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# WEST AFRICAN SMALL GRANTS PROGRAM

## Synthesis Report on the Transfer and Commercialization of Agricultural Technology (1998 - 2000)

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Funded by USAID Africa Bureau for Sustainable Development



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**Draft**

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# **THE WEST AFRICAN SMALL GRANTS PROGRAM :**

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### **I. BACKGROUND**

Agriculture remains the cornerstone of development in semi-arid Africa where 80 percent of the people depend on land for their livelihood. Yet agricultural impact analyses indicate that only marginal changes have occurred in improving the living conditions of resource poor small holder farm families in sub-Saharan Africa. Furthermore, the perception that the generation of agricultural technology is a separate activity from that of transfer has contributed to the continuous decline of productivity and earning of income. These issues present a number of formidable challenges for agricultural research and rural development. Among the challenges that SAFGRAD shares with other agricultural research and development organizations is how to assist semi-arid farmers to attain food security, with concurrent improvements of the quality of the environment, nutrition and livelihood.

At the threshold of the 21<sup>st</sup> Century, SAFGRAD has revitalized and broadened its program scope to make small-farm holdings more profitable by breaking the vicious circle of subsistence agriculture. The new niches for SAFGRAD are first to link agricultural production to small and medium-scale industries particularly to enhance the transformation of agricultural produce into value-added products; second, diversify farm-activities by integrating crop/livestock/trees and other production systems to induce complementarities and synergies in the use of resources, generation of income and employment; third, promote demand-driven research and packaging of technological options; and fourth, to facilitate the sharing of market information.

For several decades to come, the immense challenge of food security can be achieved through the intensification and diversification of agricultural production with concurrent preservation of the productivity of semi-arid ecologies. SAFGRAD has, therefore, reoriented its programs and positioned itself to play a catalytic role for accessing and enabling the verification

of best innovations by farmers in semi-arid areas for improving agricultural production and livelihoods.

SAFGRAD attains its goals and objectives by strengthening technical and institutional partnerships with various countries, regional and international agricultural research centers, national agricultural extension services, NGOs, farmers, micro-food processors, women's groups, and farm associations.

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## **1.1. Problems and Issues**

Over the last two decades, per capita food and agricultural production in the West African region have declined steadily despite the availability of more productive technologies. As the 21<sup>st</sup> century begins, attaining food security and poverty alleviation remain the key challenges of the sub-region. Sustained increases in agricultural productivity can only be achieved and maintained if farmers are supported by efficient provision of financial, technical, and institutional services.

Among the constraints causing the short fall in food production in several West African countries has been the poor performance of the public sector (extension, research and support services) in delivering agricultural inputs and technological services necessary to spur agricultural growth.

Institutional orientation and preparedness to develop technologies relevant to market demand is a crucial factor for enhancing technology transfer and commercialization. Most NARS and technology transfer system in the sub-region operate as separate entities placed under separate ministries. The functional linkages between research and development have been less than desired. This situation has accentuated technical and socioeconomic barriers for the transfer of technology to farmers and other end-users. Poor linkage with and orientation of research towards its clients, such as farmers, agribusiness, and food industries have also contributed to the inefficient transformation of research results into value-added products.

Successful commercialization of technologies developed by on-farm research is a necessary condition for the quantum leap needed for agriculture to assume its role as food provider and the engine to economic growth and development in sub-Saharan Africa. Such

scale commercialization can be best achieved by the private sector, but there are pre-requisites to its success.

The first prerequisite is an adequate institutional framework. At present, agricultural services are dominated by public agencies. Any attempt to quickly privatize these services runs the risk of moving agriculture backward. In fact, the transition must be smooth, and care must be taken to ensure that the private sector has the technical know-how to commercialize and service key technologies and that the legal framework allows for control and monitoring of the whole process. Private merchants left on their own are likely to be tempted to commercialize uncertified varieties or fertilizers to exploit farmers.

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The second prerequisite is economic. Sustained adoption of a technology will only occur if it is profitable for all actors involved, including sellers and users. Profitability and stability of the market for the end product are key elements for sustained technology adoption.

## **1.2. Goal and Objectives**

The primary goal of the West African Small Grants program has been to enhance transfer of technology to enable resource-poor farmers, microfood processors, etc. to attain food security and generate employment opportunities and income to improve their livelihood. To achieve this goal, it is necessary to create an enabling environment, with built-in information technology generation, transfer and sharing systems, and to effectively provide relevant incentives to farmers and other key actors.

The main objectives of the program are:

- **Identify viable and more productive and promising technologies that could effectively be delivered to end users to enhance micro-enterprises development.**
- **Foster linkages and partnerships between “stakeholders” including public and private research institutions, and technology users, such as farmers, development and marketing agencies, private sector NGOs, and traders.**
- **Stimulate demand driven research and enhance the transformation of agricultural technologies into value-added products.**

- **Improve national capacity for assessing socio-economic and technical constraints as well as opportunities for the development of agribusiness, food processing, etc.**
- **Put in place institutional mechanisms for follow-up on the progress of project implementation.**
- **Facilitate women's participation in agribusiness, technology transfer, and commercialization for food security and nutrition enhancement.**
- **Facilitate exchange of experiences among countries and micro-entrepreneurs.**
- **Provide technical backstopping to pilot micro-enterprise projects in participating countries in collaboration with IARCs, NARS, extension systems and NGOs.**
- **Document experiences and lessons learned in technology transfer and commercialization.**

### **1.3. Constraints**

Despite the importance of agriculture in the reform agenda of West African countries, the transition of support service delivery from the public to private sector has been slow. Some constraints that have impeded growth of the agricultural sector include the following:

- i) Agricultural policy has not encouraged farmers to invest in more productive technologies and they have not been linked to market opportunities.
- ii) Information on product market or to influence farmers' decision to invest in improved inputs, such as more productive technologies has been lacking.
- iii) Research and technology transfer have been weakly linked to and oriented toward clients in terms of generating technology that has demand/market available to farmers.
- iv) Poor linkages between agriculture (users of technology and producers of raw material) and industry/food processing units (end-users of technology) to enhance the transformation of agricultural produce into value-added products.

#### **1.4. The conceptualization of the program**

This program was conceptualized based on the following:

- i) The November 1996, Accra Workshop on the Commercialization and Transfer of Agricultural Technology gave the impetus for conceptualizing the program.
- ii) The USAID funded technology transfer grant that was coordinated through WARDA – provided some experience in the multiplication and dissemination of improved seed and related potential technologies in the pipeline.
- iii) The innovative feature of SAFGRAD's initiative for commercializing cowpea production with partnership among SAFGRAD/the Burkina National Agricultural Research System (INERA), Nestle, farmers for improving production, and utilization.

Based on established criteria and deliberations of the Regional Technical Committee, 18 small grant projects were selected for funding on a competitive basis from among the 92 proposals submitted (Annex 1). Initially, the West African Small Grant Program (WASGP) was started in Burkina Faso, Ghana, and Senegal. The program's thrust has been to enhance the transfer and commercialization of agricultural technology to stimulate growth in agriculture production and transformation into value-added products in order to broaden the base of market opportunities.

#### **1.5. Assumptions**

The underlying assumptions of the program include:

- i) Technological options that could substantially increase agricultural production and productivity do exist. However, farmers have not yet fully benefited from research results to improve production and generate income.
- ii) Market liberalization and economic policy reforms will create the conducive and enabling environment for the private sector to play a key role in the provision of agricultural production support services and the development of agribusiness.

## 1.6. Expected Output

The expected outputs of the program include, but are not limited to:

- + ✓ Increased number of profitable technologies accessible to rural households, transfer agents and private operators;
- + ✓ Increased number of women groups involved in value added processing and marketing of agricultural technologies;
- H ✓ Improved mechanisms and partnerships developed to link research and non-research agents to enhance transfer and commercialization of technology;
  - Non traditional approaches, involving non public agents, for technology transfer identified, validated and used;
- + ✓ Opportunities for technology based micro enterprises identified and developed.
- + ✓ Improve the livelihood of rural farm households through generation of income and employment;
- + ✓ Improve technical skills for agricultural production processing, product development and marketing;
- + ✓ Improved national capabilities for managing and transferring research results to farmers and other end-users of technology.

## 1.7. Identification and Development of Proposals

### National consultation

The initial driving force behind this program was that results were available at national level, but tremendous obstacles stood in the process of disseminating these results to the end users. With this concept in mind and also taking into account the specificities of the countries concerned by the program, national consultants were offered contracts to lay the ground-work for the implementation of the program. The scope of work and term of reference (TOR) for consultants study was developed based on the program document. In essence, the study consisted of the following aspects:

The first task was to take stock of the set-up and orientation of national systems to enhance transfer and commercialization of agricultural technologies, highlighting the

different key actors and the type of partnerships and institutional linkages that exist among them.

The second task was to analyze on-going initiatives in technology transfer and micro-enterprise development and identify those that merited support and strengthening; summarize the perspectives in enterprise development through transfer and commercialization of agricultural technologies; and make an inventory of available technologies of interest to technology transfer and commercialization.

The third and final task was to propose actions for the program to support transfer and commercialization of technologies including institutional mechanisms and linkages for such program implementation.

Consultants visited institutions, farms, NGOs, entrepreneurs, etc. in order to carryout their tasks. Study of the consultants to launch the programs of technology transfer and commercialization was undertaken in Burkina Faso, Ghana and Senegal. A fourth study to start the West African Small Grants Program in Mali has been recently finalized. Consultants' reports were capitalized specifically on areas deemed very useful for technology transfer. This includes, but was not limited to: seed technology, cultural practices, fertilization, water conservation, plant protection, storage, transformation and food technology, animal production, and gender specific technologies. These technologies, while similar in general from country to country, bear some country-level specificities particularly regarding the importance and priorities of the technology at stake.

### **Guidelines for proposal development at country level**

Taking stock of the consultants' study and following the objectives of the program, guidelines were created for proposal development. These guidelines were improved during the second year based on feedback from the Regional Technical Committee (RTC) and other partners involved in technology transfer and commercialization.

In brief, the guidelines included the criteria for eligibility, key components of the proposal as well as the specific requirements the project must meet, and information on the system used for rating the proposals. The call for proposals along with guidelines were sent not only to research organizations, but also to farmers' associations (end users of the technology), NGOs

(also involved in technology transfer), and to women's groups and micro-entrepreneurs in Burkina Faso, Ghana, and Senegal.

More than 90 proposals were developed by beneficiaries and submitted to the management of OAU/STRC-SAFGRAD during the two year span of the program.

It became evident that a missing link between the guidelines and the proposals themselves was the support required, particularly for the private sector (farmers' associations, etc.), to conceive and develop proposals within the guidelines. The high number of proposals submitted in Burkina Faso during the first year, and the high quality of those proposals are perhaps due to the additional support received in the conception and development of the proposals based on the guidelines.

### **Transformation of the program into projects at national level**

One of the key functions of the Regional Technical Committee is to screen the submitted proposals and to select those that merit funding from the program. The first meeting of this committee was held in Ouagadougou 30-31 May, 1998 and the second in Senegal in 1999.

The RTC is comprised of the NARS scientific directors or representatives, NGOs, the IARCs through the Maize and Sorghum Networks, representatives from the private sector, etc. As stated earlier, RTC reviewed and approved grant proposals. These proposals were rated using a rating matrix which was modified and approved at the first RTC meeting. For the first year, a technical committee at OAU/STRC-SAFGRAD short-listed projects that were considered by the RTC. The RTC became the ultimate institutional mechanism necessary for approving funding of the proposal, and thus, making the proposal a project at national level. Budget review of the proposal was done by OAU/STRC-SAFGRAD. This allowed flexibility in securing a balance in funding among all three countries, and also to regulate funds disbursements and ensure that appropriate requirements were met for proposals to be compliant with Technical Transfer Grant philosophy. OAU/STRC-SAFGRAD played a key role in facilitating and assisting farmers' associations or NGOs as well as other research organizations to develop and submit proposals and in ensuring that the projects could be fully implemented. In essence, not all proposals selected by the RTC were implemented due to financial limitations.

## **II. TECHNOLOGY TRANSFER AND UTILIZATION OF RESEARCH RESULTS**

### **2.1 Availability and Choice of Technologies**

The potential for increasing agricultural productivity and profitability are among the major determinants of the choice of a technology by farmers. Although several technological options are available at research centers, many of them are not widely adopted by farmers for a variety of reasons including their cost and affordability to farmers. Furthermore, the verification scheme for determining the viability and market opportunity of technologies has been very weak at the level of NARS.

In reality, agricultural research and transfer systems in several countries are not geared toward determining the economic costs of a technology. They also lack the capability of subjecting research findings or new technologies to financial and commercial ventures. As a result, the potential of a technology to generate income and, thus, to be competitive is usually not assessed before its recommendation to farmers and other users.

To address the issue of the choice of a technology and to ensure the success of its commercialization, the WASGP undertook initial assessment of research results and pathway of technology by fielding consultants in countries where the project became operational. Major issues addressed in each country include the extent of market demand for technologies, the technical and institutional constraints on transfer and commercialization and the impact of technology on agribusiness development. In operational terms, the WASGP used the following criteria to:

- select projects: (i) income and employment generation potential, (ii) stimulation of stakeholders partnership, (iii) sustainability, (iv) stimulate contract research/extension services, (v) matching revolving funds, (vi) private sector orientation, and
- technologies to be transferred and commercialized under these projects: (vii) market outlets (demand), (viii) their contribution to sustainable agriculture, (ix) to food security, (x) simplicity to transfer and (xi) cost effectiveness/availability.

The global overview of the number of technologies that were transferred under the different WASGP projects and their actual and potential market outlets is summarized in Table

1. Transferred technologies are very diverse and range from improved production inputs, packages and practices to processing techniques and products that were developed. Clients for these intermediate and final products are producers, processors and final consumers.

### **Transfer of technological packages: the case of integrated crop-livestock farming in Burkina Faso**

The WASGP supported a farmer organization (Association Song Koadba-ASK) in Burkina to undertake with other partners an integrated crop livestock enterprise. The main crop is cowpea that is not only a major source of protein and income for households, but also an important link for integrating crops and livestock production to enhance sustainable farming. The following results were obtained from the crop and livestock components of this project:

The project structured the participating farmers into 3 groups of 25. Group 1 received extension services and inputs, while group 2 only received inputs. Group 3 operated outside the project and thus received neither. Comparing cowpea production performances, all groups in both cropping seasons had higher than the national average yield of 400 kg/ha (figure 1). Yields for all groups increased in the second year and were respectively 2.4, 2 and 1.5 times the national average. Group 1 had always obtained higher yields than the other groups. The two groups (1 and 2) of farmers with easier access to inputs and/or extension obtained better yield than the cowpea producers not included in the project. Statistical tests showed that yield differences between groups were statistically significant.

The commercialization of cowpea production gave the impetus to raise small ruminants not only to diversify income, but also to improve the fertility of the soil. Around 25 farmers of the ASK took up sheep fattening, and most of them also cultivated cowpea. Improved feed rations determined through a contractual agreement between ASK and regional extension and NARS included concentrates, cotton oil cakes, cowpea fodder, groundnuts and cereal residues. The fattening of sheep was undertaken twice during 1999, targeting the holiday season. The average net income generated per household for the first and second operation was respectively 63 196 and 42 023 FCFA (Table 2).

Table 2 summarizes the net income gains by group of ASK farmers who chose to engage in both cowpea and sheep fattening activities under the project. Annual income gains per participating farmer averaged 171 857 FCFA (\$286 US) for the two groups operating under the project. These direct income earnings help to diversify income, and should be added to the

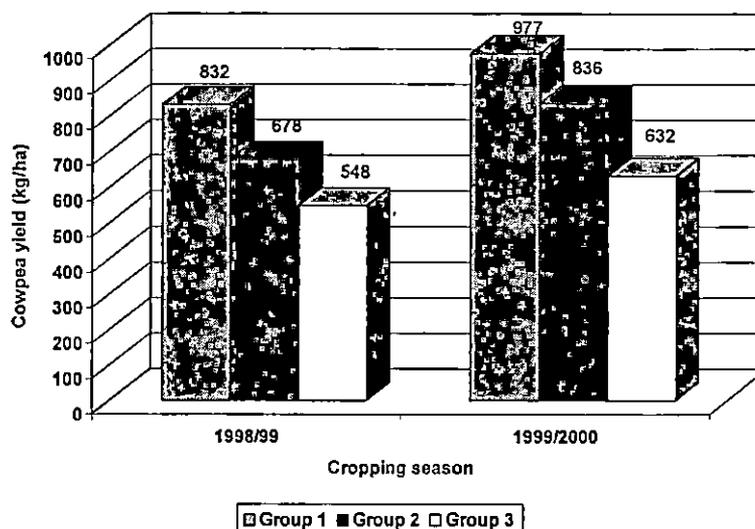
long-term indirect gains of improved soil fertility from the application of crop residues and animal manure.

**Table 1: Choice of Technologies under the WASGP**

| Projects  | Number of technologies transferred to users |       |         | Packages of Technologies  | Market Outlets  |
|---|---|-------|---------|---|---|
|   | Burkina                                     | Ghana | Senegal |   |   |
| 1. Cowpea production and Commercialization                                    | 6   |       |         | 4 cowpea varieties and 2 agronomic practices                                    |   |
| 2. Potato and onion seed production and Marketing                             | 3   |       |         | 2 onion and 1 potato varieties  |   |
| 3. Fruit and vegetable drying and Marketing                                   | >4  |       |         | Mango, tomato and other fruits and vegetables, drying techniques                | Exports to Europe   |
| 4. Integration of small ruminants and Production (animal fattening)           | 4   |       |         | Improved feed ration, shed, pest and disease control, crop residues             | Traders, final consumers  |
| 5. Community seed production of cowpea Varieties                              | 7   |       |         | 4 improved varieties of cowpea, 2 agronomic practices and one storage technique |   |
| 6. Vegetable oil seed production and processing                               |   | >2    |         | Improved soybean varieties increased and available to over 300 farmers          | Individual farmers, Bosbel oil mill industry                        |
| 7. Soybean utilization technologies   |   | 19    |         | 2 soy products and 17 recipes (staple foods, stews, sauce, beverages) developed | Final consumers   |
| 8. Community canning/bottling system for Training small scale food processors |   | >3    |         | Food processing and preservation techniques                                     |   |
| 9. Processing and marketing of Micronutrient enriched soybean Products        |   | 8     |         | 4 soy products by Darkruby and 4 by Delabac underwent quality evaluation        | Final consumers   |
| 10. Small ruminants (ARI and women Groups)                                    |   | 4     |         | Improved feed ration, shed, pest and disease control, crop residues             | Final consumers, traders  |
| 11. Seed production of improved millet and Maize cultivars                    |   |       | 6       | 3 millet and 3 maize cultivars  | Individual and organized producers, NGOs, private sector, projects, |
| 12. Valorization of the wild ditax fruit                                      |   |       | 5       | Harvesting technique and 4 products   | Producer groups, women groups, industrial processors                |
| 13. Mango and fruit drying and marketing                                      |   |       | >6      | >4 products and 2 drying techniques   | Grocery stores, Senegalese Army, hotels                             |
| 14. Production and commercialization of Improved millet cultivars             |   |       | 3       | 2 millet cultivars and one threshing method                                     | Individual producers, local traders, industrial processors          |

Note: Not included in this table is a project in Togo funded through WASGP to support women organization for processing cassava into gari.

**Figure 1: Effect of extension services and inputs on cowpea yield in Taptenga (1998/99 and 1999/2000), Burkina Faso**



**Table 2: Average annual income gains from integrated crop-livestock farming – ASK (Taptenga, Burkina Faso) Project in 1998/99.**

| Farmer Group                                    | Cowpea production (FCFA/ha)* | Sheep fattening: 1st operation (FCFA) | Sheep fattening: 2nd operation (FCFA) | Total income (FCFA) | Amount in US dollars** |
|---|------------------------------|---------------------------------------|---------------------------------------|---------------------|------------------------|
| Group 1: received inputs and extension services | 78 310                       | 63 196                                | 42 023                                | 185 529             | 306                    |
| Group 2: received inputs only                   | 54 967                       |                                       |                                       | 160 186             | 267                    |
| Group 3: received neither (outside project)     | 31 792                       |                                       |                                       | 137 011             | 228                    |
| Mean groups 1 and 2                             | 66 638                       | 63 196                                | 42 023                                | 171 857             | 286                    |

\* figures are calculated on a hectare basis even though , under the project, each farmer cropped .5 ha of cowpea.

\*\* \$1 US valued at

## **2.2 Marketing Issues and Research Implications for NARS:**

The WASGP activities have shown that the market linkage has so far been the least developed. Most of these technology transfer projects were designed, according to a two-stage scheme: (i) to link agricultural technology suppliers (mainly research/extension) to technology users (mostly organized or individual farmers, processors) on one side, and then (ii) to link these users to the industry sector as market outlets for farm products on the other side. These links can be formalized by contractual arrangements to ensure regular provision of goods and/or services of good quality, reduce transaction costs and secure market opportunities to suppliers.

Such a weak market linkage in the technology transfer program can be attributed to a number of causes. Various issues have surfaced from the functioning of these projects, and most, if not the major ones, have centered on the followings:

Technology transfer has suffered from its classic 'productivist' approach that draws upon the idea that, in technology generation, the overriding concern is on solving a production problem, i.e. on the technical feasibility. Even when the latter was done, the social acceptability and economic profitability stages did not receive proper attention for a successful transfer and adoption. The economic profitability criterion is a complex one as it embodies an array of parameters and factors to account for. Simply put, it requires looking at both the cost and revenue sides, all involving markets. In other words, it requires analyzing demand not only for the technology to be adopted, but also for the output from the use of that technology.

Determinants of demand for a technology by a rational potential user include at least its price, and how much its product would cost at various places. Costs of a technology from a potential user's perspective must be determined by research when it is being generated and, of course, before its transfer to users. Unfortunately, this has not been a regular activity of researchers since addressing this issue requires a multidisciplinary approach involving socioeconomists, farmers and other end-users of technologies. Demand studies are generally an add-on and under-researched area. Such a neglect or bias should be remedied by research.

However, research on the structure of the costs of agricultural technologies and products in the West African region has shown that a significant part of these costs can

be attributed to transport and communication costs or to factors not specific to agricultural production. For example, the poor quality of the physical road infrastructure (where it exists), and common but usually illegal, costly and time consuming practices (e.g., payments at multiple checkpoints along roads and across borders) contribute to inflating costs from farm gate to final consumer through factory and other intermediate levels. An illustrative case is provided by the SAFGRAD/INERA/NESTLE experience in Burkina. As part of a research program on determining the costs of new cowpea production technologies in Burkina in 1997 and 1998, NESTLE bought on contract cowpea produce from a farmer association, and decided to deliver it to its factory in Abidjan by road. Despite payment of all regular fees for transporting the product, constant racketeering was done along the roads to Abidjan and resulted in numerous payments made to police and custom officers. It was found that delivery (transport, road payments, sanitary control, etc) and handling costs represented 23% of the total costs of producing cowpea in Burkina and delivering to Abidjan. The resulting wide gap between farm gate and factory level costs of cowpea can provide a strong disincentive to rational private industrial users to invest in new technologies. As a consequence of these high costs, supplies are limited, and (excess) production zones disconnected from (deficit) and high demand areas. Research has an important role to play in identifying and measuring these effects and articulating issues to effectively communicate with policymakers.

The lack of good and timely information on marketing opportunities also weakens the market link. In the Senegal mango processing project, the Ndamé Lo women group has serious difficulties selling its product in surrounding areas besides few outlets in Dakar. At the same time, their counterparts in Burkina (Basnere project) have succeeded in exporting their processed mangoes to Europe. Network and communication between the two could help in sharing information and experiences about external market outlets. But, in the Senegalese case, still remain problems to be dealt with on the domestic side: pricing, existence of substitutes (fresh vs. dried mango, other fruits), income group targets, tastes and preferences, or simply information (advertisement). Socioeconomic research can help in sorting out and finding answers to these questions.

The case of maize and soybean imports for animal feed from as far as Argentina and the US to the region illustrates the weak supply-demand link. Whereas significant maize quantities are being produced in the region, external sources are used to satisfy internal demand. Whether it is a competitiveness issue (high domestic prices due to high

production costs vs. low import prices), an information gap (not knowing marketing opportunities), a physical communication constraint (poor or not existing infrastructure), an organizational problem (high transaction costs) or a policy question (fiscal and other barriers to sub-regional trade) needs to be unveiled. Who should take initiative in establishing and fostering this supply-demand link is another critical question. Again, inputs on these matters can be provided by NARS with a regional research agenda.

### **2.3. Towards The Development of Private Seed Production Microenterprises**

Over the last three decades, the public sector has dominated the production and the distribution of improved seeds whose prices have not been affordable to farmers in West Africa. In most countries of the region, the seed industry is the least developed. Improved seed production and distribution by the private sector is virtually lacking. Even though regulatory policies pertaining to seed production and distribution do exist in several countries, seed laws usually do not favor the development of a private seed industry. Whatever few improved cultivars are produced reach farmers directly from research and through rural development parastatals or community seed production schemes (farmer communities) promoted by both crop commodity networks and SAFGRAD.

The sluggish growth of food crop production has been attributed to a number of constraints including the lack of and/or limited use of improved seed and fertilizer. Among ways to boost food production, is promoting the timely access of food producers to sufficient quantities of affordable high quality seeds. NARS have accumulated years of research results on foundation seed production. Still, the production of certified seed is effected in haphazard manner by various development organizations.

To address these seed issues, the WASGP has funded two improved seed increase projects in Senegal and Burkina. The general objective of these projects is to strengthen partnership and linkages of key actors engaged at various stages of seed production, processing and distribution. This involves research as source of foundation seed, farmers as contract growers of certified seed, possibly private investors in processing, packaging and distribution of improved seed. The specific objectives of the projects are to:

- meet seed demand by increasing seed production and use by farmers, thereby increasing yields and income to farmers;
- disseminate proven seed production technologies through training of individual farmers and farmer groups;
- enable the development of viable private seed production enterprises and
- disseminate seed varieties through sales of certified seed.

The seed project in Senegal concerned improved millet and maize foundation seed increase by the Seed Production Unit (UPSE) of ISRA at Bambey research center. Contractual growers (farmers) produced certified seed. As indicated in Table 3, around 17 and 12 tons of certified seed of millet and maize were produced by contracting farmers as outgrowers. This seed output valued at a total of almost 15 million CFA can be used to plant an estimated area of 2797 ha of millet and 624 ha of maize.

A total of forty-nine (49) people were trained in seed production, treatment and conservation. These include:

- Thirty farmers as pilot producers in different production zones;
- Fifteen farmers and technicians in collaboration with other partners (UNDP, AQUADEV NGO) and
- Four students from a school of agricultural engineering (ENCR).

Table 4 depicts the broad partnership of stakeholders with specific roles, i.e. input providers, facilitators, trainers, trainees, buyers, disseminators, finance suppliers, producers, etc.

From the list of buyers (Table 5), the bulk of seed purchases is made by individual producers. Others are research, extension and rural development institutions, farmer organizations, private sector groups, etc. There is a broad spatial distribution of the seed output as buyers of certified seed from the project (not including individuals) come from all ten administrative regions, except Saint Louis and Ziguinchor for millet and Fatick and Louga for maize (table 6). It is noteworthy to even see buyers from a neighbor country (Guinea-Bissau).

The seed increase project in Burkina has been to minimize potato and onion seed imports from Europe. To build local capacity, the Yatenga Seed Producer Association (APSY), a private organization in Burkina Faso was supported through WASGP to

increase improved cultivars of potato (Sahel variety) and onion (Violet de Garmi and Garango varieties). Out of a demand for 16 tons of potato seed it received in 1998/99, APSY was able to meet two-thirds of it, i.e. 10 tons. For the forthcoming 2000-2001 season, seed demand already expressed by 85 producer groups and 46 individuals amount to 290 kg of onion seed and 51.1 tons of potato seed.

Table 7 summarizes the sale and distribution of 10 tons of potato seed (small tuberr), which generated a gross revenue of 7 000 000 FCFA. Table 8 indicates a broad spatial distribution of improved potato seed purchased by producer groups. This has enhanced a wide dissemination of the improved potato seed throughout the country.

APSY is providing training to producer groups in potato production. It has demonstration fields for tomato and potato production. So far, fifteen groups have expressed desire to have at least two of their members trained by ASPY. Several partners were involved in this project along with ASPY (Table 10). These include extension services, 85 village groups and also individual producers. In collaboration with research (INERA) and extension agents of the region, APSY innovations include the production of two videotapes to be used in producer training, farm leaflets and guidelines.

**Reinvestment of project income:** ASPY has further strengthened its enterprise by reinvesting 10 million FCFA of generated income in 1998. Reinvestment included: farm implements, storage facility repair, land preparation, wages to contractual labor hired during the 1998/99 season, etc (Table 10).

#### **Outputs/ Lessons:**

Some outputs and lessons learned include:

In Senegal, contracting farmers as outgrowers of certified millet and maize seed not only improved the skills in seed production technology of producers, but also generated income for involved farmers. The WASGP supported seed increase projects showed that small farmers and/or their associations can meet the demand of certified quality seed at the community level. The crucial factors for evolving small farmer associations to assume seed enterprise services are the sustained linkages to research,

extension and availability of credit to collectively use facilities for seed cleaning and processing.

A broad partnership was developed during the implementation of these seed increase projects. Different partners, public or private, local, national or international, were formally or informally involved in these projects as input providers, facilitators, trainers, trainees, disseminators, finance suppliers, producers, and buyers, etc.

**Financial Sustainability:** an encouraging innovation of the APSY enterprise in Burkina has been its reinvestment of income generated (during the first year) to improve both production capacity and management. This is a good management practice to start an internal process of revolving funds that helps broaden the activity base, and secure its continuation through potentially sustainable funding. This dynamic internal recycling mechanism of project funds is critical for consolidating the foundations of such an experience.

Contractual production has helped secure production and income to farmers in the Senegal seed project. A long-term benefit of this type of arrangement is the rooting of the idea of paying for any service rendered. This is a very important lesson in a country where high debt arrears and low reimbursement rates of received credits have long plagued agricultural production programs.

**Table 3: Contractual Production of millet and maize certified seed in Senegal (Bambey Research Center, ISRA): 1998 and 1999.**

| Variety                  | Production (kg) |       | Number contractual farmers |      | Estimated Area that can be planted (ha)** |       |
|--------------------------|-----------------|-------|----------------------------|------|---|-------|
|                          | 1998            | 1999  | 1998                       | 1999 | 1999                                      | 2000  |
| MILLET:                  |                 |       |                            |      |   |       |
| Souna-3                  | 4 587           | 3 398 | 3                          | 3    | 764                                       | 566   |
| IBV-8001                 | 1 637           | -     | 1                          | -    | 273                                       | -     |
| IBV-8004                 | 3 298           | 3 861 | 4                          | 4    | 550                                       | 644   |
| Total /year (kg)         | 9 522           | 7 259 | 8                          | 7    | 1 587                                     | 1 210 |
| Total seed produced (kg) | 16 781          |       |                            |      | 2 797                                     |       |
| Value of seed (CFA)*     | 8 390 500       |       |                            |      |   |       |
| MAIZE:                   |                 |       |                            |      |   |       |
| JDB                      | 5 022           | 2 500 | 2                          | 3    | 251                                       | 125   |
| Synthetic C              | 2 842           | 1 500 | 3                          | 1    | 142                                       | 75    |
| Early Thai               | 313             | 300   | 1                          | 1    | 16  | 15    |
| Total /year (kg)         | 8 177           | 4 300 | 4***                       | 4*** | 409                                       | 215   |
| Total seed produced (kg) | 12 477          |       |                            |      | 624                                       |       |
| Value of seed (CFA)*     | 6 238 500       |       |                            |      |   |       |

\*: seed valued at 500 CFA/kg

\*\* : Assumes all of the produced seed is used for the cultivation of the respective crops during the following cropping season; estimates are based on recommended seed rates (millet: 6 kg/ha; maize: 20 kg/ha).

\*\*\*: total is different from sum of above numbers because some farmers cultivate several varieties at the same time.

**Table 4: Partnerships between ISRA/UPSE and Stakeholders in Seed Technology Transfer and Commercialization**

| Partners   | Specific roles   | Institutions/Functions  |
|--|--|---|
| UPSE/ISRA  | Seed technology and production   | Training producers in seed production   |
| ENCR   | Facilitated training of four students in seed production   | School for ag engineers with collaborative teaching-research program.             |
| NGO AQUADEV Louga                                | Facilitated training of 15 producers in seed production  | NGO in the Louga region   |
| UNDP   | Facilitated training of 15 producers in seed production  | Poverty alleviation program   |
| Millet Producers (9)                             | Produced millet seed   | Contract for seed production  |
| Maize Producers (7)                              | Produced maize seed  | Contract for seed production  |
| CNRA/Bambey                                      | Supply of improved millet and maize cultivar   | Part of the national agricultural research center ISRA                            |
| Millet/Sorghum Network                           | Exchange of technical information on the performance of improved cultivars   | ICRISAT and NARS  |
| Maize/Cowpea Networks                            | Access to early and extra-early maturing maize cultivars   | ITA and NARS  |
| UNIS   | Assure seed production and marketing nationwide  | Private interprofessional group of the seed subsector                             |
| WINROCK  | Facilitated diffusion of the improved seed   | NGO involved in rural development   |
| World Vision                                     | Facilitated the distribution of improved seed  | NGO to enhance rural development  |
| AFRICARE   | Facilitated seed distribution in the Kaolack region  | NGO supporting food production  |
| SODEVA   | Facilitated seed distribution in the Louga region  | A parastatal (being dismantled) involved in agriculture extension and development |
| RODALE   | Facilitated diffusion of seed in the Thies region  | NGO supporting sustainable agricultural development                               |
| US Peace Corps                                   | Helped disseminate use of improved seed  | US organization providing volunteer work in various areas of rural development    |
| CNCR, Jeunesse Mouride, Mbouroise, Developpement | Helped disseminate use of improved seed  | Farmer organizations with national or local rural development agendas             |
| Individual Farmers                               | At least 51 and 10 farmers purchased respectively more than 5kg each of certified seed of millet and maize to cultivate these crops. | Food crop growers   |
| SAFGRAD  | Facilitates & supports technology transfer & capacity building   | Regional coordination for strengthening collaborative research and development    |

**Table 5: Sales (in kg) of produced millet and maize certified seed by type of buyers in 1999**

| Seed variety      | Individual producers | Farmer org. | Private sector org. | NGOs | Research/ Extension | GIEs | Projects | Intl org | Neighbor countries | Total |
|-------------------|----------------------|-------------|---------------------|------|---------------------|------|----------|----------|--------------------|-------|
| Millet Souna-3    | 2 186                | 547         | 436                 | 280  | 274                 | 418  | 20       | 326      | 100                | 4 587 |
| Millet IBV 8004   | 1 005                | 272         | 100                 | 272  | 1 334               | 8    | -        | 307      | -                  | 3 298 |
| Maize JDB         | 2 924                | 380         | 440                 | 148  | 700                 | -    | 230      | 200      | -                  | 5 022 |
| Maize Early Thai  | 110                  | -           | 36                  | 35   | 12                  | 120  | -        | -        | -                  | 313   |
| Maize Synthetic C | 316                  | 284         | 502                 | 572  | 295                 | -    | 170      | 703      | -                  | 2 842 |

**Table 6: Description of seed buyer groups: composition and regions of origin or intervention**

| Buyer Groups                    | Millet  |   | Maize                                  |   |
|---------------------------------|---|---|--|---|
|                                 | Composition   | Regions of origin/intervention                | Composition                            | Regions of origin/intervention              |
| Farmer organizations            | Jeunesse Mouride, Jeunesse Developpement, "Paysans"         | Diourbel, Kaolack, Fatick, Thies              | CNCR, Jeunesse Mbourose                | Dakar, Thies                                |
| Private sector org.             | UNIS, Freres Sacre Coeur                                    | Diourbel, Thies                               | UNIS, Freres Sacre Coeur, SUNPRO       | Diourbel, Thies, Dakar                      |
| NGOs                            | Winrock, Rodale, Caritas, World Vision, Africare, Gofef (?) | Dakar, Thies, Kaolack, Louga                  | World Vision, Caritas, Form-Action, 7A | Kaolack, Thies, Dakar, Kolda                |
| Research/ Extension/Development | ISRA, CERAAS, Papem, Service Semencier, SODEVA,             | Thies, Diourbel, Kaolack, Louga, Kolda, Tamba | ISRA, CERAAS, SODEVA, SODEFITEX        | Diourbel, Thies, Kaolack, Ziguinchor, Tamba |
| GIEs                            | Medina Sabakh, Bas Saloum, Diambar, Almaz                   | Kaolack, Dakar                                | Delta Express                          | Saint Louis                                 |
| Projects                        | Agro-mais   | Diourbel                                      | Progede, Projet Keur Samba Gueye       | Dakar, Kaolack                              |
| Intl organization               | Peace Corps, UNDP   | Dakar, Thies                                  | Peace Corps                            | Dakar                                       |
| Neighbour countries             | AFUF  | Guinea Bissau                                 | -                                      | -   |

**Table 7: Potato seed sales by ASPY (Burkina)**

| Buyers               | Quantities purchased (kg) | Value (FCFA)     |
|----------------------|---------------------------|------------------|
| Producer groups (15) | 9 500                     | 6 650 000        |
| Individual producers | 500                       | 350 000          |
| <b>TOTAL</b>         | <b>10 000</b>             | <b>7 000 000</b> |

**Table 8: Potato seed diffusion -- ASPY (Burkina)**

| Buyers  | Area of origin/intervention  |
|---|--|
| <b>Producer groups:</b><br>Relwendé<br>Basnére<br>Kamsaoghin<br>Yand-kay<br>Apsen<br>Laafi la soulli<br>Koom la laafi<br>Union de GV<br>Namangb Zanga<br>Yamnea<br>G. JS. 6.A<br>Nob Nooma<br>Rel Wendé<br>Laafi la Boumbou<br>Yaam Taabo | Bourbou<br>Boursma<br>Ouahigouya<br>Sodin<br>Poedgo<br>Ouahigouya<br>Tamsin<br>Zogoré<br>Sabouna<br>Ouahigouya<br>Ouahigouya<br>Tangaye<br>Vire songdin<br>Ifo<br>Ouedranein |
| Individual Producers  | Ouahigouya   |

**Table 9: Partnership in the ASPY potato and onion seed project (Burkina)**

| Partners                                     | Roles/Activities   |
|--|--|
| APSY- Yatenga Seed Grower Association        | Seed production and training   |
| Farmer organizations:                        | Potato seed buyers and growers   |
| Relwendé                                     | "  |
| Basnéré                                      | "  |
| Kamsaoghin                                   | "  |
| Yand-kay                                     | "  |
| Apsen  | "  |
| Laafi la soulli                              | "  |
| Koom la laafi                                | "  |
| Union de GV                                  | "  |
| Namangb Zanga                                | "  |
| Yamnea                                       | "  |
| G. JS. 6.A                                   | "  |
| Nob Nooma                                    | "  |
| Rel Wendé                                    | "  |
| Laafi la Boumbou                             | "  |
| Yaam Taabo                                   | "  |
| DRA-Northern Region Direction of Agriculture | Extension services and training  |
| INERA- national research institution         | Research results, technical fiches on crops                                |
| Producer groups                              | - 85 members to be trained by APSY<br>- 85 to buy seed next year from APSY |
| Individual producers                         | - to be trained by APSY<br>- 46 to buy seed next year from APSY            |
| SAFGRAD                                      | Facilitator of partnership and support of projects                         |
| National Seed Service                        | Monitoring/certification of produced seed                                  |
|  |  |

**Table 10: Reinvestment of project income – ASPY (Burkina)**

| Item                                   | Constraints resolved                   | Amount FCFA      | Amount in \$US* |
|--|--|------------------|-----------------|
| Farm implements                        |  |                  |                 |
| - 2 oxen                               | Improvement of animal traction         | 185 000          | 308             |
| - Seed grading                         | Separation of different size of potato | 2 200 000        | 3 667           |
| - Accessory of tractor                 | Facilitation of land preparation       | 3 500 000        | 5 833           |
| Storage                                |  |                  |                 |
| Cold room connection to power          | Conservation of seed                   | 1 150 000        | 1 917           |
| Land preparation                       | Increase of area of cultivation        | 2 000 000        | 3 333           |
| Wages distributed to contractual labor | Labor input                            | 720 000          | 1 200           |
| <b>Total</b>                           |  | <b>9 775 000</b> | <b>16 258</b>   |

\* \$1 US is about 600 FCFA

## **2.4. Decreasing post harvest losses and the Improvement of Nutritional Quality of Basic Diets**

A number of projects were supported by WASGP to improve the nutritional quality of basic diets and to particularly improve the health and income of the rural sector. In Ghana, soybean products and receipts were developed and evaluated to improve the nutritional quality of staple foods traditional dishes in two villages about 25 km West of Accra. In Ghana, village level techniques in the utilization of soybean were developed. The two soybeans based products developed were high quality full-fat soyflour and soybean paste with good nutritional and microbiological characteristics. The techniques developed were promoted in two villages for small scale commercial ventures by interested groups. A total of 17 recipes with desirable nutritional quality (energy, protein, vitamin B, and B2, calcium and iron) and sensory characteristics were developed. The recipes adequately cover a range of traditional dishes for effective impact on their nutritional status.

Furthermore, three microentrepreneurs were supported through WASGP in Ghana to improve food processing and preservation techniques and to promote the distribution of soy-based improved products.

As to soybean production and utilization in Ghana, the key partners include farmers, extension services of the Ministry of Food and Agriculture Research Organization (CSIR and universities) and oil and high protein food processors, etc (Table 11). The baseline studies undertaken in the two villages (Samsam-Odumase and Mimpemitroasem) of the Greater Accra Regional showed that basic traditional diets (prepared from maize, cassava, yam, plantain, etc.) are low in protein and some other nutrients.

In Senegal, funding support was provided for the exploitation of Ditax fruits (*Detarium Denegalense*), a forest tree product that is increasingly consumed in both fresh and processed forms. The overall objective of this project is to improve the well being of populations, mostly rural, by increasing their incomes and improving their nutritional status. Specially, the project attempts at:

- testing different methods for determining the optimal harvesting time to obtain a good quality fruit and reduce harvest losses;

- testing various techniques for processing the Ditax fruit to generate diversified and nutritionally-rich derived products, and also for conserving them;
- training rural producers and processors in these techniques and helping them to set up fruit processing units;
- investigating efficient methods for domesticating the tree to ensure a proper regeneration of its natural productive capacity, and for disseminating it widely. Analysis showed the fruit of Ditax is very rich in vitamin C (1200 mg/100 gm) iron, calcium, etc. Different products have been obtained from processing of the fresh fruit. These include: sweet pulp, nectar, marmalade and dried pulp which their nutrient content vary considerably. The sweet pulp is known to substitute for fermented milk and used with boiled granulated millet flour in a meal and frequently served during social ceremonies (baptism, religious gatherings, etc.) and at industrial level (soft drinks and ice cream).

**Table 11:** Partnership in the utilization of soybean products to improve the nutritional status of basic diets in Ghana.

| PARTNERS   | INSTITUTIONAL ACTIVITY AND SPECIFIC ROLES  |
|--|--|
| 1) Farmers in the villages of Samsam-Odumase and Mimpemihossem | As beneficiaries cultivate and utilize soybean   |
| 2) The Ghana Grains and Legume Development Board               | Promotion of soybean production to meet demand (300,000)   |
| 3) NARS of CSIR including Food Research Institute              | Develop improved varieties and improve nutrition of basic diets using a soybean.   |
| 4) University of Ghana (Home Science Department)               | Collaboration of FRI to develop recipes and training activities.   |
| 5) Bosbel vegetable oil mill                                   | Production of Soy oil and cake for marketing and distribution  |
| 6) Extension Services of Ministry of Agriculture               | Transfer of soybean production and utilization technologies  |
| 7) NESTLE Ghana Ltd.   | Produce soybean based high protein food for commercial purposes, for example, infant foods   |
| 8) Dodo Foods  | Production and marketing of soy based high protein foods   |
| 9) ADRA  | Distribution of soy based high protein food for children   |
| 10) Darkruby and Delabac Enterprises                           | Processing and marketing of soybean based food products: receive technical assistance and collaboration from Food Research Institute |
| 11) OAU/STRC-SAFGRAD   | Facilitated project support and implementation through funding of USAID and linkages with other projects.                            |

Training of producers and processors helped the diffusion of harvesting methods, processing and conservation techniques. Optimal harvesting methods can reduce harvest losses: as a result, production, therefore, income from its sale would increase. Several nutrition-rich food products have been derived that can be used as a food ingredient (in a millet-based meal) and at industry level (drinks, ice cream), thus allowing an improvement of the nutritional status of populations. Trained people have gained more knowledge about the fruit and also the tree that could lead to a better management of this forestry product.

Direct partners range from rural producers (individuals, men and women groups) to local processing industries through local and international research institutes (Table 12). Other potential users of project results are producer groups, rural populations, especially those in production areas (islands), women groups that process the fruit, local industrial units (ice cream, fruit drinks, etc.).

**Table 12: Partnership for developing and utilizing Ditax in Senegal**

| PARTNERS   | ORIGIN/AREA OF INTERVENTION | ACTIVITIES   |
|--|-----------------------------|--|
| Producer groups<br>Individual producers<br>Mar Fafaco Islands<br>Mar Lodge Islands | Djilor<br><br>Sine<br>Sine  | Production and management of forestry products (ditax)<br><br>Idem<br>Idem |
| Industrial processors:<br>La Galette   | Dakar                       | Ice cream production   |
| Women Groups   | Yungar                      | Gardening  |
| ISRA/DRPF: Agroforestry Research department  | Dakar                       | Agroforestry study   |
| ENEA-National School of Applied Economics*   | Dakar                       | Socioeconomic study (to be done)   |
| CIRAD/France   | Montpellier                 | Biochemical analyses   |
| SAFGRAD  | International               | Facilitates project support and implementation                             |

\* This school is expected to assign 1-2 of its graduates to carry out the socioeconomic study later this year.

Decreasing post harvest losses, for example fruits vegetables has been of the crucial support of WASGP particularly to improve the livelihood of women. Throughout the Sahel, Mango is an important tropical fruit both for domestic and export market. During peak season post harvest losses from 10 to 25 percent are common. Minimizing post harvest losses of various fruits, vegetables (by promoting community based food processing and storage) contributes to food security, and also enables food processors to take advantage of existing markets.

In Burkina Faso, the main beneficiaries of the project include women groups (Women Association) of Basnere, based in Ouahigouya, about 170 km North of Ouagadougou. The assistance to this group of women involves capacity building, introduction of technology for drying mango, potato, banana, papaya, tomato, onions, etc. both for export and local market. This activity has generated employment for 20 more women on a permanent basis. Furthermore, the Women Group raised their business gross income to the level of 12 513 000 FCFA (US\$20,855). This raised the gross income of permanent members of the association to the level of 1 808 000 FCFA (US\$3,000). The other beneficiaries of the project are farmers who sold mango to women association to the level of 899 275 FCFA (US\$1500 dollars). Since most of the mango has been received from Bobo area, some 300 km from processing site, transport cost amounted to 3 209 980 FCFA (US\$5,350).

The major partners in the support of the above project include are farmers who produce mango, other fruits and vegetable transporters (trucks and donkey cart, etc.), marketing partners (from Germany, England, Belgium, France, Italy and Swiss) which imported the dried and fresh mango and also provided material for packaging and OAU/STRC-SAFGRAD through USAID funding introduced technology and training in post harvest technology.

In Senegal, the Ndamé Lo Women Association (comprised of about 125 members) was supported in post harvest processing of mango, other fruits and spices. Local fruits and vegetables are highly perishable. Broad distribution and utilization of fruits and vegetables are limited due to lack of post harvest processing and conservation. To at least partially alleviate constraints of post harvest losses the WASGP supported the Ndamé Lo Women Association by linking the technical services of the Senegalese Food Technology Institute (ITA) to the above mentioned women association.

The overall objective of this project has been to enable rural women from N'dame Lo, Senegal to improve their conditions of living through increased employment and income from processed fruit and vegetables using research proven techniques. Specially, ITA has committed itself this project to:

- providing direct technical assistance to the woman group in acquiring and installing fruit drying equipment;
- training group members in proven fruit drying techniques and in running day-to-day operations of the facilities and
- assisting the group in finding outlets to the processed products.

Three activities were undertaken:

- equipment acquisition and installment,
- training and
- dried fruit and vegetable production.

ITA has constructed and installed two gas dryers in the village of N'Dame Lo (Thies region). These dryers add to the preexisting one bought by the woman group on a now completely reimbursed bank loan. A 42-square-meter building facility has been constructed.

ITA trained 15 members of the group in carrying out several operations of the drying unit (dryer operation, burning flames and temperatures setting and control, hygiene and security measures, etc), drying techniques (osmotic dehydration, leaves herbs and vegetable drying, etc.). These 15 women are responsible for training the other members of the 120-member group.

The acquisition of the two drying units has more than doubled the fresh fruit processing capacity of the overall plan from 150 to 375 kg/day. Production statistics during the 1<sup>st</sup> trimester of 2000 are:

- dried coconut: 80 kg
- dried mint leaves: 30 kg
- dried parsley: 10 kg
- morenga (?) leaves: 18 kg

Sales from this production generated a net income of 281 850 FCFA during the 1<sup>st</sup> trimester of 2000. A noteworthy remark is that dryers have enabled the group to diversify production towards new plant and leaf-based products appreciated for their nutritional value or their aromatic perfume. Of course, classic products such as fruits and vegetable still constitute the bulk of their production. Mango is the main one and accounts for at least 2/3 of their activity. Production plans for the next semester (June to November) are:

- dried mango: 1000 kg
- dried coconut: 300 kg
- mint leaves: 50 kg
- parsley: 50 kg
- morenga leaves: 50 kg

Sales receipts are used in various ways: cash flow funds, payments to members, savings in bank account, and contribution to village-level investments. Expected annual net income from sales in 2000 is around 6 000 000 FCFA (US\$10,000). Despite these production performances, findings market outlets is the main constraint for this women group. Group members attribute it to the lack of or poor advertisement efforts. So far, their main clients have been small stores and industries in Dakar such as "La Dakaroise des Fruits" and Free Work Services". They buy dried products from the group and package them for sale to consumers, mostly hotels, grocery stores and tourists. A potential buyer could be the Senegalese Army, which has selected the N'Dame Lo dried mango as part of its new "food ration for a soldier" which comprises processed product by local industries. The quality of their product and the fame of the N'Dame Lo women group (winner of the 1994 edition of the Head of State Grand Prize for women promotion) may explain their selection.

However, marketing difficulties may be related to other factors, besides information (advertisement): pricing (uniform price of 3000 FCFA/kg for all dried fruits), clientele targeting, substitutes (fresh, vs. dried mango for example), tastes and preferences, etc. Women group members have problems to access water to grow fruits and vegetables, fresh mangos from their own fields for the drying units.

An important partnership has been developed by the women group. Direct partners range from research and donors/facilitators to clients (Table 13). It should be mentioned that this women group has held long-standing relations with national and international partners (UNIDO, Government of Japan, AFRICARE, ACCT, ENDA and a Dutch NGO, CNCAS, Germany-Senegal Solar Energy Project, etc.).

**Table 13: Partnership Development by the N'Dame Lo Women Group under the Fruit Processing Project.**

| PARTNERS   | ORIGIN/AREA OF INTERVENTION  | ACTIVITIES  |
|--|------------------------------|---|
| Clients :<br>La Dakaroise des Fruits                   | Dakar                        | Buyer of processed fruits   |
| Free Work Services                                     | Dakar                        | Idem  |
| Army of Senegal  | National                     | Potential buyer of dried mango  |
| Women Group  | N'Dame Lo, Thies region      | Produced and processed fruits and vegetable.                                      |
| ITA-Food Technology Institute                          | Dakar                        | Technical assistance and training to N'Dame Lo women group.                       |
| SAFGRAD  | International partner        | Facilitator: provided funding through WASGP and facilitated linkages to research. |
| Photovoltaic Solar Energy Project<br>Germany – Senegal | Former International partner | Provided equipment for solar dryer  |
| CNCAS – Agricultural Credit Bank                       | National                     | Provided funds for acquiring one gas dryer  |
| UNIDO – UN Organization for Industrial Development     | Former International Partner | Provided assistance to women group in engaging into fruit processing.             |
| Government of Japan                                    | Idem                         | Funded the UNIDO Project  |
| ACCT – Agency for Technical and Cultural Cooperation   | Idem                         | Funded group to build storage unit, meeting room, packaging bags, etc.            |

## **Outputs**

Among the output, of the post harvest processing and improvement of the nutrition basic diets include:

- Improved nutrition (energy, vitamin, protein, iron, calcium, etc.) of basic diets which can impact better health for both rural and urban population;
- Increased production capacity of the fruit processing units with a combination of a solar dryer with gas dryers that also reduces drying time and alleviate workload for women;
- Increased employment and income: more women are being employed in the processing plant that has increased its production, thus more income to members, despite persistent marketing problems;
- Improved hygiene: required cleanliness practices at the plant have spilled over to family households, resulting in better hygiene conditions for them;
- Increased literacy for trained women members in accounting and bookkeeping;
- Increased capacity of the women group to contribute to community investment (schools, mosque, etc.).

## **Lessons**

- i) Strengthening partnership and linkages of key stakeholders, such as sources/or supply of technology to producers (farmers) and other-end users and consumers and limited financial support from donors initially and credit from financial institutions in the medium-term can lead to income generation and employment of involved communities.
- ii) The exchange of market information between countries and across borders by strengthening networking for market outlets is a way out to develop market opportunities both for local and export market.

### **III. CAPACITY BUILDING**

#### **3.1. Strengthening National Institutions**

One of the major thrust of WASGP has been to improve technical skills of food and raw material production for industry. The initiative undertaken by OAU/STRC-SAFGRAD involved the establishment of Focal Unit in NARS to serve as pathway of research results to extension, farmers and other end users of technology. The establishment of Focal Unit in the involved countries (i.e Burkina Faso, Ghana, Mali and Senegal) linked NARS Networks and IARCs, as sources of technology, to clients, such as farmers, microfood processors, agroindustry, etc.

The institutionalization of WASGP projects at national level also improved the monitoring and management of project by the grantees themselves in the involved countries.

One aspect of capacity building refers in strengthening Focal Units to facilitate technical exchange of information among partners, to organize training, workshops to improve technical skills; to address issues of technology transfer and the development of agribusiness; and to identify market demand for specific technology and agricultural commodities.

Technical workshops were held to particularly address and articulate issues of technical and socio-economic constraints that impeded the transfer and utilization of research results, as well as to strengthen functional linkages and partnership among key stakeholders engaged in development and transformation of agricultural produce into value-added products, the following workshop were organized.

National workshop was held on 16<sup>th</sup> April, 1999 in Ouagadougou, Burkina Faso. More than 30 participants from research, extension, micro entrepreneurs, food science and processing, and development support services attended the meeting. Institutional, technical and socio-economic constraints to technology transfer were identified and solutions to various constraints were proposed. The main theme has been: "Problématique de la valorisation des résultats de la

recherche". The committee was established to follow the implementation of the recommendations.

Workshop took place on 20 and 21<sup>st</sup> April, 1999 in Accra, where 43 participants from the public and private sectors including research, extension, the Ministry of Food and Agriculture, food processors attended. The main theme has been : Prospects for small scale enterprise development in Ghana. Social technical, and institutional problems encountered in the enhancement of technology transfer were discussed. Manpower training, accessing market information, and credits were recommended.

National workshop was held on 10 and 11 May, 1999 in Dakar, at ISRA. The main theme of the workshop include: Transformation and commercialization of agricultural produce Technical, social and institutional. Constraints were identified and their solutions were proposed. Committee was established to synthesize the deliberation of the workshop.

### **3.2. Improving Technical Skills**

As summarized in Table 14. About 430 men, 334 women and 47 children were trained in various aspects of food production and processing. These include in soybean utilization to improve the basic diets, commercial production of cowpea; seed increase of improved cultivars of millet, maize, cowpea and potato, modern husbandry of small ruminants, as on-farm enterprise and post harvest processing of fruits (mango) vegetables and spices in three participating countries.

Training to improve specific skills was embodied in each project. For example, in food science and technology several women (72), men (29) received practical training in development and processing skills.

In Senegal, 15 women trainers received short course at the "Institut Technologique Alimentaire" to train about 120 women of N'Dam Lo Association in post harvest processing of mango, other fruits, harvesting spices and condiments.

With regard to harvesting and post harvest handling of Ditax fruit 13 producers received training. The overall objective of the Ditax project is to improve the living conditions of rural population.

Furthermore, the seed increase project supported in Senegal provided short-term training to forty nine (49) participants. Thirty of them were farmers who received training in seed technology as out growers of certified seed (millet and maize). In collaboration with UNDP poverty alleviation project and other educational and rural development agencies, 19 technicians also received training in seed production technology and processing.

In Burkina Faso, 60 women were trained in post harvest technology, processing and marketing of mango and other fruits and vegetables. 93 men and 2 women received training in the commercial cowpea production, storage and conservation. In order to integrate the small ruminants microenterprise into predominant cropping systems in Mossi Plateau of Burkina Faso, 25 farmers were trained in feeding, sheltering, veterinary services and fattening of small ruminants. The seed growers private enterprise of Yatenga trained 15 representatives of producers groups in the production of improved potato seed for farmers users.

Furthermore, 95 farmers (55 women and 36 men) from five villages of Burkina Faso (Saltouko, Thiougou, Tiakane, Manega and Sagnogo) participated on the farm verification trials and improved skills in cowpea production using improved projection and agronomic practices

**Table 14: Training for improving technical skills and implementation of some WASGP activities**

| ACTIVITY  | MEN        | WOMEN                 | CHILDREN  | TOTAL      |
|---|------------|-----------------------|-----------|------------|
| <b>Training</b>   |            |                       |           |            |
| 1) Utilization of soybean for improving nutrient Content of basic diets in Ghana.                                       | 29         | 72                    | 47        | 148        |
| 2) Post harvest processing of mango, other fruits, vegetables, spices and condiments:<br>i) Burkina Faso<br>ii) Senegal |            | 60<br>and<br>110 (15) |           | 185        |
| 3) Commercial cowpea production storage, conservation and marketing in Burkina Faso.                                    | 93         | 2                     |           | 95         |
| 4) Increase of improved potato seed production in Burkina Faso.   | 15         |                       |           | 15         |
| 5) Post harvest handling Ditax fruit in Casamance region of Senegal.  | 13         |                       |           | 13         |
| 6) Millet and maize seed production technology of farmers as out growers of certified                                   | 49 (30) b  |                       |           | 49         |
| 7) Community seed production of cowpea in five villages of Burkina Faso.  | 36         | 55                    |           | 91         |
| 8) Farm demonstration and improved production of soybean in Northern Ghana.   | 170        | 20 (?) c              |           | 190        |
| 9) Improved husbandry of small ruminants (fattening, shetter and veterinary services) in Burkina Faso.                  | 25         |                       |           | 25         |
| <b>TOTAL</b>  | <b>430</b> | <b>334</b>            | <b>47</b> | <b>811</b> |

a - number in parenthesis refer to trainers

b - number in parenthesis refer trained farmers

c - estimated of women trained in the production of soybean

#### **IV. INSTITUTIONAL FRAMEWORK FOR THE IMPLEMENTATION OF WASGP AND PSAFS PROGRAMS**

The AFR/SD/USAID grant to OAU/STRC-SAFGRAD has been to put in place a national and regional mechanism linking major stakeholders in the areas of technology generation, transfer and farm-output commercialization involving the private sector, research and extension, farmers associations, policy makers, consumers and agro-industries. The program also aimed at improving capacity and efficiency for delivery of agricultural production support services. The medium term output of these programs can lead to the establishment and stabilization of agricultural growth, a condition necessary for poverty alleviation in the sub-region.

The activities of these programs also realized the weakness of NARS technology verification and transfer systems in the delivery of research results to farmers.

OAU/STRC-SAFGRAD in collaboration of partner institutions (NARS, the National Extension Systems, etc.) has put in place the following mechanisms to revitalize NARS approach, orientation, and capacity to enhance technology transfer by forging partnerships to facilitate the development of agribusiness.

##### **4.1. Strengthening collaboration with NARS**

Building upon on existing linkages and networking, a Memorandum of Understanding was established between OAU/STRC-SAFGRAD and respective benefiting countries of the program (i.e. Burkina Faso, Ghana, Senegal and Mali). The MOU defined: the purpose of the agreement; the establishment of the Focal Unit (FU) as the mechanism for coordinating and implementing project activities; the specific roles and responsibilities of partners in the implementation of project activities; channeling and use of approved funds; and reporting and liaising with the regional coordinating entity (SAFGRAD).

##### **4.2. The establishment of the Regional Technical Committee (RTC)**

This committee is comprised of NARS' Director, IARCs through networks, representatives from the private sector, women's groups, universities, micro-processors, etc. Some of the functions of the RTC are to: review and approve grant proposals based on established criteria; monitor implementation of project

activities; and provide guidelines to enhance efficiency of the implementation of project activities.

### **4.3. The establishment of Focal Units (FU) at National Level**

To ensure ownership and management of approved projects at the national level; OAU/STRC-SAFGRAD has facilitated setting-up Focal Units (FU) based on the established Memorandum of Understanding (MOU) with participating countries. In consultation with OAU/STRC-SAFGRAD, a Coordinator of the Focal Unit was identified from the existing staff of NARS.

Focal Units were established to: link NARS/or research results to clients; follow-up the implementation progress of projects at the country level; assist groups such as farmers, micro processors, and women's groups in the development of projects as well as to linking NARS research to development; organize national workshops to address issues that affect technology transfer and commercialization; submit biannual reports on project activities to OAU/STRC-SAFGRAD; undertake new initiatives and research for developing markets and facilitating the cost of production of agricultural technologies (including food processing) to improve competitiveness in local and international markets; facilitate the disbursement and justification the use of funds on project activities; and organize training, as well as the promotion of agri-business.

In Burkina Faso, the Focal Unit (FU) was established in 1998 – within the center of Research and Scientific Technology (CNRST) of Burkina Faso and links INERA to its clients, and monitored the implementation of the six projects at country level; and facilitated the transformation of research results into value-added products by working with processors, organizing workshops, training, etc. Through the consultation between CNRST and OAU/STRC-SAFGRAD, the coordination the Focal Unit was appointed.

In Ghana, FU became operational in 1998. The consultation between CSIR (Ghana) and OAU/STRC-SAFGRAD led to the appointment of coordinator who monitored the implementation of 6 projects; organized workshops, facilitate the development of proposals; and served as Secretariat to National stakeholders committee.

In Senegal, FU was established in 1998 and is based at ISRA headquarters. The FU monitored project implementation, promoted utilization of technology, linked ISRA research to users of results, organized workshops, training etc.

#### **4.4. National Working Committee**

In each country, a National Working Committee was established to guide the implementation of PSAFS. The overall function or Term of Reference of the NWC includes but not limited to:

- Revise and adopt work plan to meet national conditions,
- Monitor and review the progress of the implementation of approved work plan
- Harmonize activities of various stakeholders, minimize duplication and stimulate synergies and complementarities,
- Devise ways and provide advice for implementation of the activities contained in the work plan.

The membership of NWC in the participating countries slightly varies. In general, it is comprised of the public sector (NARS, extension, Ministries of Agriculture and Rural Development, Ministry of Planning Finance (in some cases), other financial institution, the private sector, farmers organizations, NGOs, and women organizations.

#### **4.5. Coordination and Management**

As outlined in Fig.2. SAFGRAD operates an autonomous agency within the Institutional legal framework and support of the organization of Africa Unity. Strengthening partnership with various research and development organizations including the private sector, agroindustries, etc. has been the key strategy of OAU/STRC-SAFGRAD for implementing programs/projects.

To sustain the flow of agricultural technologies from research to farmers and users, SAFGRAD utilizes its network linkages and collaboration with IARCs and other agencies.

Over the last three years, SAFGRAD collaboration with agroindustries/food processing industries, small to medium-scale food processors, have developed partnerships with various technology transfer and rural development agencies. These linkages have facilitated not only the exchange of experiences, but also to test and share workable innovations.

The broad areas of OAU/STRC-SAFGRAD Regional support include technical coordination to follow-up program implementation progress, financial disbursement and management, institutional support (such as training, workshops, management services), facilitation of exchange of technical information and sharing of experiences through its linkages and networks.

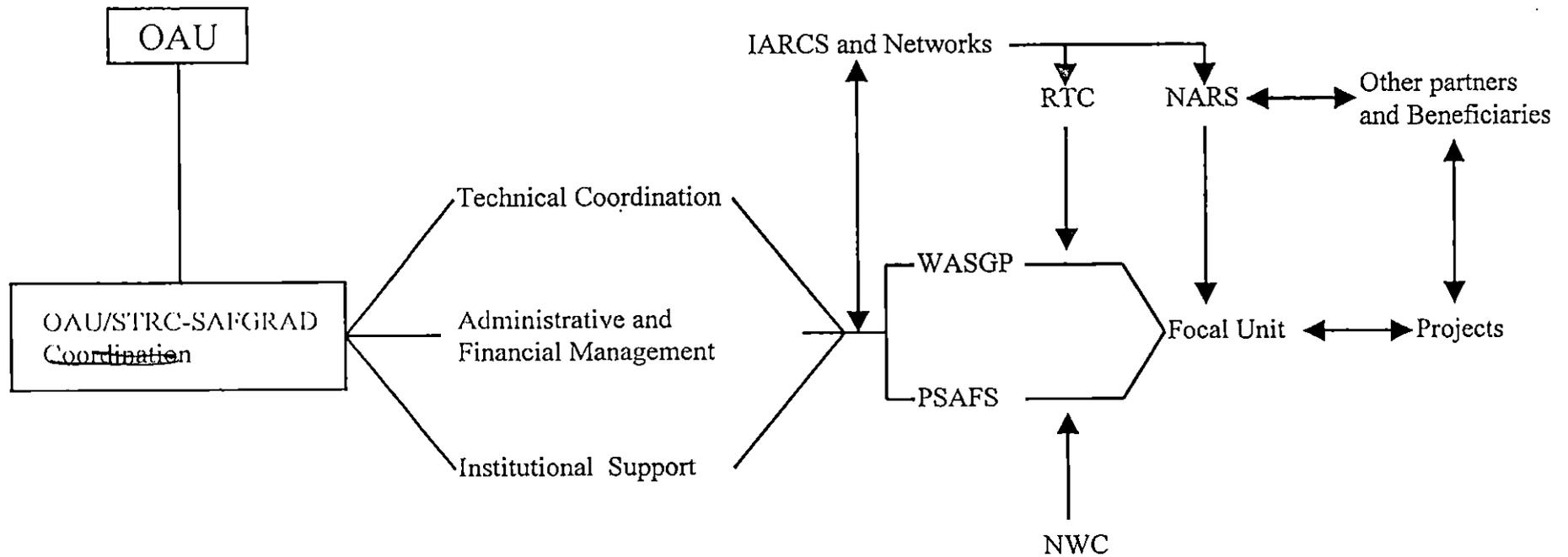


Fig. 2: Schematic outline of linkages and OAU/STRC-SAFGRAD Technical support for the implementation of WASGP and PSAFS Programs

|  |   |
|--|---|
| <p>OAU : Organization of African Unity<br/>         WASGP: West African Small Grants Program<br/>         RTC: Regional Technical Committee<br/>         NWC: National Working Committee</p> | <p>PSAFS: Production Support and Financial Services<br/>         NARS: National Agricultural Research Systems<br/>         IARCS: International Agricultural Research Centers</p> |
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