version is also produced, with assistance from CIAT's communications section.

Germplasm exchange

There has been much less research in Africa on beans than on the major cereal crops, and the centres of genetic diversity are in Latin America. Consequently, the majority of recent promising introductions have come from outside Africa. Regional scientists facilitate access to appropriate germplasm and work with each country to assist its utilization. The network may be useful later in across-country interpretations.

A short term approach to identifying some new varieties to revitalize extension programmes is being used successfully. A regional variety trial series allows national programmes to evaluate each other's released or promising material. Direct bilateral introductions or exchanges between neighbours that share agroecological conditions have also been useful, as in Uganda, to quickly increase the genetic base for selection. Increasingly, steering committees expect scientists responsible for disease-related collaborative research projects to assemble regional nurseries that enable other member countries to benefit from preliminary results in the lead country.

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zambia</td>
<td>1984-85</td>
<td>Insecticides trials identified endosulfan as a seed dressing.</td>
</tr>
<tr>
<td>Rwanda</td>
<td>1984-85</td>
<td>Exploratory trials indicated that beanfly was a priority problem.</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1986</td>
<td>Strategic workshop on beanfly.</td>
</tr>
<tr>
<td>Burundi</td>
<td>1986-87</td>
<td>Optimum rate for endosulfan application identified as being 2-3 g/kg.</td>
</tr>
<tr>
<td>Rwanda</td>
<td>1987</td>
<td>Seed dressing verified on-farm based on research station results from the above countries.</td>
</tr>
<tr>
<td>Burundi</td>
<td>1987</td>
<td>Extension bulletin produced (to guide safe application of new recommendations), to be made available to other countries.</td>
</tr>
</tbody>
</table>
Output

A principal technical output from networking activities so far is the identification of new varieties. The first on-farm trials of bean varieties in Uganda, an activity that started only in 1987, included entries received through the African Bean Yield and Adaptation Nursery contributed by Rwanda and Zambia.

An example of benefits arising from regional dissemination of other types of research information is the progress being made in beanfly control. As very little research had been conducted on this pest prior to 1982, Zambia started with an insecticides trial. Future developments built on this experience and avoided duplication of work across countries, as shown in Table 1.

Introducing seed dressing at low rates of chemical application in several countries has allowed time for developing more sustainable technology. Two areas of research are now in progress on a cooperative basis, and hold out prospects for pest management adapted to the ecology of the pest in different agroecological zones (see Table 2).

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIAT</td>
<td>1985</td>
<td>Beanfly resistance nursery assembled.</td>
</tr>
<tr>
<td></td>
<td>1986</td>
<td>Evaluated in four countries in Africa.</td>
</tr>
<tr>
<td>Burundi</td>
<td>1987</td>
<td>Resistant lines in regional nursery identified.</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1987</td>
<td>Screened 300 CIAT lines.</td>
</tr>
<tr>
<td>Tanzania</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1987-88</td>
<td>PhD thesis at two locations in Ethiopia.</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1988</td>
<td>MSc thesis at three locations in Tanzania.</td>
</tr>
</tbody>
</table>

Network Effectiveness

National programmes look to the network as a source of pre-adapted technology, and for means of using research resources more efficiently and strengthening their research capacity. CIAT and the donors have similar objectives. On-farm research has received considerable attention and is showing results. Additionally, CIAT believes in modest decentralization of research to appropriate environments, and in the utility of peer group example and critique in improving national programmes' performance.

Results so far support these objectives and methods. However, it is often difficult to separate network effects from those of increased financial support (for equipment, training and, to a lesser extent, for operational expenses) which well-funded regional programmes can bring indirectly to national programmes. Having strong steering committees guiding the research priorities and use of network funds, and integrating regional research into national programmes whenever possible are felt to minimize risks of distorting national
priorities. These actions are also seen to increase the likelihood of long-term benefits to national programmes.

The flexibility offered by the collaborative research mode also contributes in this regard. For example, Somalia produces few beans but has a very serious storage problem affecting all grain legume crops. Being relatively strong in the field of entomology, Somalia has taken responsibility for bruchid research but has relatively little involvement in many other areas of network activity. Collaborative research of this type can only be fully effective because adequate funds are available from donors for visits of various types, and also, in many cases, for specialized short-term training.

In the Great Lakes region and much of Southern Africa, except Tanzania, there is an acute shortage of well-trained scientists. This will severely limit the sustainability of networks, as well as limit their short-term performance, unless support is also available for considerable long-term post-graduate training. Although some funds are already provided for this purpose, it appears to be an area that donors do not always associate with network development.

Indicators of network progress include an awareness on the part of researchers that research in neighbouring countries can complement their own. Awareness should be accompanied by evidence that researchers are prepared to accelerate or miss out a step in the development of a technology where results are available and communicated from another institution or country. That bean steering committees are composed of active researchers, rather than administrators, is an advantage in developing this complementarity. On the other hand, it imposes a greater burden upon national coordinators to have to convince directors of NARS that it is efficient to cooperate, increase travel, and so on.

The effects of peer group evaluation of collaborative research is also a useful indicator. Offering constructive criticism and acting upon it require not only individual maturity but also the development of mutual respect and the familiarity that comes from repeated contact through network activities. Within the Eastern Africa steering committee, national coordinators now show no hesitation in rejecting research proposals that do not meet regional priorities. They also return some proposals for improvement in specified areas. They now expect regional activities and benefits (e.g., a new regional nursery) from an activity that may have started out with all the work concentrated in the researcher’s home base.

**Future Direction**

While most interaction has taken place within regional sub-groupings, a gradual increase in contacts across Africa is being encouraged wherever priorities and interests overlap. Researchers from within the network will increasingly be used for training and consultancy work, and the network would like to make more specific use of local newsletters and journals (from Kenya, SACCAR, etc.) for announcements and technical communications.

The regional programmes will continue to be very active in training, and will become more specialised as basic research techniques improve. Evaluation of training effectiveness may become a new network activity.

The main lines of cooperation are expected to remain appropriate for at least the next five years, and probably much longer in regions having less well developed national programmes. Experience with Latin American bean networks suggests that the network should pass increasingly to local management and staffing. In the meantime, some direct interaction among African and Latin America networks will be encouraged.

**References**


RAPPORTEURS' SUMMARIES
Rapporteurs: B. Dzowela, N. Alvarez
Discussions of Network Reports:
Rapporteurs' Summary

The papers presented in this review meeting discussed aspects of networks which affect participation. These aspects fall into four groups, as follows:

1. Long and short-term objectives, target, and purpose of network activities.
   The overall long-term objectives of the networks are to:
   • increase well-being of farmers and their families
   • increase cooperation among participants
   • help strengthen national programmes

2. Network models and structures and the way team activities are coordinated to achieve the above objectives.
   • Network models were discussed in detail. Although networks are organized around different subjects, they were characteristically either centre-oriented and influenced by an IARC, or decentralized with more control by NARS.
   • In either case, national programme commitment and funding are necessary for sustainability.
   • How does the network structure or model affect coordination? Are some models more effective than others? Are the links with NARS of equal proportions and what are the needs and expectations of small, weak programmes versus large, strong ones?
   • It is vital for steering committees to be involved in decision-making in order to sustain team spirit or culture.

3. The danger of a NARS being involved in too many networks.
   • To what extent should NARS set up their own networks at national level?
   • What is the cost effectiveness of various kinds of networks: national locally-controlled versus regional IARC-controlled?
   • At the level of NARS, participants' skills need to be improved so that they can improve the quality of their research and at the same time increase their absorptive capacity.

4. Ways to strengthen linkages within the networks
   • Links at the individual and informal scientific level are more flexible and faster than official government channels.
   • Formal links can be made through mandated organizations, such as the Southern African Centre for Cooperation in Agricultural Research (SACCAR).
   • Funds should be made available to facilitate linkages by supporting existing viable publications, working groups, etc. Making these group more effective could help them influence national policy formulation.

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BRAINSTORMING SESSIONS

Session I
Chairman: R. Kirkby
Rapporteurs: A. Omran, L. House

Session II
Chairman: B. Scott
Rapporteurs: D. Ngugi, V. Guiragossian
Topics for Brainstorming Sessions

The topics for this session were:
- network models, cost effectiveness, objectives, SPAAR classification
- national programmes
- network coordination
- training
- other network activities (all activities but training)
- funding
- evaluation—measuring progress
- evolution, sustainability, phasing out

Brainstorming

Models

Networks may provide models of how to strengthen the research capability of NARS and generate appropriate technology by more effectively utilizing existing research personnel and facilities. Their models may also ensure stability of production through a responsive research capability. A final objective of networks building models is to provide appropriate groups to coordinate the above activities on a regional basis.

Strengthening national programmes

Strengthening national programmes is a common goal. Networking may help avoid repeating research among participating national programmes. Research activities should be prioritized and should be able to respond flexibly to new or changing opportunities and demands. In most cases, networks were viewed as a means to an end.

Three major components for strengthening national research systems were identified. These components were research (planning, execution, and evaluation), human resources development, and facilities to support high quality research. Research execution includes developing methods, designing experiments, tapping each other’s experiences, and supporting—not overpowering—the national agricultural research systems (NARS).

Generating appropriate technology

Generating technology involves adapting existing knowledge and creating new technologies. Regional programmes need to respond differently according to national capabilities.
It is important that a regional programme or network be seen as contributing to national programmes. It should not be perceived to be primarily concerned with strengthening the relevant International Agricultural Research Center (IARC).

Some donors have supported the idea that networks and regional programmes should be provided with funds to strengthen national facilities. Participants felt that this should be encouraged. Networks and regional programmes should be responsive, which is necessary for carrying technology to the farmer.

It was recognized that most networks and regional programmes are generated by IARCs. Many models exist, each likely to be designed to suit the need of its region. Several models involve a team of scientists who bring together a critical mass of talent. These may be working together at one location (centralized model), or scattered in the region (diffuse model).

The networks represented at the review started in many ways which has, in turn, affected their organization. Some have been generated by IARCs, some by a professional society developing a network (e.g., WAFSRN), and others by bringing several projects together in one network (e.g., the Oilcrops Network).

In most networks and regional programmes implemented by an IARC it is likely that the IARC's network leadership role will be phased out. Almost all networks operate from national research stations which encourages constant interaction between regional and national scientists.

Sustainability

Sustainability refers to the continuing ability of a country to maintain production. This requires a research capability which can change over time to respond to problems. The regional programme aims to help create research capability which can involve collaboration between countries, outside agencies, and within the national programme itself.

Cost effectiveness

To maintain cost effectiveness, problems should be identified and priorities among them set, and repetition of research avoided. Whether people are aware of the existing relevant technology within or outside of the region and are using it should be considered. Facilities to support good research should also be provided.

SPAAR

Several concerns were raised about SPAAR. Participants suggested that SPAAR is trying to fit networks into a preconceived model which could reduce the opportunity for a specific network to be locally responsive. They were concerned that SPAAR is donor-driven, and that some donors favour bilateral arrangements and some emphasize regional ones (networks). It was felt that SPAAR needs to interact more with existing networks.

SPAAR is recommending rather small amounts of support money. It was suggested that SPAAR should consider larger coordination units where appropriate to provide network coordinators with more administrative, fiscal, and technological back-up.

National programmes

Participants listed a number of problems experienced by national programmes, as follows.

- There is a low level of motivation, which is reflected in staff instability.
- It has been difficult to get members of steering committees together because many national staff are expected to attend too many meetings.
- Plans are often not followed through partly because of bureaucratic and fiscal constraints.
- Quarantine regulations are often inappropriate and can hinder movement of plant material.
- Communication can be poor and is often exacerbated by the difficulty of moving people and material.
- National priorities are distorted by networks partly because there is no clear cut national policy accepting network activities.
- The methods to identify and set research priorities are often poorly developed.
- There are insufficient facilities for doing high quality research.
- Human resources are also limited.
Enhancing human resources is not only a matter of providing more education and training but also of providing incentives. These incentives can include supplementing salaries where this is government practice, inviting attendance at workshops and scientific meetings, providing consultancies with generous per diems where national staff members are qualified, giving prizes and advancement on merit, improving research facilities, and assisting staff in publishing the results of their research.
BRAINSTORMING SESSION II: RAPPORTEUR'S SUMMARY

Major Points

Stability of staff

• Transfers of researchers are a problem. Currently, staff permanence is based on gentlemen's agreements. In some cases, poor people should be allowed to move on.

• Solution: Train more than one person per available position. Training is key to stability. Send young scientists for training to ensure longer service.

• Policies requiring retirement at a relatively young age dictate more training of replacements.

• Research Associateships should be built into the projects.

• Research Directors should be exposed to a research management course, such as that offered by the International Service for National Agricultural Research (ISNAR).

Staff and steering committee travel

Travel by network staff

• Allow enough notice.

• On matters relating to training, letter of offer should be written to the Director, i.e., the person dealing directly with the matter, and another copy sent to the candidate. The letter can seek clearance by government.

• Combine research workshops and monitoring tours to minimize time spent on travel. There is a danger of losing contact, especially if these activities are held every other year as suggested.

• Technical advisory panels are best attended by the scientists, who are easier to schedule than directors.

• Procedures should be well understood for each country. Steering committee should be consulted for guidance.

Travel by steering committee

• Give ample notice to reduce lack of attendance and schedule meetings well in advance.

• Explore the possibility of combining the meetings of the technical advisory panel and steering committee to enable them to discuss common problems.

Financial constraints of national programmes

• Lack of funds affects such things as equipment, vehicles, and even housing.

• The coordinator should make an effort to secure donor support for the national programmes.

• Donor communities must consider funding the research as fully as possible. However, networks should not become synonymous with donors.

• Networks must involve the national agricultural research systems (NARS) in deciding on fund allocation—but ensure that the project's interests are not compromised.
• A small amount of funds applied in a flexible way may help national programmes participate fully in network activities, e.g., ICRISAT has helped countries such as Zambia to a considerable extent without compromising their programme.

• When it comes to the control of the budget, a strong regional controlling authority (e.g., steering committee) is necessary to relieve pressure on the International Agricultural Research Centers (IARCs).

Communication problems

There are many problems of communication: between countries, isolated locations, disciplines, and languages. The following solutions were suggested:

• encourage national fora along interest lines, such as national steering committees
• encourage travel within countries more than international travel
• provide simple facilities, such as photocopiers, telephone, etc.
• utilize project activities as local rallying points for sending out information to farmers and other scientists
• regarding language, it is helpful to encourage interaction between French and English-speaking countries. Portuguese and Spanish speaking countries are still a problem. Publish bilingual reports/newsletters.
• coordinators can facilitate communication, e.g., photocopy and distribute tables of contents of key journals

Setting priorities in national systems

It is difficult to set priorities in national systems since the network may be based on a commodity. Networks could help set priorities by training national scientists. As note of caution: donor support sometimes distorts priorities.
RECOMMENDATIONS SESSION

Chairman: D. Faris
Rapporteurs: A. Ker, R. Kirkby, L. House
RECOMMENDATIONS

Objectives
These recommendations are given in light of the following objectives for networking suggested by the review.

• To strengthen the applied research capability of national agricultural research systems to identify, address, and solve farmers' problems.
• To generate appropriate technology by more effectively utilizing existing research personnel, facilities, and other resources.
• To ensure stability of agricultural production through a responsive research capability.
• To provide the support, both technical and financial, required to facilitate the coordination of activities on a regional basis.

Recommendations
1. A primary objective of agricultural research networks and regional research programmes is to help strengthen national agricultural research systems. The activities of networks and regional programmes should be multi-disciplinary and of sufficient time duration to help ensure that strong and stable ongoing national systems are in place.
2. Networks are useful mechanisms to induce and sustain a dynamic and fruitful level of communication and interaction between national and regional agricultural research programmes.
3. Stability of national agricultural production partly depends on having a well-defined research strategy. Networking by national and regional agricultural research programmes can contribute substantially to developing and articulating such strategies.
4. It is imperative that while establishing and operating a network special care is taken to ensure that national objectives and desires are addressed, and that the appropriate national authorities are fully involved at all stages.
5. Networks need a clearly-defined coordination mechanism if they are to function effectively. Coordination should be carried out by a steering committee which controls the network activities and resources, assisted by a coordinator and appropriate supporting staff.
6. Sufficient financial support should be provided to networks and regional agricultural research programmes to ensure that they are dynamic and flexible and are able to support exploratory research, respond to unexpected opportunities, and utilize new technology.
7. Networks and regional agricultural research programmes should have sufficient funds to backstop and actually strengthen at an appropriate level the research activities of national programmes. Networks and regional programmes can also help to identify the need for and the sources of bilateral funding to assist national agricultural research systems.
8. It is important that a representative group of countries in a region convene periodically (such as the Southern African Centre for Cooperation in Agricultural Research (SACCAR) is doing) to determine what networks and regional programmes are required in their region, look at opportunities for consolidation, and examine ways to manage common activities across networks.
9. The effectiveness of networks depends on having strong national research programmes. To be strong, national programmes need dedicated scientists who are adequately supported. To ensure this, national programmes are encouraged to provide appropriate salary levels and allowances, stability, effective re-
search opportunities and facilities, upgrading of personal capability through training and educational opportunities, and advancement by merit for their scientists.

10. Networks and regional research programmes should assist in developing human resources by providing opportunities for education and training at appropriate levels, improving research facilities, arranging contacts with peers in other countries, and encouraging increased opportunities for educated scientists to contribute across the spectrum of agricultural activities.

11. Arrangements should be made to upgrade existing systems that facilitate movement of seed in a region as this free movement is essential for the success of networks and regional agricultural research programmes.

12. Recognizing that there are as many models as there are research networks and regional programmes, it is recommended that a study be made to determine the strengths and weakness of each, including a measurement of their effectiveness. This study could take many forms, one of which would be to make a baseline description now, to be followed up in about five years by measuring "progress" and identifying problems. The group felt that this study might be undertaken by SPAAR, by a specific donor, or by an International Agricultural Research Center.

13. A meeting similar to this one should be held in alternate years (approximately) to provide an opportunity for network coordinators to interact and identify the accomplishments, problems, and limitations of their networks. The meeting should have no more than twelve to fifteen people and should have a specific focus. A few national scientists should be involved to provide a better understanding of operational problems within national agricultural research systems. A representative from the International Service for National Agricultural Research (ISNAR) could also be invited.
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Telefax: 521001
<table>
<thead>
<tr>
<th>ACRONYMS</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AAASA</td>
<td>Association for the Advancement of Agricultural Sciences in Africa</td>
</tr>
<tr>
<td>AFBYAN</td>
<td>African Bean Yield and Adoption Nursery</td>
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<tr>
<td>AFRENA</td>
<td>Agroforestry Research Networks for Africa (a programme of ICRAF)</td>
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<tr>
<td>AGLN</td>
<td>Asian Grain Legumes Network</td>
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<tr>
<td>ARDA</td>
<td>Agricultural Rural Development Authority (Zimbabwe)</td>
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<td>ARFSN</td>
<td>Asian Rice Farming Systems Network</td>
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<tr>
<td>ARNAB</td>
<td>African Research Network for Agricultural By-products</td>
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<tr>
<td>CARNet</td>
<td>Collaboration Agricultural Research Network</td>
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<tr>
<td>CGIAR</td>
<td>Consultative Group on International Agricultural Research</td>
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<tr>
<td>CIAT</td>
<td>International Center for Tropical Agriculture [Centro Internacional de Agricultura Tropical]</td>
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<tr>
<td>CIDA</td>
<td>Canadian International Development Agency</td>
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<tr>
<td>CIDARC</td>
<td>Centre International de Documentation sur l'Agriculture des Régions Chaudes (part of CIRAD)</td>
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<tr>
<td>CIP</td>
<td>International Potato Center</td>
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<td>CIRAD</td>
<td>Centre for International Research in Agricultural Development (France)</td>
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<tr>
<td>CSIRO</td>
<td>Commonwealth Scientific and Industrial Research Organization (Australia)</td>
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<tr>
<td>EARSAM</td>
<td>Eastern Africa Regional Sorghum and Millets Network</td>
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<tr>
<td>EEC</td>
<td>European Economic Community</td>
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<td>ESARRN</td>
<td>East and Southern Africa Regional Root Crops Network</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>FLAG</td>
<td>Forage and Legume Agronomy Group (at ILCA)</td>
</tr>
<tr>
<td>FSR</td>
<td>Farming Systems Research</td>
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<tr>
<td>FSSP</td>
<td>Farming Systems Support Projects</td>
</tr>
<tr>
<td>GCIRC</td>
<td>Group Consultative International de Recherche sur la Colza</td>
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<tr>
<td>GTZ</td>
<td>German Agency for Technical Cooperation</td>
</tr>
<tr>
<td>IARC</td>
<td>International Agricultural Research Center</td>
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<tr>
<td>IBPGR</td>
<td>International Board for Plant Genetic Resources</td>
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<tr>
<td>ICIPE</td>
<td>International Centre of Insect Physiology and Ecology</td>
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<tr>
<td>ICRAF</td>
<td>International Council for Research in Agroforestry</td>
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<tr>
<td>ICRISAT</td>
<td>International Crops Research Institute for the Semi-Arid Tropics</td>
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<tr>
<td>IDRC</td>
<td>International Development Research Centre</td>
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<tr>
<td>IFDC</td>
<td>International Fertilizer Development Center (USA)</td>
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<tr>
<td>IITA</td>
<td>International Institute of Tropical Agriculture</td>
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<tr>
<td>ILCA</td>
<td>International Livestock Centre for Africa</td>
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<tr>
<td>INFIC</td>
<td>International Network of Feed Information Centers</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>INTSORMIL</td>
<td>Collaborative Research Support Program on Sorghum and Pearl Millet (USAID Title XII, USA)</td>
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<tr>
<td>INTSOY</td>
<td>International Soybean Project</td>
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<tr>
<td>IPM</td>
<td>Integrated Pest Management</td>
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<tr>
<td>IRAT</td>
<td>Institute for Tropical Crops (France)</td>
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<tr>
<td>IRRI</td>
<td>International Rice Research Institute</td>
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<tr>
<td>ISNAR</td>
<td>International Service for National Agricultural Research</td>
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<tr>
<td>ISRA</td>
<td>Senegalese Institute for Agricultural Research</td>
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<tr>
<td>KIRDI</td>
<td>Kenya Industrial Research Development Institute</td>
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<tr>
<td>MPT</td>
<td>multi-purpose tree</td>
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<tr>
<td>NARS</td>
<td>National Agricultural Research Systems</td>
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<tr>
<td>NFTA</td>
<td>Nitrogen Fixing Tree Association</td>
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<tr>
<td>NGO</td>
<td>non-governmental organization</td>
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<tr>
<td>NORAD</td>
<td>Norwegian Agency for International Development</td>
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<tr>
<td>OAU</td>
<td>Organization of African Unity</td>
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<tr>
<td>ODA</td>
<td>Overseas Development Administration (British Government)</td>
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<tr>
<td>ODNRI</td>
<td>Overseas Development Natural Resources Institute (London, was TDRI)</td>
</tr>
<tr>
<td>PANESA</td>
<td>Pastures Network for Eastern and Southern Africa</td>
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<tr>
<td>SACCAR</td>
<td>Southern Africa Centre for Cooperation in Agricultural Research</td>
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<tr>
<td>SADCC</td>
<td>Southern African Development Coordination Conference</td>
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<tr>
<td>SAFGRAD</td>
<td>Semi-Arid Food Grain Research and Development (Project)</td>
</tr>
<tr>
<td>SIDA</td>
<td>Swedish International Development Authority</td>
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<td>SMIP</td>
<td>Sorghum and Millets Improvement Program (under SADCC/ICRISAT)</td>
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<tr>
<td>SPAAR</td>
<td>Special Program for African Agricultural Research</td>
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<td>STRC</td>
<td>Scientific, Technical and Research Commission (of OAU)</td>
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<td>TDRI</td>
<td>Tropical Development and Research Institute (now ODNRI)</td>
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<td>TRIP</td>
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<td>USAID</td>
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<td>WAFSRN</td>
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<td>WARDA</td>
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