Promoting the International Collaborative Research in West Africa for the Sustainable Development of Agriculture and Food Security

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ABSTRACT

In Africa, food production over the past 30 years has risen by only 2% per annum. The average percentage per capita food availability is 80-90% of the requirements. With a projected population growth of at least 2.8-3% per annum, agricultural production in Africa would have to grow each year by 4%.

Throughout the continent of Africa, where farming contributes more than 50% of the GDP in most countries, the production of agricultural commodities grew by an average of 1.5% per annum between 1970 and 1980, while the rate of population growth ranged between 2.8 and 3%. Between 1960 and 1980, the degree of self-sufficiency in food in sub-Sahara Africa fell from 98% to 86%. Food imports rose to make up for the deficit, covering 14% of the food needs in 1980 and consisting of 20.4 million tonnes of cereals, to which should be added 1.5 million tonnes of food and aid received in various forms.

In such a context, agricultural development for food security is necessary and requires that international collaborative research be properly understood. If well understood, international collaborative research could then become an asset from which a sustainable agricultural system can be built. To achieve this goal, greater attention will need to be given to the promotion of international collaborative research contexts. As a way of exploiting these issues, this paper explains why collaborative research is important and the role of international collaborative research in Africa. Examples of these activities in some African Countries and a case study related to the NERICA evolution in Guinea are presented to illustrate the critical importance of partnership research contexts. Ways of implementing this in research programs are also presented. Finally, the main challenges facing international collaborative research in West Africa and areas that need further attention in the future will be outlined.

INTRODUCTION

The needs for enough food to insure against hunger and the fear of famine have probably been among the strongest motivating forces in history. The threat of starvation remains a primary concern in many nations even today, including those of Africa. In developing countries, one individual in five is eating under his nutritional requirement. Poverty and famine confine the most deprived people in the world to a miserable existence. Under-nourishment and malnutrition make any work unproductive and compromise the prospects of individuals. These are the causes of undeveloped state and poor security in Africa: without enough food, people cannot work productively (Revue agriculture + développement rural 2002).

As shown in Table 1, the proportion of persons suffering chronic under-alimentation in Africa rose from 38 percent in 1969 to 43 percent in 1992. The absolute number of persons having no access to proper food

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Table 1. Estimations and projections of chronic undernourishment in developing regions

Region/year (average for 3 years)	Total population (millions)	Under undernourished population	
Sub-Sahara Africa			
1969-1971	268	38	103
1979-1981	357	41	148
1990-1992	500	43	215
2010	874	30	264
Near East and North Africa			
1969-1971	178	27	48
1979-1981	233	12	27
1990-1992	317	12	37
2010	513	10	53
East Asia			
1969-1971	1147	41	475
1979-1981	1393	27	378
1990-1992	1665	16	268
2010	2070	6	123
South Asia			
1969-1971	711	33	238
1979-1981	892	34	303
1990-1992	1138	22	255
2010	1617	12	200
Latin America and Caribbean Islands			
1969-1971	279	19	53
1979-1981	354	14	48
1990-1992	443	15	64
2010	593	7	40

Source: FAO (2002)

doubled, rising from 103 to 215 million people during the same period. This situation is explained by the quick demographic increase and the repeated dry seasons in some countries during the 1980s and the early 1990s. Wars and internal conflicts have also contributed to the food security deterioration.

The FAO estimates that about 215 million persons are suffering from chronic under-alimentation in sub-Sahara Africa. And UNICEF (1995) believes that undernourishment contributes to the increased rate of disease and mortality in children; the mortality rate of children under five years old is 40 times higher in sub-Sahara Africa.

AGRICULTURAL PRODUCTION, NUTRITION AND FOOD SUPPLY

With an area of 30.4 million km², Africa is the second largest continent after Asia. Deserts cover 28% of the land area, and unsuitable soils covers 20%. Altogether, 800 million hectares are "potentially arable," but only 215 million hectares are actually cultivated (Grall, 1986).

In spite of making considerable efforts, research and extension are frequently at the end of the priority lists in many African policies. Instead, donors have generally reserved about 40 percent of funds (Pardey, Roseboon and Beintema 1997, reported by World bank 2002). According to a recent study, the mean yield of internal research expenditure stands at about 37 percent (Table 2). The number of research programs and the

Table 2. Internal yield of agronomic research and extension service expenditures by region

Region	Applied research		Extension service	
	Number of studies analyzed	Mean yield (%)	Number of studies analyzed	Mean yield (%)
Africa	44	37	10	27
Asia	120	67	21	47
Latin America	80	47	23	46

mean internal expenditure on research are low compared to those in Asia and Latin America. After rising from $256 million in 1961 to $701 million in 1981, African agricultural research expenditures in the continent fell back to $684 million dollars in 1991.

Furthermore, forestry, livestock and fishery sectors play essential roles in agricultural and economic development in Africa, as well as food security. Economic growth in sub-Sahara Africa (SSA) has been limited by slow agricultural growth, a rapidly increasing population, and degrading natural resources through the last decade. Recognizing that agriculture including crops, livestock, fisheries and forestry will continue to be the engine for economic growth, African leaders have called for African agricultural production to grow at 6% annually through 2020 while improving the natural resource base to support future generations (SPAAR/FARA 2000).

AGRICULTURAL RESEARCH

Agricultural research is important for identifying and providing ways to eliminate constraints to agricultural development and providing a steady flow of technologies adaptable to local conditions in order to improve the productivity of African agriculture food security for the poor. However, national and international research centers are forced to conduct their research activities with constantly decreasing budgets. The Special Program for African Agricultural Research (SPAAR) and the forum for Agricultural Research in Africa (FARA) have developed "Vision for African Agricultural Research (SPAAR/FARA, 2000)" targeting the three long-term goals: food security and poverty alleviation, competitiveness of African agriculture, and the enhancement and sustainability of natural resource base (SPAAR/FARA 2000).

The vision also indicated that in order to achieve desired and laudable goals owned by African countries, it will be required to disseminate and adopt the new technologies generated by CGIAR Centers (IARCs) and advanced research institutes for the promotion of international collaborative research focussed on these issues.

International collaborative research in West Africa

Why do we need international collaborative research?

The original role of collaborative research was to assist African countries to maintain their place in the global scientific and technological effort. Thus, IARCs have a key role to bring the best of science to agricultural research in Africa. The IARCs will also play a catalytic role in encouraging advanced research institutions to collaborate with African partners in technology development, capacity building, technology transfer, and policy research (including research on gender issues).

About African's sub-regional organizations (SROs)

Africa faces major challenges in increasing agricultural productivity to achieve food security, higher

rural incomes, and sustainable economic growth while maintaining and improving the natural resource base. In response to the SPAAR/FARA Vision and the 3rd CGIAR System Review, the CGIAR center Directors Committee convened three meetings with African partners. The series of meetings was characterised by a new atmosphere of partnership and the expectation that that NARS-CGIAR collaboration facilitated by sub-regional agricultural research organisations (SPAAR/FARA 2000) will make the required impacts on African agriculture. The convening role of SPAAR and FARA is expected to provide a regional mechanism for integrating consultation and building up the sub-regional contribution of SCCAR, ASARECA and CORAF. According to an ICRISAT statement: "IARCs in partnership in sub-Sahara Africa expect that, by the year 2020, their role will have contributed to the goals of African agriculture research community of attaining food security and poverty eradication though research, policy support and capacity building based on the environmentally sound management of natural resources"(ICRISAT's Africa Agenda, 2000).

Most regional collaborative networks and programs are carried out by IARCs and advanced research institutions; however, they are not adequately linked to national systems and are not sustainable in the long run at present.

Networks, Programs and Projects Coordinated by SROs

The information obtained from SPAR/FARA plenary session held in 2000 shows the following.

West and Central Africa. CORAF/WECARD (Conseil Ouest et Centre Africain pour la Recherche et le Développement Agricoles / West and Central African Council for Research and Development) is the SRO of West and Central Africa. It supports program planning process and emphasizes a participatory process. Three levels (national, zonal and regional) of consultation were built, and there is a general meeting for approving the portfolio of collaborative programs at the third of those levels.

The collaborative networks, projects and programs include commodity-based programs (44%), livestock (8%), NRM (32%), technology transfer (8%), policy research and analysis (4%), and genetic resources (4%). Most are coordinated by national systems and backstopping by advanced research institutions (SARI), and a few are coordinated and backstopped by IARCs.

Eastern and Central Africa. ASARECA (Association for Strengthening Agricultural Research in Eastern and Central Africa) is the SRO of Eastern Africa. The secretariat has a coordination and fund mobilization mechanism and facilitates a significant number of networks. The networks are jointly operated by the IARCs and NARS partners. They are essential for creating a coalition among key research and development partners. Each network covers a specific commodity or production system. A competitive grant system is a key mechanism for soliciting research proposals and allocating funds to the network activities.

The focal areas are: food and commercial crops (44%), livestock (5.5%), natural resources management (17%), postharvest technology (5.5%), technology transfer (5.5%), information and communication (11%), policy research and analysis (5.5%), and genetic resources (5.5%).

Most collaborative activities are backstopped by IARCs, and a few are backstopped by advanced research institutions. The Eastern and Central Africa Programme for Agricultural Policy analysis (ECAPAPA) is coordinated directly by ASARECA Secretariat.

Southern Africa. In Southern Africa, the main SRO is SACCAR (Southern African Center for Cooperation in Agriculture Research and Training), a sector coordination unit of the Southern Africa Development Community (SADC) for collaborative activities in agricultural research and training. The Government of Botswana manages SACCAR on behalf of the SADC region.

Collaboration in agricultural research and training in Southern Africa is older than that in other sub-regions. SACCAR has 16 networks, projects, and programs including research on commodities, NRM, plant genetic resources conservation, and post-graduate training. The majority are backstopped and managed by IARCs in cooperation with SACCAR and national systems.

Focal areas are: crops livestock (29.4%), NRM (17.6%), agricultural education (11.8%), policy research

and analysis (5.9%), and genetic resources management (5.9%).

Examples of international collaboration

All 16 IARCs and some advanced research institutes and organisations of Europe, Asia and America are carrying out research activities in Africa. It should be noted that all IARCs and institutes are strongly involved with training and information transfer in additions to their research activities and various collaborative arrangements with NARS and regional organisations.

Experts for technical cooperation. Launched by FAO in November 1996 to allow less developed countries to benefit from the experience and expertise of more advanced countries in the framework of the Special Programme for Food Security (SPFS), the South-South Cooperation Scheme continues to gather momentum. The scheme provides a new impetus for cooperation between participating developing countries to improve national food security in low-income and food-deficit countries (LIFDCs) through the rapid improvement of agricultural production and productivity and access to food. Advanced developing countries send experts and field technicians with considerable and practical experience in agricultural and rural development to LIFDCs for two to three years, where they work directly with farmers and technical staffs.

In Senegal, 100 Vietnamese farming experts are already providing technical advices to rural communities and farmers: they are focusing on water management, crop production, small animal production, artisanal fisheries and aquaculture, food and fish processing, beekeeping, and small-scale water control technologies. These are all economically important areas and where South-South cooperation has a particular impact.

Visiting experts from academic and research institutions. For last two years, JIRCAS has sent a researcher to West Africa to seek and discuss a possibility of initiating a new collaborative research program in West Africa. This is a valuable example of collaboration between the North and South research institutions. Japan has made great progress towards self-sufficiency in rice. Guinea has to import 153,000 tons of rice per year to feed its people. Japan and Guinea have similar growing conditions for rice, and Japan can help Guinea develop high-yielding rice varieties and advanced farming techniques.

Possible collaborations between Japan and Guinea cover two areas: adaptation of sustainable rice cultivation and the performance of NERICA varieties under field conditions

Use of retired experts. Under the programme for the use of retired experts, American solar energy expert Hanna Daoud undertook a ten-day tour in Guinea and trained 1,000 people (95% were women) in the use of solar cooking equipment.

Another example is William Stoop from the Netherlands, who contributed to the development of the research and development mechanism and edited the first R/D guide in Guinea.

Young professional program. Within the framework of French international collaboration, young professionals were trained by experts from the CIRAD. Knowledge and details on the use of the geographical information system were transferred to more than 18 trainees.

CASE STUDY: NEW RICE FOR AFRICA (NERICA) IN GUINEA

Demand for rice is growing faster than those for any other major food staple in sub-Sahara Africa. Consumption is increasing across all socio-economic classes, including the poor. These patterns are especially profound in West Africa, where the substitution from course grains and traditional roots and tubers to rice has led to a growth in demand of 5.6% per annum between 1961 and 1992 (roughly double the population growth rate during the same period). As consumption has outstripped production, imports have increased at an annual rate of 8% since 1961. Today imports stand at close to 4 million tons and incur a cost of $1 billion (Beye 1999).

Considering this reality, WARDA has to strengthen sub-Saharan Africa's capability for technology generation and transfer and policy formulation in order to increase the productivity of rice-based farming systems while conserving natural resource bases and contributing to the food security of the poor in rural and urban areas. Enhanced rice productivity and competitiveness are pursued through the diffusion of appropriate rice technologies in rainfed upland and lowland areas. Participatory variety selection (PVS) and community-based seed systems (CBSS) are also emphasised in some African countries.

Aly Condé (2003) reported that seed has occupied a central role in the government's agricultural development strategy in Guinea. In 1997, the extension service (SNPRV) and research institute (IRAG) started an intensive transfer program of NERICA varieties from WARDA in collaboration with the World Bank (the resident mission) and the SPAAR. After two years of experiments (1997 and 1998), farmers selected 5 NERICA varieties (No. 1,2,3,4 and 6) based crop features such as short vegetative periods, good yields with less fertilizer use, good taste, etc. The extension service has been immediately confronted with increasing seed demand. To solve the problem, the extension service and the World Bank collaborated with WARDA to implement a CBSS. From 1999 to 2000, the CBSS was financially supported by the World Bank (through the National Agricultural Services Program) and SG2000. The WARDA technical assistant developed the CBSS approach, and from 1999 to 2001 about 580,180 kg of NERICA seeds were distributed to farmers and sown over 9,659 ha at an average yield of 2 tons per ha.

In 2002, the Ministry of Agriculture and Livestock (MAE) started a new project with the financial support from the Japanese Government through the UNDP program. This six-year project has two phases: a pilot phase (2002 – 2003) and a consolidation phase. The goal is to increase the use of high quality seed, as promulgated in the second agricultural development policy.

The project uses the CBSS approach for a better and rapid NERICA seed diffusion and consists of building up the seed conservation practices and exchange networks to multiply and diffuse seeds of the varieties selected by farmers themselves through PVS. The project covers 20 prefectures and four ecological zones.

Seven elite lines including local standard variety *Samban-Konkon* were evaluated at the Kilissi Research Station. An average yield of 6 new elite lines was 2.491t/ha, more than twice as high as the local variety. NERICA 2 has the highest yield (3.2 t/ha) but has not been adopted extensively because its aroma attracts more rodents. In addition, the vegetative growth period is 90 to 92 days for NERICAs and 141 days for the local variety.

During the dry season of 2002-3, the Kilissi Research Centre and Sérédou Research Centre produced foundation seeds. At the same time, basic seed was produced by 16 farmers' groups and 36 farmer leaders. These farmers are credited for their achievement and are expected to be refunded through in-kind payment by seed. The farmers are allowed to sell remaining seed from March if there is no purchase order. Extension technicians, farmer leaders, and representatives of NGOs and development projects train some farmers in seed production and distribution.

CONCLUSIONS

In summary, international collaborative research in Africa faces the following main challenges:

- Good research with a profitable impact always requires good experience in each research area. A well-organized capacity building program should be developed.
- More technology options should be prepared and made accessible to farmers to increase the productivity of crops, livestock, tree and fish, to improve the sustainability of the natural resource base, to restore soil fertility, and to add values to farm products.
- Natural resource management skills should be developed and provided to farmers.

- More appropriate policies should be implemented to promote and assure research impact and technology adoption at all development levels.
- Access to inputs and credit, information, and markets at regional and international levels should be developed to assure that agriculture will be more market-oriented and focused on high value crops and products, as well as other agricultural outputs.

In addition, more attention should be paid to the following issues:

- Strengthening national research systems through joint research, network, policy support, training and knowledge-sharing;
- Increasing the productivity of crops, livestock, fisheries, forest and the natural resource base;
- Improving policies affecting agriculture, food, health, the diffusion of new technologies, and the management and conservation of natural resources;
- Protecting the environment by making more prudent use of land, water and nutrients and helping to reduce the adverse impacts of agriculture; and
- Finally, improving the collaboration between NARS and IARCs in considering the low investment in agriculture by many African governments.

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