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PRELIMINARY REPORT ON THE STRATEGIC PLAN

OF SAFGRAD NETWORKS

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A C R O N Y M S

CIMMYT	International Center for Maize and Wheat Improvement
EARSAM	East African Regional Sorghum and Millet Network (SAFGRAD/ICRISAT)
IARC	International Agricultural Research Center
ICRAF	International Council for Research in Agroforestry
ICRISAT	International Crops Research Institute for The Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Center for Agricultural Research
ISNAR	International Service for National Agricultural Research
NARS	National Agricultural Research Systems
OAU/STRC	Organization of African Unity Scientific, Technical and Research Commission
RENACO	West and Central African Cowpea Collaborative Research Network (SAFGRAD/IITA)
RESPAO (WAFSRN)	West African Farming Systems Research Network
RUVT	Regional Uniform Variety Trial
SCO	SAFGRAD Coordination Office
SACCAR	Southern African Centre for Cooperation in Agricultural Research
SPAAR	Special Program for African Agricultural Research/World Bank
WASHAT	West African Sorghum Hybrid Adaptation Trial
WASVAT	West African Sorghum Variety Adaptation Trial
WCASRN	Western and Central Africa Network Sorghum Research (SAFGRAD/ICRISAT)
WECAMAN	West and Central African Maize Research Network (SAFGRAD/IITA)

EXECUTIVE SUMMARY

The ~~elaboration~~ preparation of the Network Strategic Plan was made possible through active participation of NARS senior scientists, research managers, the network coordinators and IARC scientists etc. They attended the planning sessions of respective Steering Committees and the special sub-working groups. About 40 experts of different disciplines from 19 countries have participated at various stages of the development of the plan.

One aspect of the planning exercise has been to assess the technical achievements attained during SAFGRAD Phase II in general and by espective networks in particular. The networks have contributed to the release of improved varieties and agronomic practices by NARS which are currently used by farmers in different countries. The network process has enabled NARS to know each others research programs as well as their strengths and weakness in alleviating food production constraints of common interest. The network strategic plan major thrust is the development of NARS scientific leadership. The desired and critical level of research manpower requirements for each participating country was determined. The availability of qualified researchers apparently is far too small even to sustain a minimum level of research in weak NARS.

Some of the positive indicators that the networks are making impacts on NARS institutions are : the gradual emergence of scientific and research management leadership, improvement of research skills, shouldering of research responsibilities, etc. Intensive exchange of technologies through the evaluation of elite germplasm has enhanced the transfer and adoption of research results by farmers. For instance, some varieties of cowpea introduced through the network mechanism were identified as suitable by NARS and are currently cultivated by several farmers in Burkina Faso, Guinea Bissau, Ghana, Mali, Nigeria, Benin, Cameroon, Togo etc.

Some of the Early and Extra-early maturing groups of maize varieties were developed by the IITA/SAFGRAD resident research program and the network. The low yielding and late maturing types are being replaced by these early types and these are moving maize cultivation increasingly from the Northern Guinea to Sudan Savanna zones.

A large number of sorghum cultivars resistant to Striga, drought, insects, diseases were identified. Some of these varieties are being cultivated by farmers in Cameroon, Nigeria, Burkina Faso, Ethiopia, Kenya.

The transfer of network leadership and management could become a reality when NARS attain a strong technological base. The collaborative research projects already

in progress would be strengthened to concurrently enhance NARS leadership as the future technological base for networking. For smooth transfer of network coordination and management to NARS IARCs ~~involvement~~ ~~in~~ continued technical support is vital. ~~and should be assured~~.

The short-term training courses of networks have yielded positive results since upgrading of research skills has improved execution of field experiments and data management. The plan presumes that most of the short-term training costs to be supported within the core budget of respective networks whereas substantial portion of the long-term training would be supported through bilateral, regional or international organizations.

Recognizing that the impact of research on development could not be attained unless research results reach the farmer, agronomic on-farm verification and validation (by NARS) would also be an important activity of respective networks.

The long-term support of donors (USAID, etc) has enabled the SCO also to serve as Secretariat for other complimentary research networks. The SCO through its OAU umbrella provides these networks with the legal and political framework in addition to its administrative, financial and technical services.

The plan also looked into the possibilities of addressing agricultural research policy issues through an intended high level OAU Ministerial meeting.

The major focus of the plan is to ensure the transfer of network management and leadership to NARS. Realizing the limited availability of qualified research manpower in NARS, each network has taken a pragmatic and cautious approach. The stage of network development suggests that participating NARS are ready to assume certain technical research responsibility i.e through Lead NARS centers. They have started to contribute to share time of qualified researchers and facilities to attain common network objectives. NARS also realized through the network mechanism that they would be able not only to tackle common constraints to food production but could also optimize the technical assistance from IARCS and other agencies. The network activity , has yet to be institutionalized if the NARS have to contribute funds for the operation of networks which they are not ready to do.

The proposed scenarios can be considered a reflection of the state of development of networks and NARS level of research capability and infrastructure. It also reflects the concern for a smooth functioning of network entities. These scenarios will be studied further for their technical and financial feasibilities.

PRELIMINARY REPORT ON THE STRATEGIC PLAN OF SAFGRAD NETWORKS

I. BACKGROUND

A. THE PROCESS

The 1987 conference of the Directors of Agricultural Research of SAFGRAD member countries provided the general framework for networks structure and operation. Food grain collaborative research networks were organized taking into account the different levels of research strengths and weaknesses among NARS.

Initially, NARS made a thorough inventory of food grain production constraints. Based on the available resources and the pool of scientific manpower in the region, NARS scientists decided to utilize optimum ecological sites (i.e in different NARS) or "hot spots" to screen food grain cultivars to alleviate constraints (biotic and physical stress factors) to food grain production. Consequently, a common strategy for achieving network objectives was realized. The network model (involving IARCS, SCO and NARS) as conceived within SAFGRAD II project was set in motion with the long-term goal to transfer network leadership and management to NARS.

Based on the technical progress attained by the respective networks and on the outcome of the mid-term evaluation of the SAFGRAD II project, the SCO facilitated broader participation of NARS in the development of the network plan accordingly :

i. The elements of the plan were discussed at the 1989 Conference of the Directors of Agricultural Research. The NARS Directors gave policy guidance and encouraged the network entities - i.e the Steering Committee of respective networks, the SCO, the Oversight Committee, the Coordinators and relevant NARS institutions to exert concerted effort in the development of the plan.

ii. The SAFGRAD Network Review Meeting to elaborate issues related to medium and long-term was held from 14-15 June 1989.

iii. Then, SCO activated networks planning sessions by the respective Steering Committees of networks as follows :

a. (EARSAM) Steering Committee Planning session in combination of field research visits was held from 23 October to first November 1989 in Wad Medani, Sudan.

b. The Cowpea and Maize Steering Committee Meetings were held from 6-10 November 1989 in Ouagadougou. The Steering Committees also held a planning session to develop its medium and long-term plans.

c. The West and Central Africa Sorghum Research Network during its meeting in Ouagadougou from 14 - 17 November 1989 also elaborated its future plan activities.

d. Working Group Sessions

To facilitate the study of the working group, the SCO management prepared working documents based on the outcome of the technical planning sessions carried out by the respective steering committee of networks as well as on networks management issues. Five sub-working group sessions covering each network and management entity of SAFGRAD took place from 27 November to 1st December, 1989 in Ouagadougou, Burkina Faso. The results of each sub-working group were further discussed during a plenary session.

B. HIGHLIGHTS OF ACHIEVEMENTS IN PHASE II

1.0 WEST AND CENTRAL AFRICA COWPEA NETWORK

The new technologies identified at the lead NARS and from IITA have enabled the network to organize regional trials in various aspects of cowpea improvement and production. Adaptation trials for Sudano-Sahelien Zone, Northern Guinea Savanna Zones and moist savanna zones were set in motion. Other regional trials are screening for aphids, bruchids, striga and virus diseases reactions.

During the SAFGRAD Phase II, the network has made the following contributions to technology exchange and development in the sub-region :

a. Greater interaction among NARS scientists

b. Exchange of genetic materials among member states and nomination of varieties into the regional trials by the lead centers - Senegal (2 varieties), Nigeria (2 varieties), Niger (2 varieties) and Burkina Faso (3 varieties).

c. The minimum spray technique developed by the network has resulted in the reduction of chemical sprays required for protection of cowpea against insect damage from 4-7 to 2 without substantial yield decrease.

d. Identification of two tolerant and six striga resistant lines within the Sub-region.

e. The Research seminar on cowpea improvement and production was held from 4-25 November 1988 at IITA, Ibadan. Scientists from lead centers and IITA cowpea researchers participated in the seminar.

f. Training of national scientists on appropriate technology development and transfer was held in cooperation with the National Agricultural Research Program of Burkina Faso. Ten participants from seven countries in the region benefitted from the training in September 1989

ADOPTION OF RESEARCH RESULTS BY FARMERS

Through the activities of the network, the following cowpea varieties are presently being cultivated by farmers in member countries.

Burkina Faso	- KNI, Suvita 2, Tvx 3236, TVx 396-4-4
Guinea Bissau	- IT82E-9
Ghana	- IT82E-16 and IT82E-22
Mali	- Suvita 2
Nigeria	- Tvx 3236
Bénin	- TVx 1850-01F, IT82E-32, IT81D-1137
Cameroon	- IT81D-985 (BRI) and IT81D-994
Togo	- IT81D-985 (B-Togo)

On-farm survey is needed, however, to quantify the actual hectarage cultivated to the aforementioned varieties in each country.

2.0 WEST AND CENTRAL AFRICA SORGHUM RESEARCH NETWORK

Since its establishment the West and Central Africa Sorghum Research Network (WCASRN) has placed emphasis on the development of relatively high yielding cultivars with resistance to several biotic and physical stresses such as, nutrient and drought stress, low soil fertility, grain molds, leaf diseases, insect pests, and grain quality and utilization. Through ICRISAT/SAFGRAD collaborative research support, few sorghum varieties were found promising in different NARS. Some of these varieties are ICSV 1001 (Framida), E 35-1, ICSV 16-5 BF, and ICSV 1049 BF; which were found suitable in Burkina Faso. The varieties S-34 and S-35 are grown by farmers in Cameroon. In addition ICSV 1007 BF was found promising in Niger, Nigeria, and Togo.

After the WCASRN was formalized, it has organized three types of regional trials. These were, the West African Sorghum variety Adaptation Trial (WASVAT) early and medium maturities and the West African Sorghum Hybrid Adaptation Trial (WASHAT). A number of varieties from these trials were promising at different participating NARS. After intensive testing the WCASRN Steering Committee recommended that three early maturing varieties, ICSV 1083, CE 180-33, and ICSV 111 and three medium maturing varieties, ICSV 1063, ICSV 1089, and Malisor 84-1, should be multiplied on a large scale in farmers'fields.

Lead NARS were identified to undertake collaborative research activities in specific stress factors for which they had accepted responsibility. These are, Burkina Faso on leaf anthracnose, Cameroon on striga and drought, Mali on head bugs, Niger on long smut, and Nigeria on industrial use. These research projects were started in the 1989 cropping season and will continue in 1990.

TRAINING WORKSHOPS AND IN-SERVICE TRAINING

a. The Striga training workshop was held from 5-10 October 1987, in Ouagadougou. Twelve participants from Cameroon, Gambia, Mali, Niger, Togo, Kenya, Ghana, Uganda, Nigeria and Sudan benefitted from the training.

b. The Training workshop on agronomici research and on-farm testing was held from 19-30 September 1989, in Bamako, Mali. The nine participants were from Côte d'Ivoire, Gambia, Ghana, Guinea Bissau, Mauritania, Niger, Nigeria, Senegal and Sierra Leone.

These short training courses have yielded positive results based on feed-back received from trainees. However, advanced research level training up to the M.Sc. and Ph.D in collaboration with African Universities was not exploited.

3.0 THE WEST AND CENTRAL AFRICA MAIZE RESEARCH NETWORK

Principal researchable constraints to maize production in semi-arid West and Central Africa were identified by the assembly of national program Scientists. Then, collaborative research projects were established for resolving regionally common constraints by lead NARS based on availability of manpower and facilities and relevance to national interest. Furthermore, the following three types of Regional Uniform Variety Trials catered for different ecological zones and duration of maturity were intensified :

RUVT-1 : Early drought resistant varieties
RUVT-2 : Intermediate/Late maturing varieties
RUVT-3 : Extra-early maturing varieties.

The development of extra-early maize varieties by the network has been identified as an avenue to expanding maize production to new areas and/or new seasons. The efforts of the network have enhanced the release of some improved varieties by several NARS while many are in pre-release stage.

Weaker National Programs have been assisted through visits by the Network Coordinator and some assigned members of the Steering committee and the provision of research materials and some funds. Some financial assistance was also given NARS for implementing collaborative research projects.

Technicians from Benin, Burkina Faso, Central African Republic, Ghana, Guinea-Bissau, Guinea-Conakry, Mali and Tchad participated in a 5-month residual course at Kamboinse (1988 and 1989) that emphasized trial management, varietal maintenance and seed production.

Monitoring tour was restructured to involve fewer participants and visiting two countries a time in order to enhance effective interaction between experienced and young inexperienced maize workers and at the same time provide a medium for self-evaluation by the experienced ones.

The maize network has been found to have contributed immensely to forging closer contacts and exchange of technical information and materials between participating NARS.

IMPACT

Through the network extra-early cultivars have been identified for release in participating countries. Varieties of some countries have been adopted in other countries for cultivation.

For instance, in Cameroon older varieties like Mexican 17, are now being replaced by the DMR-ESRY which was identified through the activities of the network. In Nigeria, the extra-early maize regional trials of the Network are being identified as an avenue to expanding maize cultivation to new areas where short wet season duration has precluded cultivation and/or achievement of sustainable yields. It is evident that the Streak resistance technology developed at IITA has been transferred to the NARS of Togo through the activities of the SAFGRAD Maize Network.

Given the period of less than three years that the SAFGRAD Maize Network has been in existence not much could be said that has been achieved in the area of technology adoption by farmers. Nevertheless agronomists are presently formulating technology adoption studies and it is premature to evaluate the contributions of the network in this area.

4.0 THE EASTERN AFRICA SORGHUM AND MILLET RESEARCH NETWORK

An intensive exchange of germplasms and related technologies took place among NARS and ICRISAT. The network research priorities and plans were developed and implemented through collaborative research projects conducted by lead centers. Regional trials were carried out by NARS in the region at different ecological zones.

In collaboration with the Institute of Agricultural Research in Ethiopia, 28 striga resistant sorghum genotypes were identified in four hot spot locations. The seed of these 28 genotypes were increased and were distributed for the participating NARS for further evaluation in the region.

Kenya provides leadership for screening sorghum cultivars to long smut resistance. In collaboration with the Kenya Agricultural Research Institute (KARI), and ICRISAT, the network was able to identify IS8595 as resistance to long-smut. Several other sorghum genotypes are being evaluated to long-smut resistance at Muguga in Kenya for future regional trials.

In collaboration with national programs in Rwanda and Ethiopia, 15 and 6 resistance lines to ergot disease were identified respectively. In both countries, it was observed that ergot incidence increased as time interval between inoculation and anthesis increased. Screening sorghum cultivars to drought stress was carried out in Wad Medani, Sudan as lead center of the network. Similar drought resistant sorghum cultivars were also

evaluated at Kiboko, Kenya in cooperation with KARI. Some genotypes were included in the preliminary regional observation nurseries in Ethiopia, Sudan, and Kenya.

Eight sorghum varieties were released in the region of which some of them are cultivated by farmers. Also fourteen sorghum varieties for different ecologies have also reached at pre-release stage. Some pearl and finger millet varieties are at pre-release stage.

TRAINING

a. A Sorghum and Millet Seed Production Training Workshop was held 13 to 19 September 1987. Thirty eight participants from eight EARSAM countries benefitted from the training workshop.

b. In-service training between 1986-1988 was provided to 38 participants : Burundi (3), Ethiopia (5), Kenya (6) Rwanda (2), Somalia (9), Sudan (7), Tanzania (4), and Uganda (2).

c. An entomology short course training workshop was held from 20-30 June, 1989 in Kenya. Seventeen technicians from seven EARSAM countries attended the course. Participants came from Burundi (1) Ethiopia (2), Kenya (6), Rwanda (2) Somalia (2) Sudan (2) and Uganda (2). Experts from ICRISAT, ICIPE and Muguga (KARI) assisted as lecturers of the technical sessions and in the practical field activities.

d. A pathology course was conducted in ICRISAT for EARSAM countries in September 1989, including 12 technicians

II. THRUST OF SAFGRAD NETWORKS STRATEGIC PLAN 1992-1996

The intensification of food grain research and production within National Agricultural Research Systems (NARS) would continue to be central to SAFGRAD activities through focused activities of collaborative research networks.

The commonality of food production constraints convinced participating NARS to create collaborative research networks by mobilizing scientific talents and resources of member countries. Food production problems transcend linguistic and cultural barriers as well as political frontiers. The collaborative mode has been adopted to facilitate exchange and evaluation of

technologies in different ecological zones. Taking into account the different levels of NARS research capabilities, the collaborative research networks programmes did orient activities to both technology adapting, and generating NARS.

A comparative advantage has been realized by pooling research resources together with relatively strong and weak national research programs as well as those of the IARCs in alleviating common constraints to food production in the region (Tables 1, 2, 3). For example, a particular national program alone could not afford to resolve the problems of streak virus, striga, insects and disease on different crops. Furthermore, technology adapting NARS have benefitted not only by concentrating on the verification and validation of elite germplasm to their environmental and socio-economic conditions but also have changed their research strategy in taking advantage of the NARS aggregate research capabilities and optimizing the technical research and training assistance being provided through IARCs. The network process has brought this change.

The SAFGRAD mandated area is estimated to have a total population of 250 million inhabitants about 80% of whom are small scale farmers, producing most of the staple food supplies consumed in the region. Food grain particularly sorghum, millet, maize, cowpea and groundnuts constitute over 70% of food produced in the area. SAFGRAD's goal is therefore to facilitate research in order to increase the quantity and quality of staple food crops effectively available to the increasing population in semi-arid zones of Africa. It is at this level of farm activities that efforts to increase food production has, unfortunately, been the least successful. Food self-sufficiency at the individual and household levels could be attained if technological changes could be realized at on-farm level. SAFGRAD's activities will continue in enhancing the adoption of suitable packages of technologies to improve yields of food grains. Evaluation of technologies through agronomic research of each network at NARS level would be strengthened through African Development Bank support.

The family labour in semi-arid tropics of Africa largely consists of women and children. Women play a key role in the production of food, storage and utilization. If agricultural output, productivity and employment would have to increase substantially to keep pace with population growth, the major mechanism to realize technological change in agriculture would be the active participation of women at research and on-farm production levels. Collaborative research effort would be oriented to also enhance the participation of women.

The network strategic plan has considered the following issues.

1.0 THE MANPOWER AND LEADERSHIP ISSUES.

A review of the research manpower of different NARS showed that networks (maize, sorghum, millet, cowpea, and FSR) face an acute shortage of qualified researchers. Development of leadership thus depends on the availability of research manpower with corresponding experience. The interactive research programmes of networks have identified some scientific leaders. Participating scientists have been sensitized in addressing research issues of regional dimension.

The indicators that leadership qualities of NARS scientists are steadily emerging are : (1) the self-confidence and high sense of responsibility asserted in the management of networks; (2) the utilization of senior NARS scientists and members of steering committees to assist in implementing network research plans in different NARS; the policy and management guidance provided by NARS directors and members of Oversight committee. Furthermore, the collaborative research activities of networks in NARS also improved the level of technical communications.

Furthermore, through the networks NARS are increasingly aware of each others research program, weaknesses and strengths. The NARS and IARC interactions through networking is gradually influencing the research agenda and strategy of the latter.

Although leadership of NARS scientists and research managers is just emerging, the number of available qualified researchers is far too short not only to impart "critical research mass" but also to sustain national research activities.

The review of the networks research manpower revealed an acute shortage of qualified researchers (Annex 1,2,3 and Tables 1, 2, 3, 4 and 5). The situation in the 17 participating NARS in general is as follows :

West & Central African Research Network — Current situation of research manpower in the different NARS

	Weak	Medium	Strong
Maize	14 countries	Ghana	Nigeria
Sorghum	13 countries	Cameroon	
Cowpea	8 countries	Benin Ghana Mali Niger Ghana Cameroon	Nigeria Burkina
FSR	11 countries	Niger Burkina Ghana	Nigeria Senegal Mali
Sorghum and Millet Network in Eastern Africa	3 countries	Somalia Tanzania Kenya	Sudan Ethiopia

Networking is a technological process. Its success (or benefits to participating NARS) depends on the sustained flow and exchange of technical information. The IARCs to a large extent are providing that support at present. Through such support, the networks' long-term strategy is to gradually enable certain NARS to serve as technological base for networking.

The weak NARS benefit from networks activities through training particularly. The development of qualified researchers should be a priority of respective governments and donors.

From the networks perceptive, the desired graduate level of training and needs are as summarized in Annexes 1, 2, 3. The critical research manpower requirement for Lead NARS in order to enable them to discharge their specific areas of research responsibility is indicated in Tables 1, 2, 3, 4 and 5.

The number of research workers on sorghum improvement in 17 countries in West Africa is approximately 56. More than 50% of the researchers are part-time and also working in other crops. About 60% of the research cadre are junior scientists. Those with Ph.D degree or with qualified research experience making 7% of the research cadre, are based at Lead NARS. Eight more staff are returning also within the next three years. About 25 of sorghum researchers of WCASRN are based at lead NARS

It is projected that sorghum improvement would require 85 researchers over the next decade . A staff development plan particularly to improve the research capabilities of weak NARS is worked out for the next decade. Twenty five junior researchers currently working on sorghum are expected to pursue graduate level training at M.Sc. level between 1992 - 1996. The plan also calls for a third of them to be trained at Ph.D level and an additional 26 researchers are expected to be trained at M.Sc. level between 1996-2000 (Annex 3).

Ten problem areas of sorghum production and improvement were identified for training workshops. The duration of these courses vary 1-2 weeks. About 200 participants from 17 countries in the region would benefit from the training. In-service training in five problem areas of sorghum improvement and production were proposed. The duration of each training is 4-6 months.

Close to 100 research workers are engaged in the improvement of maize in the 17 countries in the region. Furthermore, 40% of them are based in five lead NARS.

For the next decade, it is projected that the maize improvement program in these countries require 115 additional scientists including 17 to be trained at Ph.D level or equivalent training.

Seven short-term training workshops were identified in four problem areas of maize improvement and production. The duration of these courses would be 1-2 weeks. About 140 participants from 17 countries would benefit from such training.

In close cooperation with IITA, in-service training is planned to take place every other year. The duration of the training would be 4-6 months. About 30 junior scientists mostly from weak NARS would benefit from the training.

Taking the comparative advantage of IITA, it is proposed that data management by acquiring skills in computer use, management of experiment stations and post harvest technology courses would be offered at IITA, Ibadan. About 50 participants are expected to benefit from the training.

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* At Lead NARS Centers - Minimum Staff requirement is in addition to the current level. Qualified staff means that most of them would have Ph.D level or equivalent training.

There is an acute shortage of qualified researchers for cowpea improvement and production in the region. About 65 research workers are engaged in cowpea improvement in the 16 countries. Since cowpea is grown largely as companion legume to the main cereals, unfortunately hardly 30% of the above mentioned number of scientists work full time on the various constraints of cowpea production. Furthermore, about 70% of them are junior scientists with B.Sc. level of training. About 43 researchers few with Ph.D degree are based at relatively strong national research programs.

As projected in the staff development plan, close to 170 additional researchers would be required in the region during the next decade. First, about 50% of the current researchers working on cowpea improvement need to be upgraded through graduate level training at M.Sc. level in different disciplines. About 25% of those with M.Sc level of training could be provided opportunities to Ph.D level of training with more emphasis on improving the research capabilities of weak NARS.

Three types of short-term training are considered. These would be fully developed and implemented in close cooperation with IITA and lead NARS institutions.

In-country training is planned in order to familiarize extension agents to technologies developed at NARS. The purpose of training is to enhance the adoption of technologies by farmers. The program is expected to improve research and extension linkages. SAFGRAD could facilitate such training to be conducted in each country by the experienced researchers and extension agents in a particular country.

Five areas of training workshops were selected. The training workshops are expected to serve as a forum for scientists to have better understanding of research activities in NARS centers within the sub-region as well as at IITA. This, enhances harmonization of research methodology. Two sessions of this type of training are planned. About 50 scientists and technicians from participants NARS would benefit from the training.

Seven In-service training areas for cowpea improvement and production were identified. Four sessions are planned. About 45 participants in the region would benefit from the training.

The Eastern Africa Sorghum and Millet Research Network (EARSAM), includes eight countries in Eastern Africa from Sudan to Tanzania. NARS within EARSAM Network in aggregate have the minimum level of qualified researchers to sustain agricultural development in the region, although eleven out of fourteen Ph.D level researchers are in Sudan. Except for Burundi which has one B.Sc holder, the remaining NARS in the network have 1 to 4 researchers at least at M.Sc. and Ph.D level. There are about 74 research workers for sorghum and millet improvement in the region. Out of this research pool, 45% of them have B.Sc training and 20% have completed Ph.D level training. The remaining have M.Sc. degrees with relatively long experience of research.

Out of the total research pool mentioned above, only seven researchers are working in millet improvement (one Ph.D, 2 M.Sc. and 4 B.Sc.) in Sudan, Kenya and Uganda.

The projected staff development for the EARSAM Network forecasts close to 40 additional researchers (third of them at Ph.D level) during the next decade.

Three areas of training workshop (i.e utilization, striga, and agronomic techniques with emphasis on management of drought stress) are planned. The duration of these courses varies from 1-2 weeks. Each training workshop would be developed and implemented in collaboration with ICRISAT, Institutions of Lead NARS, Universities, ICIPE, CIMMYT. These courses are expected to benefit about fifty participants in the region.

In-Service training courses in three areas (i.e post harvest management, breeding techniques, research apprenticeships) were identified. The content of these courses would be fully developed and implemented in cooperation with Lead NARS institutions, Universities, ICRISAT etc.

TRAINING

The continuous improvement of research skills of NARS technicians and scientists is given high priority. Training requirements between 1992 - 1996 and beyond for different NARS is summarized below : (see tables and annexes for details)

	NETWORKS			
Type of training	W C M A N	R E N A C O	W C A S R N	E A R SAM
Short-term				
a. Training workshop	140	50	200	60
b. In-Service	80	45	30	20
c. In-country training	x	x	x	x
Long-term	115	170	85	40

x to be determined based on each NARS capability or interest to do its own training. In country-training effort is also to forge functional linkages : between researchers and extension agents.

Please note the World Bank projection of research manpower requirement estimate in the region is apparently 30, 50 and 40% higher for maize, cowpea and sorghum respectively.

The plan presumes that support for short-term training to be included within core budget of regular network activities.

The SCO will intensify its efforts to identify long-term training opportunities through bilateral donors support in respective NARS. It will also liaise networks research manpower development activities of different NARS in order to reorient their activities to networks.

At regional level SCO will also solicit support for limited long-term training to narrow research gaps among weak NARS, since some of them lack bilateral aid.

Training costs for both short and long-term were estimated. It varies considerably. At the IARCs such as IITA, total course costs (residence and training fee) is 1000 dollars per month. Short-term training approximates 600 dollars per month at NARS research institutions and higher education.

The estimate for long-term training of funding support was based on costs of 7500 dollars/year in African Universities and 15 - 20,000 dollars/year in American and European Universities.

The plan also points out the need to influence certain African Universities particularily, Faculties of Agriculture to reorganize and reorient their training programs both at undergraduate and graduate level

The identification and collaboration with certain universities and Faculties of Agriculture to implement short and long-term training would be emphasized. Progress is already made towards this effort. For example, the West African Farming System Research Network (WAFSRN) is already cooperating with University of Dshang in Cameroon to offer regularly Farming Systems courses in alternate years in French and English.

2.0 NARS RESEARCH CAPABILITY ISSUE

Many of the SAFGRAD member countries in the region had established agronomic research within their national programs. Many of the research programs are weak. Furthermore, the effectiveness of the few strong ones is highly constrained. At the national level, the lack of effective staff management and career development policies, combined with inadequate of research operating funds, resulted in a disruption of even well designed research programs and failure in building an effective indigenous national research capacity and extension system.

The network approach and support could not substitute national efforts and development needs. It can, however, facilitate the utilization of available research resources including those of IARCS and NARS. It could (through SCO in a small way) influence NARS research managers to place highly trained returning scientists in their field of research competence.

From technical point of view, networks could make progress and improve research output of NARS if collaborative network research activities started in SAFGRAD Phase II are further strengthened. Two level of research program are elaborated in the plan :

2.1 Network research activities and support to Weak NARS.

First, both short and long-term training opportunities would be biased towards the need of so called Technology Adapting NARS.

Second, an attempt would be made to fill research gaps among weak NARS through regional specialized research teams, comprised of NARS and IARC scientists.

And third, each network will ensure that weak NARS effectively participate in the evaluation of regional elite material.

2.2 Networks collaborative research Activities at Lead NARS Centers.

The thrust of the research activities are outlined in tables 1, 2 and 3.

Research at Lead NARS Centers is to focus on priority constraints in certain ecological zones. Focussed research on specific research themes could speed up the process of resolving food production problems of regional importance. The research of Lead NARS Centers will be linked to associate NARS i.e cooperating NARS Centers to intensify the evaluation and validation of results. The acceptance of research responsibility by relatively strong NARS to provide leadership in specific areas and eventual sharing of research results is a positive trend. Collaborative research at each Lead NARS would be strengthened to concurrently enhance NARS leadership as future technological base for networking. In this regards, IARCs' continuous technical support is vital and it is of long-term activity. Based on experience gained during the last years, it is now apparent that technology generation and evaluation of NARS capabilities could be enhanced if the networks and IARCs institutionalize the following common scheme :

ACTIVITY	RESPONSIBILITY
a) Technology Generation - Development of broad germplasm for different environmental and biotic stresses and economic uses	IARCs with involvement of Lead NARS at research conception, planning, etc.

b) Screening and evaluation of elite germplasm selected against assigned stresses (i.e Striga, drought, disease, insects etc) and for special purposes or economic use.	Lead NARS as indicated in Tables 1, 2, 3 Continuous interaction of IARCs and other cooperating NARS
c) Regional Trials - would be mainly organized with entries from lead NARS centers	Network workshops and Steering Committee IARCs would assist in improving research skills and data analyses of weak NARS
d) Validation and verification through agronomic trials of the suitability of cultivars to specific local conditions	National research and extension programs of participating countries. Respective networks will monitor how much of network technology have reach farmers.

For example, RENACO and IITA have formalized the above mentioned scheme. Some of the advantages of the scheme are :

- It will enable IARCS and other agencies to streamline the various nursery trials and regional elite variety trials being channeled to NARS. This will enable particularly weak NARS to concentrate their efforts on adaptive purposeful research, thus they would not waste resources in every type of nursery trial currently being distributed.

- IARCs and other agencies can work very closely with Lead NARS which relatively has the critical research manpower and capability to screen germplasm in their assigned stress factors (disease, insects, drought, striga, etc) and then each commodity network could prepare the outstanding germplasm that it could evaluate at regional level. This joint effort of IARCs and networks could enhance the transformation of research capabilities to NARS.

3.0 STRENGTHENING AGRONOMIC RESEARCH OF NETWORKS

The network research activities are biased towards plant breeding. Agronomic research to evaluate improved varieties under different environmental and biotic stress was not intensified due to lack of funds. SAFGRAD, through funding support of the African Development Bank would be facilitating agronomic and on-farm research of networks. The main purpose of the project is to speed up the process of transforming of research results into extension recommendations and production. Now the funding support from African Development Bank is made available to SAFGRAD, technical aspects of the program will be finalized during the Agronomic Research Planning Workshop scheduled to take place in February 1990. The support is expected to continue throughout the next phase of SAFGRAD. Regular activities of networks such as workshops, monitoring tours and regional trials would be continued.

4.0 SAFGRAD COORDINATION OFFICE SERVING AS SECRETARIAT TO OTHER NETWORKS

4.1 THE WEST AFRICAN FARMING SYSTEM RESEARCH NETWORK

Second Phase of WAFSRN (1990-1992) is supported through the IDRC, Canada. The Ford Foundation and the French cooperation for development are also supporting certain activities of the network. Its major program also complements or supports the activities of the other SAFGRAD networks. Its program of activities include :

- Creation of scientific and technical information data base or system in order to facilitate the dissemination of FSR and other related information.
- Annual publication of programme of research and researchersin FSR throughout West Africa.
- Annual bibliographies in FSR
- Publication of an Agricultural Scientific Journal to facilitate communication among researchers.
- Training in FSR in cooperation with University Dschang in Cameroon, CIRAD, IITA, the Cameroon Agricultural Research Institute and the University of Florida.

- Organization of workshops
- Collaborative research in FSR to be elaborated sometimes in 1990.

4.2 AGROFORESTRY RESEARCH NETWORK IN SAHELIAN COUNTRIES.

The International Council for research in Agroforestry (ICRAF) currently is engaged in discussion with SCO and at SAFGRAD OAU/STRC - to base its coordinating activities for Agroforestry Research network for the Sahelian countries. The arrangement is expected to be similar to that of WAFSRN.

4.3 The West and Central Africa Millet Research network has requested SAFGRAD to facilitated its activities. SCO has already started to attend the Steering committees of this network.

4.4 THE EAST AND SOUTHERN AFRICA FARMING SYSTEM RESEARCH NETWORK:

In cooperation with SACCAR, CIMMYT, and ILCA, SCO would facilitate the formal organization of this network similar to WAFSRN to be based with EARSAM at OAU facilitaties in Nairobi.

5.0 INTERNETWORKS COMMUNICATION

SAFGRAD networks have encouraged SCO to upgrade its capacity for timely publication of various aspect of network activities. It was suggested that SAFGRAD Newsletter be distributed to various NARS institutions universities research stations, and libraries. The SCO is handicaped due to shortage of staff in this area. SAFGRAD and WAFSRN are planning to improve their respective documentation units. SCO would solicit donor support for an English or French language editor to complement WAFSRN effort.

6.0 ADDRESSING AGRICULTURAL POLICY ISSUES

The need to address agricultural research and development issues was stressed by entities of SAFGRAD (NARS Directors, networks etc).

SAFGRAD as an agency of the OAU could actively promote discussion on agricultural policy issues in order to influence member countries to allocate more resources. In cooperation with various agencies such as ISNAR and IFPRI SAFGRAD would elaborate the issues for Africa wide conference on Agricultural Research policy issues at OAU Ministerial level.

7.0 ASSOCIATION AMONG SEMI-ARID AGRICULTURAL EXPERIMENT STATIONS

The national research stations, already located in different locations of semi-arid ecological zones, have the potential to develop technologies for wider adoption.

The overall objective is to improve the research output of these experiment stations and strengthen cooperative research activities throughout joint projects. Improvement of the management of Agricultural Experiment Stations and networking could lead to strong regional cooperative research activities. Establishing good research working relationships among National Agricultural Experiment Stations could help to :

a) Effective utilization of resources among Agricultural Experiment Stations to fill research gaps or share the services of expensive research equipments that may be available in few of the national research stations.

b) Organize a general conference of Agricultural Experiment Station Directors every three years to promote research cooperation the improvement of experiment station management through specialized workshops and training for research administrators (in cooperation with IITA, ISNAR, CIMMYT, Government agencies).

c) Among NARS facilitate the exchange of research scientists with specialized skills.

d) Promote multidisciplinary research teams consisting of highly qualified scientists from different research stations.

III. THE TRANSFER OF NETWORK LEADERSHIP AND MANAGEMENT TO NARS

At the moment the networks on maize and cowpea are managed in collaboration with IITA and those of sorghum and millet with ICRISAT. The fifth, the West African Farming Systems Research Network (RESPAO) is managed entirely by the SAFGRAD Coordination Office (SCO). It should be noted that four of the network Coordinators are staff of the IARCs. Four of the networks cover West and Central Africa and the sorghum and millet network EARSAM covers East Africa.

The organization and functioning of the above networks has gained momentum. What remains is how their coordination and management can be transferred to the NARS.

1.0 NARS TO SERVE AS NETWORK TECHNOLOGICAL BASE

Networking interests its participating NARS when the continuous flow of relevant technology among NARS is sustained. This can be ensured if some of the Lead NARS centers develop capabilities to serve as technological base for networking. In this respect, IARCs priority is for long-term technical backstopping. It requires a time frame to be worked out in order to make a smooth transfer of the network management to NARS. An important issue remains to be resolved some time in the future on how the IARCs will continue to support networks technically once they are relieved of their present network management responsibility.

2.0 INSTITUTIONALIZATION OF NETWORKS

Institutionalization of network activities among NARS is an important aspect of realizing networks management and leadership by NARS. It depends on the extent to which participating NARS, Governments and Institutions are ready to commit resources i.e manpower, funds etc for networking in resolving their common problems of food production. One school of thought advocates (at an approximate stage of network development) formal institutional agreements among governments of participating NARS to formalize the activities of networks. This approach may even lead to resource contributions for the operation of networks. But this will require long-term framework. The perception of another school of thought is not to make networks formal or structured entities. It should be guided by an informal association of scientists and institutions, such as the current situation, where the legal framework of the five SAFGRAD networks is provided through SCO under the umbrella of OAU/STRC.

3.0 POSSIBLE SCENARIOS FOR TRANSFER OF NETWORK COORDINATION TO NARS

During the last three years, the positive trend of network development has been to consider networking not necessarily as an avenue for more resources but as mechanism to promote collaborative research, improvement of research skills and exchange of relevant technologies. With regard to turning over network coordination to NARS, the following scenarios are being studied from technical and financial point of view.

i. It is recommended that transfer of network management to NARS should be facilitated by hiring a qualified coordinator from the NARS as an OAU/SAFGRAD staff. It is envisaged that this will act as a linkage between the OAU/SAFGRAD Coordinating office and the NARS. Secondly, with secondment of this coordinator to IARCs it is believed it will continue to strengthen the linkage between IARCs, i.e ICRISAT and IITA with NARS.

   It is proposed that the coordinator be recruited during initial two years of SAFGRAD Phase III. It is suggested that funds for the Networking Coordinating Unit be lodged in the SCO and made available to the Coordinator as needed.

ii. Selection of a NARS scientist to serve as a network Coordinator but who would remain and be working from his home country (station). In this case, an agreement would be signed between OUA/STRC SAFGRAD and the host country to guarantee autonomy in the regional scope of Coordinator's activities. Also, technical backstopping would have to be ensured by relevant IARCs. SCO would provide the legal, administrative and financial services.

iii. A transfer of the African network Coordinators from the IARCs to the SCO and the network funds to a SAFGRAD account. Such staff would then become staff of the SCO.

iv. Direct recruitment of a qualified NARS scientist to serve as Coordinator through SAFGRAD (the case of RESPAO)

v. Selection of one or two NARS scientists to work with and understudy any of the present network Coordinators during a transitional period of one year.

vi. To ensure smooth transition of network management to NARS, it is also suggested that present arrangement should continue at least during SAFGRAD III. This could give more time for NARS to strengthen their technological base for networking.

4.0 NETWORK ENTITIES RELATIONSHIP

During the initial years of SAFGRAD III, it is important to streamline the administrative and technical entities of networks by redefining their respective roles. The network entities within NARS driven model may have the following functional relationship :

The Council of NARS Directors - same role as during SAFGRAD II. As more resources to networking would be committed by participating NARS, the Council may redefine its role. The same applies to the Oversight Committee.

4.1 NARS - Lead NARS Centres are expected to serve as technological base for networking with backstopping from respective IARCs.

4.2 Steering Committees of respective networks

Current role of technical management of networks would continue.

4.3 IARCs - are expected to continue to provide leadership in the generation of technology for maize and cowpea networks (IITA) and for the sorghum and millet research networks (ICRISAT). Strong linkages of NARS technological base (i.e Lead NARS) with IARCs is vital and of a long-term activity. Liaison scientists of the IARCs are expected to work very closely with NARS network coordinators and also participate in the Steering Committee meetings of respective networks.
The IARCS current coordinating and managing role is expected to be gradually assumed by NARS.

4.4 The SCO - Will continue to serve as Secretariat for all network activities. It provides the legal and political frame for SAFGRAD networks. In addition to its current role defined by NARS Directors, it could play increased administrative and financial management roles for networks. It will continue to provide various services that will enhance the technical development of networks.
In the medium-term, the SCO is expected to further evolve as follows :

- Simplified administrative structure with broad flexibility and a highly service-oriented set up.

- Appropriate mix of few innovative and dynamic professional and technical staff.

- Adequate technical back-up support for planning, project development and coordination of collaborative research among NARS, to monitor the implementation of network plans and effectively work with coordinators.

- Ability to provide efficient administrative and financial services as well as soliciting funds for networking.

- Computerized communication services to efficiently facilitate the exchange of technical information and dissemination of research results.

- To facilitate NARS efforts in the identification and development of manpower needs in food grain research and then make information available to prospective donors.

OAU SUPPORT TO SAFGRAD

OAU agreements with member countries will continue to facilitate functioning of networks. Further steps were taken by OAU/STRC-Lagos office and the Oversight Committee to step up OAU involvements and contributions to SCO. OAU has taken keen interest in research and development issues related to SAFGRAD activities.

As soon as network projects are completed, OAU has plans in 1990 to call donors meeting to raise funds for SAFGRAD activities. A special document reflecting SAFGRAD project technical achievements, donors funding during the last decade and as well as trends of future activities was prepared by OAU/STRC-Lagos office to brief Council of Ministers of OAU that will take place in February 1990.

ESTIMATE OF RESOURCE REQUIREMENTS

Through the respective steering committees, the networks gained experience for analysis and preparation of budgetary needs for network activities. Some of the networks have prepared project and estimated financial requirements to supplement current network activities. This has been submitted to SPAAR by the IARCs. Furthermore, the networks have requested the SCO to pursue soliciting of funds. As the result, the network planning sub-groups have developed budget estimates for core network operations and supplemental funding support to participating NARS. For core network operation, cost for collaborative research, short-term training, coordination activities, workshops, monitoring tours, steering committee meetings etc, is estimated. The projected funding requirement for each network during the five year period varies from 2,3 to 2,9 million dollars.

TABLE 1. WEST AND CENTRAL AFRICA MAIZE RESEARCH NETWORK.

NARS Lead Centers and Research Responsibilities — Critical Level of Research Manpower Requireme (1992-1996).

	CUR	BR	Ag	ENT	PATH	PHS	UT	AE
i) CAMEROON:	17							1
Screening cultivars suitable to Sudan and Sahel Savannah with emphasis on:								
. Drought		1				1		
. Striga			1					
. Early maturity								
ii) COTE D'IVOIRE	2							1
Screening cultivars suitable to North. Guinea and Sudan Savannah with emphasis to Borer Resistance		1	1	1				
iii) BURKINA FASO.	6							1
Developing Extra-Early var.for Sudan Savannah with emphasis on Drought stress			1		1	1		
iv) GHANA.	10							1
Var. for N. Guinea Savannah				1	1			
v) TOGO.	8							
Site:N.Guinea Savannah and Sudan Savannah streak resistant		1	2	2	1	1	1	1
TOTAL	43	3	5	4	3	3	1	5

CUR = Current
BR = Breeding
Ag = Agronomy
PHYS = Physiology
PATH = Pathology
UT = Utilization
AE = Agr. Economics

* Remarks on current research manpower situation at Lead NARS.

CAMEROON:

7 Breeders two at B.Sc. level, three at M.Sc. level and two at Ph.D. level for humid, sub-humid and semi-arid ecological zones. One full time breeder at M.Sc. level for semi-arid zones.

4 Agronomists, two at M.Sc. level and two at Ph.D. level part-time also working on other crops.
1 Entomologist at M.Sc. level or equivalent (part-time)
1 Pathologist at M.Sc. equivalent (part-time)
4 Agr. Economists - two at M.Sc. level, one at B.Sc. and Ph.D. level (part-time)
1 Virologist - (part-time).

COTE D'IVOIRE:

One breeder at Ph.D. level
One Agronomist at M.Sc. level.

BURKINA FASO:

2 Breeders at B.Sc. and M.Sc. level
1 Agronomist at M.Sc. equivalent
2 Entomologists at Ph.D. equivalent (part-time)
1 Virologist - at Ph.D. level - part-time.

GHANA:

4 Breeders three at Ph.D. level and one at M.Sc. for humid, sub-humid and semi-arid ecological zones.
4 Agronomists at M.Sc. level working on different crops.
1 Entomologist at Ph.D. level (part-time)
1 Seed production specialist at M.Sc. level.

TABLE 2. WEST AND CENTRAL AFRICA SORGHUM RESEARCH NETWORK.

NARS Lead Centers Areas of Research Responsibilities		Critical level of Research Manpower Requirements. (1992-1996).								
		CUR	BR	Ag.	ENT	PATH	PHYS	UT	AE	Oth
i)	CAMEROON Screening resistant cultivars to Striga for Sudan and Sahel Savannas	2(3+)*	1	1			1			
ii)	NIGERIA Screening and developing cultivars resist to stem borer and identifying varieties suitable for industrial use in the North-Guinea and Sudan Savanna Zones	10*	1	1	1	-		1		
iii)	MALI Screening cultivars resist. to panicle insects and drought in Sudan Savanna zone	8*	1	1	2		1			
iv)	BURKINA FASO Developing cultivars resist. to various leaf diseases in North Guinea and Sudan Savanna zones	5(2+)*		1		2				
v)	NIGER Screening cultivars resistant to smut diseases and research to improve grain quality.	6(3+)*	1	1		1		1		
	TOTAL	31(8+)*	7	4	3	3	2	2	0	

BR = Breeding
Ag = Agronomy
PHYS = Physiology
AE = Agr. Economics
ENT = Entomology
PATH = Pathology
UT = Utilization

* Remarks on current research manpower situations at Lead NARS.

CAMEROON:

2 Breeders one at M.Sc. level and the second at B.Sc. level currently on training.
1 Agronomist at M.Sc. level (Part-time)
1 Entomologist at B.Sc. level (part-time) and one of them on training.
1 Pathologist on training for M.Sc.

NIGERIA: non on training.

2 Breeders at M.Sc. and Ph.D. level
5 Agronomists - 3 at M.Sc. level and 2 at Ph.D. level (part-time)
1 Entomologist at Ph.D. level (part-time)
2 Pathologists at M.Sc. and Ph.D. level (part-time).

MALI:

2 Breeders at M.Sc. equivalent
1 Agronomist at Ph.D. level (part-time)
3 Agronomist at B.Sc. equivalent (part-time)
1 Entomologist at Ph.D. level equivalent (part-time working on all food grains)
1 Pathologist at M.Sc. equivalent (part-time on all crops).

BURKINA FASO:

1 Breeder at Ph.D. level (part-time)
1 B.Sc. breeder
1 B.Sc. agronomist
2 Agronomist on training for Ph.D. level equivalent training
1 Entomologist at Ph.D. level or equivalent training (part-time)
1 Pathologist at M.Sc. level or Equivalent (part-time).

NIGER:

2 Breeders one at M.Sc. level and one on training
2 Agronomist at M.Sc. equivalent training (part-time)
2 M.Sc. entomologist - one at M.Sc. equivalent and one on training towards M.Sc.
3 Pathologist at M.Sc. equivalent and (part-time) one of them on training.

TABLE 3. WEST AND CENTRAL AFRICA COWPEA NETWORK

NARS Lead Centers Area of Research Responsibilities — Critical Level Research Manpower Requirements (1992-1996).

	CUR	BR	Ag	ENT	PATH	PHYS	UT	AE
i) BURKINA FASO:	5*							
Screening for Sudan and Sahel zones								
. Drought		1						
. Striga			1			1		
. Insects				1			1	
. Diseases					1			
ii) CAMEROON:	3*							
Screening and developing cultivars to Sudan and Sahel zones with emphasis on:								
. Storage and post harvest technology		1		1				
. Adoption-Agronomic practices			1					
iii) NIGER:	7*							
Screening and developing cultivars to Sudan and Sahelian zones:								
. Drought		1				1		
. Striga		1	1					
. Insects				1				
. Diseases					1			
iv) NIGERIA:	11*							
Developing varieties for adaptation to N. Guinea, Sudan and Sahel Savanna zones with emphasis on stresses:								
. Striga		1				1		
. Variety		1						
. Insects				1				
. Diseases					1			

BR = Breeding
Ag. = Agronomy
PHYS = Physiology
ENT = Entomology
PATH = Pathology
UT = Utilization
AE = Agr. Economics
CUR = Current

	CUR	BR	Ag	ENT	PATH	PHS	UT	AE
vi) SENEGAL:	6*							
Screening cultivars for adaptation to Sahel and Sudan Savanna with emphasis on stresses:								
. Drought		1						
. Variety		1						
. Insects				1				
. Striga						1		
. Diseases					1			
vii) GHANA	9*							
Screening and development of cultivars to North.Guinea Savanna zone with emphasis on stresses:								
. Storage pests								
. Diseases					1			
. Striga						1		
TOTAL	41	8	3	5	5	5		

* Remarks on current level Research Manpower.

BURKINA FASO.
- 1 Breeder at B.Sc. level
- 1 Agronomist at B.Sc. level
- 1 Entomologist at Ph.D. level
- 2 Pathologists - part-time.

CAMEROON.
- 1 B.Sc. Breeder
- 1 B.Sc. Agronomist
- 1 M.Sc. Entomologist.

NIGER.
- 1 Breeder at B.Sc. level
- 1 Agronomist at B.Sc. level
- 1 Entomologist at Ph.D. level
- 1 Pathologist at Ph.D. level
- 1 Weed scientist at M.Sc. level

NIGERIA.

1 Breeder at M.Sc. level
3 Agronomists two at Ph.D. level and one at M.Sc. level
2 Entomologist - one at B.Sc. and one at Ph.D. level
2 Pathologists at Ph.D. and M.Sc. level
2 Weed science at Ph.D. and M.Sc. level
1 Soils microbiology at Ph.D. level.

SENEGAL.

1 Breeder at M.Sc. level
1 Agronomist at Ph.D. level
1 Entomology at Ph.D. level
1 Pathologist at Ph.D. level
1 Microbiologist at Ph.D. level.

Table 4 Current level of manpower in EARSAM (Revised Oct. 1989)

Country	PhD		MSc		BSc		Total
	Sorghum	(Millets)	(Sor.)	(Mill)	(Sor.)	(Mill.)	
Burundi	0	NI	0	NI	1(B)	NI	1
Ethiopia	1(B)	0	1(A) 2(P) 1(B)*	0	4(B) 1(A) 1(E) 1(U)*	0	12
Kenya	0	0	1(B)* 2(P)*	1(B)	3(B)* 1(A)	1(B) 1(G)	10
Rwanda	0	NI	2(P)	NI	1(B)	NI	3
Somalia	0	NI	3(B) 1(FS) 3(A) 1(S) 1(E)*	NI	2(B) 3(E)** NI 2(A) 1(P)* 1(S)		18
Sudan	2(B) 1(A) 3(P) 3(U) 1(E)	1(B)	0	0	1(B) 2(P)	0	14
Tanzania	1(A) 1(P)	0	1(B)* 1(E)*	0	1(B)* 1(E)* 1(P)*	1(B)	8
Uganda	0	0	1(A)1(B)* 1(U) 1(P)* 1(G)	1(B)	1(B) 1(E)	1(B)	8
Total	13	1	24 2		30	4	74

Note: * on training
(G) Germplasm
(B) Breeder
(A) Agronomist

** one on training
(E) Entomologist
(U) Utilization
(P) Pathologist

(FS) Farming system
(S) Soils

NI - Not required

Source - EARSAM reports

Table 5. Current and required manpower in eastern Africa (1991 to 1995)

Country	Current levels (PhD)	(MSc)	(BSc)	Additional required (PhD)	(MSc)
Burundi	0	0	1	1	1
Ethiopia	1	4	7	3	5
Kenya	0	4	6	2	5
Rwanda	0	2	1	1	1
Somalia	0	9	9	7	4
Sudan	11	0	3	5	5
Tanzania	2	2	4	2	5
Uganda	0	5	3	3	3
Total	14	26	34	24	29

Source - EARSAM reports

ANNEXE 1.

Current and Projected Manpower Requirement for Maize Network of West and Central Africa, 1992-96

Country	Discipline	M.Sc Years 0	1	2	3	4	5	Ph.D Years 0	1	2	3	4	5
BENIN	Breeder	1	-	-	-	-	-	-	1	-	-	-	1
	Agronomist	1	-	-	-	-	-	-	1	-	-	-	-
	Entomologist	1	-	-	-	-	-	1	-	-	-	-	-
	Pathologist	1	-	-	-	-	-	-	-	1	-	-	-
	Economist	1	-	-	-	-	-	-	-	-	-	-	-
	Seed Production	1	-	-	-	-	-	-	-	-	-	-	-
	Food technology	1	-	-	-	-	-	-	-	-	-	-	-
BURKINA FASO	Breeder	1	1	-	-	-	-	-	-	-	-	1	-
	Agronomist	1	1	-	-	-	-	-	-	-	1	-	-
	Entomologist	-	-	-	-	-	-	2	-	-	-	-	-
	Pathologist	-	1	-	-	-	-	-	-	-	-	-	-
	Seed Production	-	1	-	-	-	-	-	-	-	-	-	-
	Virologist	1	-	-	-	-	-	-	1	-	-	-	-
CAPE VERDE	Breeder	-	1	-	-	-	-	-	-	-	-	-	-
	Agronomist	-	-	-	1	-	-	-	-	-	-	-	-
	Entomologist	-	-	-	-	1	-	-	-	-	-	-	-
	Pathologist	-	-	1	-	-	-	-	-	-	-	-	-
	Seed Production	-	-	1	-	-	-	-	-	-	-	-	-
CENTRAL AFRICAN REPUBLIC	Breeder	-	1	-	-	-	-	-	-	-	-	-	-
	Agronomist	-	-	-	1	-	-	-	-	-	-	-	-
	Entomologist	1	-	-	-	-	-	-	-	-	-	-	-
	Pathologist	-	-	1	-	-	-	-	-	-	-	-	-
	Seed production	-	-	-	1	-	-	-	-	-	-	-	-
CAMEROON	Breeder	3	-	-	-	-	-	2	-	-	1	-	1
	Agronomist	2	-	-	-	-	-	2	-	1	-	-	-
	Entomologist	1	-	-	-	-	-	-	1	-	-	-	-
	Pathologist	1	-	-	-	-	-	-	1	-	-	-	-
	Economist	2	-	-	-	-	-	-	-	-	-	-	-
	Seed Production	-	-	1	-	-	-	-	-	-	-	-	-
	Food technologist	-	1	-	-	-	-	-	-	-	-	-	-
	Virologist	-	-	-	-	-	-	1	-	-	-	-	-

ANNEX 1 - CONTINUED

Country	Discipline	M.Sc Years 0	1	2	3	4	5	Ph.D Years 0	1	2	3	4	5
COTE D'IVOIRE	Breeder	-	-	-	-	-	-	1	-	1	-	-	-
	Agronomist	1	-	-	-	-	-	-	1	-	-	-	-
	Entomologist	-	-	-	-	1	-	-	1	-	-	-	-
	Pathologist	-	-	-	-	-	-	-	-	-	1	-	-
	Economist	-	-	-	-	-	-	-	-	1	-	-	-
	Seed production	-	1	-	-	-	-	-	-	-	-	-	-
	Food technologist	-	-	-	-	-	-	-	-	1	-	-	-
GHANA	Breeder	1	-	-	-	-	-	3	-	-	-	-	-
	Agronomist	4	-	-	-	-	-	1	-	-	-	-	-
	Entomologist	-	1	-	-	-	-	1	-	-	-	-	-
	Economist	-	-	1	-	-	-	-	-	-	-	-	-
	Pathologist	-	-	-	-	-	-	-	-	-	-	1	-
	Seed Production	1	-	-	-	-	-	-	1	-	-	-	-
	Food Technology	-	-	1	-	-	-	-	-	-	-	-	-
GUINEA CONAKRY	Breeder	-	-	-	-	-	-	-	1	-	-	-	-
	Agronomist	-	-	-	-	-	-	-	-	-	-	1	-
	Entomologist	-	-	1	-	-	-	-	-	-	-	-	-
	Pathologist	-	1	-	-	-	-	-	-	-	-	-	-
	Seed Production	-	-	-	-	-	-	-	-	-	-	-	-
	Economist	-	-	1	-	-	-	-	-	-	-	-	-
GUINEA BISSAU	Breeder	-	-	-	-	-	-	1	-	-	-	-	-
	Agronomist	-	1	-	-	-	-	-	-	-	-	1	-
	Entomologist	-	-	1	-	-	-	-	-	-	-	-	-
	Pathologist	-	-	-	-	-	-	-	-	-	1	-	-
	Seed Production	-	-	1	-	-	-	-	-	-	-	-	-
	Economist	-	-	1	-	-	-	-	-	-	-	-	-

ANNEX 1 - CONTINUED

Country	Discipline	M.Sc Years 0	1	2	3	4	5	Ph.D Years 0	1	2	3	4	5
NIGERIA	Breeder	-	-	-	-	-	-	3	-	-	-	-	-
	Agronomist	7	-	-	-	-	-	3	-	-	-	-	-
	Entomologist	-	-	-	-	-	-	2	-	-	-	-	-
	Economist	-	-	-	-	-	-	3	-	-	-	-	-
	Pathologist	1	-	-	-	-	-	-	1	-	-	-	-
	Seed Production	-	-	-	-	-	-	-	1	-	-	-	-
	Food Technology	-	-	-	-	-	-	-	1	-	-	-	-
SENEGAL	Breeder	1	-	-	1	-	-	-	-	1	-	-	-
	Agronomist	-	1	-	1	-	-	-	-	-	-	1	-
	Entomologist	-	-	-	-	-	-	-	-	-	1	-	-
	Pathologist	-	1	-	-	-	-	-	-	-	-	-	-
	Economist	-	-	-	-	1	-	-	-	-	-	-	-
	Seed Production	-	-	-	1	-	-	-	-	-	-	-	-
TCHAD	Breeder	-	-	-	-	-	-	-	1	-	-	-	-
	Agronomist	-	-	-	-	1	-	-	-	1	-	-	-
	Entomologist	-	-	1	-	-	-	-	-	-	-	-	1
	Pathologist	-	1	-	-	-	-	-	-	-	-	1	-
	Economist	-	-	-	1	-	-	-	-	-	-	-	-
	Seed production	-	-	1	-	-	-	-	-	-	-	-	-
	Food Technology	-	-	-	1	-	-	-	-	-	-	-	-
TOGO	Breeder	-	-	-	-	-	-	1	-	-	-	1	-
	Agronomist	2	-	-	-	-	-	-	1	-	-	-	-
	Entomologist	2	-	-	-	-	-	1	1	-	-	-	-
	Pathologist	-	1	-	-	-	-	1	-	-	-	-	-
	Economist	1	-	-	-	-	-	-	-	-	-	-	-
	Food Technologist		1	-	-	-	1	-	-	-	-	-	-
	Seed Production	1	-	-	-	-	-	-	-	-	-	-	-
	Virologist	-	-	-	-	-	-	1	-	1	-	-	-

Country	Discipline	M.Sc Years 0	1	2	3	4	5	Ph.D Years 0	1	2	3	4	5
	Breeder	1	1	-	-	-	-	-	-	-	-	1	-
	Agronomist	1	-	-	-	1	-	-	1	-	-	-	-
	Entomologist	-	-	1	-	-	-	1	-	-	-	-	-
AMBIA	Pathologist	-	1	-	-	-	-	-	-	-	-	-	-
	Economist	-	-	-	-	-	-	-	-	1	-	-	-
	Food Technologist	-	-	-	-	-	-	-	-	-	-	-	1
	Seed Production	-	-	1	-	-	-	-	-	-	-	-	1
	Breeder	-	1	-	-	-	-	-	-	-	-	-	-
	Agronomist	1	-	-	1	-	-	-	-	1	-	-	-
ALI	Entomologist	1	-	-	-	-	-	-	1	-	-	-	-
	Pathologist	-	1	-	-	-	-	-	-	-	-	-	-
	Seed Production	-	1	-	-	-	-	-	-	-	-	-	-
	Food Technology	1	-	-	-	-	-	-	-	-	1	-	-
	Breeder	1	-	-	-	-	-	-	1	-	-	-	-
	Agronomist	1	-	-	-	-	-	-	-	-	1	-	-
	Entomologist	-	-	1	-	-	-	-	-	-	-	-	-
	Pathologist	-	1	-	-	-	-	-	-	-	-	-	-
	Economist	-	-	-	1	-	-	-	-	-	-	-	-
RITANIA	Seed Production	1	-	-	-	-	-	-	-	-	-	-	-
	Food Technology	-	-	1	-	-	-	-	-	-	-	-	-
	Breeder	-	1	-	-	-	-	-	-	-	-	-	-
	Agronomist	-	1	-	-	-	-	-	1	-	-	-	-
	Entomologist	-	-	1	-	-	-	-	-	-	-	-	-
GER	Pathologist	-	-	-	-	-	1	-	-	-	-	-	-
	Seed Production	-	-	1	-	-	-	-	-	-	-	-	-
	Food Technology	-	-	-	1	-	-	-	-	-	-	-	-

COWPEA NETWORK STAFF DEVELOPMENT PLAN FOR WEAK NARS (1992-1996)

Country	Breeding			Agronomy			Entomology			Pathology			Utilisation			Physiology			Weed Science		
	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D
Benin																					
Current	-	-	1	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 1	(1)	-	1	(1)	(2)	-	-	1	-	-	(1)	-	-	-	-	-	-	-	-	(1)	-
Year 2	Same as Year 1																				
Year 3	-	(1)	1	-	(2)	(1)	-	-	(1)	-	(1)	-	-	-	-	-	-	-	-	(1)	(1)
Year 4		(1)	1	-	(2)	(1)	-	-	(1)	-	(1)	-	-	-	-	-	-	-	-	-	-
Year 5	Same as Year 4																				
Côte d'Ivoire																					
Current	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 1	-	-	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 2	(1)	-	-	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 3	(1)	-	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 4	-	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 5	-	(1)	-	-	(1)	(1)	-	-	-		-	-	-	-	-	-	-	-	-	-	-
Gambia																					
Current	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 1	-	-	-	(1)	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 2	(1)	-	-	(1)	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 3	(1)	-	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 4	-	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 5		(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Figures in parenthesis indicate additional manpower needed.

Country	Breeding			Agronomy			Entomology			Pathology			Utilization			Physiology			Weed Science		
	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.SC	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	M.Sc
Guinea Bissau																					
Current	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 1	-		-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 2	(1)	-	-	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 3	(1)	-	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 4	-	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 5	-	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Guinea Conakry																					
Current			-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Year 1	-	-	-	(1)	-	-	-	-	1	(1)	-	-	-	-	-	-	-	-	-	-	-
Year 2	-	-	-	(1)	-	-	-	-	1	(1)	-	-	-	-	-	-	-	-	-	-	-
Year 3	(1)	-	-	-	(1)	-	-	(1)	1	-	(1)	-	-	-	-	-	-	-	-	-	-
Year 4	-	(1)	-	-	(1)	-	-	(1)	1	-	(1)	-	-	-	-	-	-	-	-	-	-
Year 5								Same as Year 4													
Cape Verde																					
Current		-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 1	-	-	-	(1)	(1)	-	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 2	-	-	-	(1)	(1)	-	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 3	(1)	-	-	-	(1)	(1)	-	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-
Year 4								Same as Year 3													
Yeat 5								" "		" "											

Country	Br ng			Agronomy			Entomology			Pathology			Utilization			Physiology			Weed Science		
	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D
Mali																					
Current	1	–	1*	1	–	–	–	1	–	1	–	–	–	1	–	–	–	–	–	–	1*
Year 1	–	(1)	1	–	(1)	–	–	–	(1)	–	(1)	–	–	1	–	–	–	–	–	–	1
Year 2								Same as Year 1													
Year 3		–	–	–	–	(1)	–	–	(1)	–	–	(1)	–	1	–	–	–	–	–	–	1
Year 4	(1)	(1)	1	(1)	(1)	(1)	–	(1)	(1)	–	–	(1)	–	1	–	–	–	–	–	–	1
Year 5								Same as Year 4													
Mauritania																					
Current		1*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 1	–	1	–	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 2	(1)	1	–	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 3	–	(1)	(1)	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 4	–	(1)	(1)	(1)	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 5		(1)	(1)	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Central African Republic																					
Current	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 1	–	–	–	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 2	(1)	–	–	–	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 3	(1)	–	–	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 4	–	(1)	–	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 5	–	(1)	–	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tchad																					
Current	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 1	–	–	–	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 2	(1)	–	–	–	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 3	(1)	–	–	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 4	–	(1)	–	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Year 5	–	(1)	–	–	(1)	(1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Figures in parenthesis indicate additional manpower need .

* On study leave

Country	Breeding			Agronomy			Entomology			Pathology			Utilization			Physiology			Weed Science		
	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.D	B.Sc	M.Sc	Ph.
TOGO																					
Current	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 1	-	-	-	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 2	(1)	-	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 3	(1)	-	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 4	-	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Year 5	-	(1)	-	-	(1)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* On Study leave

Figures in parenthesis indicate additional manpower needed.

ANNEX 3

PROJECTION OF THE STAFF DEVELOPMENT REQUIREMENTS
FOR WEST AND CENTRAL AFRICA SORGHUM RESEARCH NETWORKS
(TECHNOLOGY ADAPTING NARS)

Country	1992 - 1996 M.Sc. Level	1996-2000 Ph.D Level	M.Sc. level
Benin (6)			
Breeder	1	1	2
Agronomist	1		
Entomologist			
Pathologist	1	1	
Food Utilization			
Physiologist			
Gambia (5)			2
Breeder	1	1	
Agronomist	1	1	
Entomologist			
Pathologist	1		
Food Utilization			
Physiologist			
Central African Republic			2
Breeder	1		
Agronomist	1		
Entomologist		1	
Pathologist		1	
Côte d'Ivoire (1)			2
Breeder	1		
Agronomist	1		
Entomologist			
Cape verde (1)			2
Agronomist	1	1	
Ghana (2)			2
Breeder	1		
Agronomist			
Pathologist	1		
Entomologist			
Guinee Conakry (2)			2
Breeder	1		
Agronomist		1	
Pathologist	1		
Entomologist			

	1992-1996 M.Sc. Level	1996-2000 Ph.D Level	M.Sc. Level
Tchad (6)			2
Breeder	1	1	
Agronomist	1		
Pathologist	1	1	
Guinea Bissau (2)			2
Agronomist	1		
Breeder	1		
Pathologist			
Entomologist			
Mauritania (1)			2
Breeder	1		
Agronomist	1		
Pathologist			
Entomologist			
Senegal (2)			2
Breeder	1		
Agronomist	1		
Sierra Leone (1)			2
Breeder	1		
Agronomist	1		
Togo (1)			2
Breeder	1		
Agronomist	1		

Figures in parenthesis indicate current level manpower.

1989-12

PRELIMINARY REPORT ON THE STRATEGIC PLAN OF SAFGRAD NETWORKS

OUA/CSTR-SAFGRAD

OUA/CSTR-SAFGRAD