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Semi-Arid Food Grain Research and Development
Recherche et Developpement des Cultures Vivrières dans les Zones Semi-Arides

FOOD GRAINS COLLABORATIVE RESEARCH NETWORKS*

STRATEGIC PLAN : 1992 - 1996

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I. BACKGROUND

INTRODUCTION

In the semi-arid zones of Africa which constitute the SAFGRAD mandate area, food production has consistently failed to keep pace with the rate of population growth. Traditional food production systems have become grossly inadequate to satisfy the food needs of the increasing rural and urban populations. This zone is the major production area for grain and livestock in Africa. Food grains particularily sorghum, millet, maize, cowpea, etc, constitute over 70% of food produced in the area.

The food crisis situation in sub-Saharan Africa which has assumed alarming proportions in recent times, has been attributed to several causes. Four of the most important being high population growth rates (the highest in the world); lack of technological change, which is leading to stagnation or even decline in crop yields; lack of conducive policy environment to stimulate agricultural production; degradation of the environment, especially drought and low soil fertility, which seriously affected the reliable production of staple food crops.

CONSTRAINTS

Considerations of the constraints to satisfactory food production in the African Semi-Arid Tropics (SAT) have, among other issues, focussed attention on the analysis of the environmental, scientific, and institutional difficulties which are major barriers to rapid and steady production of the principal food crops of this zone, namely the cereals sorghum, millet and maize and the legumes cowpea, groundnuts and Bambara nuts.

The environment of semi-arid Africa is characterised by high temperatures, low, highly variable and unpredictable rainfall patterns, fragile and mostly infertile soils. The area is subjected to serious and continuous degradation as a result of the recent series of droughts enhanced by rapid desertification processes. Rainfall and its distribution are also major critical factors in food production in the region. Average total annual precipitation ranges from 300 mm in the driest areas to 1000 mm in some areas, but throughout the SAT, there are wide seasonal fluctuations and great variations in the intensity of individual rains and intervals between rains. In areas with a higher rainfall, overpopulation leads to heavy cultivation and over-exploitation, which also causes rapid degradation of the fragile resource base.

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Rapid progress to substantially increase the food production capacity of semi-arid African countries can be made by improvements in local production systems developed by scientific research and effectively communicated by national agricultural extension services to the farmers. This has been well emphasized by the OAU Heads of State in the 1980 Lagos Plan of Action (LPA) which states as follows:

- Paragraph 36.

" Science and technology have pivotal role in the development of agriculture, especially in connection with agronomic research, training and extension. Within the context of agronomic research, special emphasis should be placed on improvement of selected seeds, fertilizers, pesticides and other chemicals suitable for African conditions".

- Paragraph 38.

" It is crucial that research findings be made available within minimum delay to the farming community. It is therefore recommended that:

- a closer link be established between research and extension services,

- the extension services should lay more emphasis on the spread of existing technologie".

In the semi-arid zones of Africa there is a shortage of well trained scientists and technologists for effective organisation and execution of agricultural research. In a few instances where trained manpower is available, there is often under-utilisation or misplaced deployment of trained personnel. Expertise in planning, implementing, and evaluating agricultural research is weak and there are hardly any serious links or effective communication between national agricultural research, extension services and the farming population. There is also a very poor coordination of agricultural research within the region and many research efforts are carried out in isolation; this has given room for duplication and overlap of research activities which tend to be counterproductive.

Realizing the recurrent food shortage problems that many member countries faced during the past 25 years, African Governments adopted a series of plans and declarations to stimulate an immediate improvement in the food situation and to lay foundations for the achievements of self-sufficiency in cereals, livestock and fish products. The Lagos Plan of Action (1980) which was closely linked with the regional Food Plan for Africa (1978) set a number of targets, including a growth rate of 4 % per annum for the agricultural sector which, if achieved, would eventually bring about food self-reliance on the continent. Because of constraints mentioned earlier, together with several others not cited here (except in few countries), this target is yet to be achieved.

Almost half of the OAU Member States, particularly those in semi-arid regions, have become increasingly vulnerable to drought stress and dependence on food aid. The Harare Declaration on Food Crisis in Africa, adopted during the 13th FAO Regional Conference for Africa (July 1984), further reaffirmed commitment to the Lagos Plan of Action which provided policy guidelines to alleviate the existing serious food crisis.

Furthermore, the Assembly of African Heads of State and Government adopted, inter alia established a Special Programme of Action for the Improvement of the Food Situation and Rehabilitation of Agriculture in Africa. Concrete proposals, including correcting the inconsistency between the declared objectives of giving high priority to the food and agriculture sector and the official actions, were made in this report. This action is meant to induce agricultural policy changes in African governments in order to gradually increase national resources to agricultural development by 20 to 25 % by 1989. Due to climatic calamaties, lack of productive policy initiatives in many countries, economic difficul-ties and socio-political problems, this policy change is yet to be attained.

It was stressed that the current extent of hunger and malnutrition in Africa calls for resolute actions and for effective mobilization and judicious exploitation of resources on the basis of well formulated development strategies and plans of action that could lead to food self-sufficiency and self-sustained growth and development. The importance of research, training and moving research results to farmers to attain increased food production were duly emphasized by various regional plans and strategies. Unless immediate actions are taken towards improvement in agricultural technology, food production would not keep pace with increasing human populations in the African SAT.

Considerable research efforts need to be oriented towards the needs of the small farmer since over 80% of the working population force is in agriculture. Small farmers are generally at subsistence level, and do not often produce marketable surpluses. In all countries, small farmers predominate in the production of traditional food grains. Technical solutions to on-farm problems and systems approaches are essential ingredients for improving the farm unit. Research and extension service activities need to concentrate on improving traditional systems of production.

A. THE GLOBAL OBJECTIVES AND RATIONALE FOR RESEARCH COORDINATION

The Semi-Arid Food Grain Research and Development (SAFGRAD) Project is sponsored by the Organization of African Unity's Scientific, Technical and Research Commission (OAU/STRC) with the global objective to strengthen the capabilities of National Agricultural Research Systems (NARS) to efficiently execute and manage agricultural research networks for maize, cowpeas, sorghum, millet resource management research etc., through improvement of technical capabilities of NARS scientists and instituions. The exchange of technical information and of research results with broad applicability, has been one of the major thrusts of SAFGRAD.

Rapid growth of human populations and prolonged, severe droughts in recent years have increased international awareness of food problems of the semi-arid zones of Africa. This has prompted a dramatic proliferation of bilateral and multilateral research and development projects for addressing the food problems. SAFGRAD was conceived as a means for regional coordination of research to minimize waste of resources and duplication of efforts.

Specifically, SAFGRAD would aim at more impact from both sub-regional and international cooperation through a stronger focus on key research and development issues. Greater emphasis is to be placed on the rationalization and coordination of agricultural research and development policies on mandated crops at sub-regional and regional levels, better management and coordination of resources including directing it on projects that stimulate growth of indigenous research capability and farmers' initiative for self-sustained and improved production and maintaining regular and constructive dialogue among all parties, especially Africans, so as to make them understand each others perspective and problems.

Although the IARCs have excellent capacities for generating technologies for increasing food production in Africa, their initiative has also dominant role in the establishment of networks for the principal commodities. However there are usually differences between national priorities and those of regional and international agricultural research programmes which could be specific to the involvement of an African Agency such as the coordination, organization and management of collaborative research networks.

The IARCs could not assume the role of bringing together the efforts of NARS and their respective governments to make policy and technological changes. SAFGRAD, research coordinating and technology application promotion capacity, has creditably played this role and will continue to do so under umbrella of OAU, particularly in mobilizing political and financial support to NARS in the years to come.

Weaknesses of national agricultural research and extension programmes and the fragmentation and poor coordination of research activities in Semi-Arid Africa have directly or indirectly affected progress in agricultural development in the region. A multitude of funding and implementing agencies actively operate at national and /or regional levels through bilateral and multilateral agreements. While these activities have positively affected agricultural development, to some extent, they have also increased fragmentation of national research efforts and, to some degree, caused overlap and duplication.

To reverse the unfavourable performance of agricultural research in Africa, there is an urgent need for continued greater and more effective cooperation and coordination among African countries so as to achieve greater individual and collective self-reliance in agricultural research and efficient allocation and utilization of outside assistance to develop agricultural research in the SAT.

The need therefore arises for an African Agricultural Agency like SAFGRAD which would play the vital role of coordinating research and organizing networks among NARS, IARCS and related research and development efforts.

B. TARGET GROUP

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. SAFGRAD's goal is therefore 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. The thrust of SAFGRAD's activities would continue in enhancing suitable packages of technologies not only increase agronomic yields of food grains but also to minimize labour constraints of food production.

The family labour in Africa SAT 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 momen at research and on-farm production levels. Collaborative research effort would be oriented towards the needs of the small farmers who generally operate at subsistence level and do not produce marketable surpluses.

C. THE RESEARCH CAPABILITY PROBLEM

Many of the SAFGRAD member countries in the region had established agronomic research within their national programmes. Many of the research programmes are weak. Furthermore, the effectiveness of the few strong programmes is highly constrained. The weakness of agricultural research in different countries in the region is not due mainly due to lack of experienced researchers in particular and skilled manpower and fund in general, but also to poor and ineffective agricultural research policies at national and sub-regional levels. At the national level, the lack of effective staff management and career development policies, combined with inadequate of research operating funds, had resulted in a disruption of even well designed research programmes and failure in building an effective indigenous national research capacity and extension system.

Several technological options could be made available to NARS in the region from various regional and international research programmes. But technology can only be successfully transmitted within various countries (or beneficiaries), namely to farmers through national agricultural institutions which in turn should have the capability to receive, verify and transfer these technologies. The lack of productive research institutions in most African countries has resulted in dearth of farmer-acceptable improved technologies required to increase agricultural production and productivity. With the exception of few countries in the region, the bulk of NARS cannot afford research strategies based on total individual self-reliance and self-sufficiency in agricultural research.

Improvement of national research capabilities is pre-requisite to enable participating NARS to fully utilize technologies in order to translate research results into extension recommendations and production. Many of the food production problems that limit production cut across national boundaries and are common to parts of different nations of the region.

Technological practices necessary for sustained higher levels of productivity, appropriate to the ecology and culture of the region, must be applied if the necessary rate of advance of agricultural production is to be attained. As reported within the recent West Africa Agricultural Review (1987), financial resources and human talent with required background and training for addressing these problems are limited. A "critical mass" of scientific effort is needed to address them problems effectively.

National agricultural research institutes are often poorly equipped and inadequately funded to accomplish this task.

Bew of the researchers have actual farming experience in semi-arid agriculture. Better ways must be found to make more efficient use of the limited resources of these millions of small farmers. Increasing their productivity is a basic strategy for a regional agricultural development programme. Strengthening the national agricultural research systems of the region is the foundation upon which to build.

SAFGRAD was established to effectively mobilize and coordinate available regional resources, including those of the International Agricultural Research Centres (IARCs) and the National Agricultural Research Systems in order to provide the knowledge base necessary to achieve signficant advances in food grain production (maize, cowpea, sorghum, millet and groundnut).

D. THE SAFGRAD ENVIRONMENT

The SAT region of West and Central Africa in particular could be delineated into the three ecological zones : the Sahel, Sudan and the Northern Guinea Savannas, all of which are characterized by a monomodal rainfall pattern. The different climates and respective food grains of economic importance of these ecological zones are briefly described below.

Ecological zone	Climate and SAFGRAD mandated crops of economic importance
1. The Sahel Savanna	Occurs in all the countries of the sub-region. Rainfall varies from 300 mm/year in the north to 600 mm in the south. This zone has limited surface water resources and a low and poorly distributed rainfall. Particularly in the Sahelian countries, it is an important crop production area (millets, cowpeas, etc). The percentage of crop production from the Sahelian zone ranges from 90% in Mauritania, 47% in Niger, 27% in Mali, 16% in Chad, 14% in Senegal and 3% in Burkina Faso (). The climate of the region is characterized by low temperatures from November to February (10-15%) to over 40°C in April and May. More than 12 million ha of millet of the produced in the region (),

	over 65% is from this ecological zone. The length of the growing season varies from 2 to 3 months. There are two main seasons;the dry season from November to the end of May and the rainy season from June to October. The warm dry winds, the harmattan, dominate the climates from March to June.
2. The Sudan Savanna	It has relatively higher rainfall 600 - 850 mm/year. The pattern of rainfall, although more reliable than Sahelian zone, is occasionally irregular to sustain crop production. This zone accounts for almost 17% of the land area in West and Central Africa. The length of the growing season extends from 3 to 5 months. Rains start in late May or early June. Drought stress is frequent mainly due to the erratic rainfall pattern rather than its acute shortage. Temperature ranges from 15° to 40°C. Sorghum is the major cereal; millet is equally cultivated particularly in the transitional Sudano-Sahelian zone. Maize occupies more than 20% of the cultivated area and its production is on the increase. Cowpea and groundnuts are largely intercropped with the above mentioned cereals.
3. The Northern Guinea Savanna	It has relatively more dependable rainfall: 850-1100 mm/year; it has four to six months of extended rainfall. Soils are largely alfisols and types similar to the Sudanian zone. Maize is the predominant cereal. Sorghum is largely cultivated particularly in the transitional Sudano-Guinea zone of 700 - 900 mm rainfall. Cowpeas and groundnuts are the important pulses usually intercropped with cereals.

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