OAU/STRC – SAFGRAD

SEMI-ARID FOOD GRAIN RESEARCH AND DEVELOPMENT

Scientific, Technical and Research Commission of the Organization of African Unity

STAKEHOLDERS CONSULTATION WORKSHOP ON:

Agricultural Technology Transfer and Commercialization in Nigeria

9 to 11 April 2001, at IITA, Ibadan

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STAKEHOLDERS CONSULTATION WORKSHOP FOR ENHANCING THE TRANSFER AND COMMERCIALIZATION OF AGRICULTURAL TECHNOLOGIES IN NIGERIA 10 TO 12 APRIL, 2001 – IITA – IBADAN

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INTRODUCTION

The stakeholders Consultation Workshop for enhancing the transfer and commercialization of agricultural technologies brought together key actors from NARIs, ADPs, the private sector, policy makers, IARCs representatives particularly engaged to enhance growth of agriculture in Nigeria. Three sessions were held. The opening session emphasized the purpose, objectives and outputs of the workshop.

The technical session addressed the salient issues and constraints apparent to enhance micro-enterprise development, gave an overview on technology transfer in Nigeria, outlined current policies and practices of seed industry and fertilizer distributors. Furthermore, the experience and lessons in technology transfer and commercialisation from other countries have been documented.

The Institutional framework and mechanisms for implementing the project has also been discussed. Section three of this report presents the deliberations and recommendation of the two working group sessions that met concurrently. Gaps for improving technology transfer were identified and follow-up actions/recommendations to alleviate problems were proposed.

Issues related to strengthening linkages between producers and agro-industries, research and extension have been discussed. Among the issues addressed include supply of quality raw material to industry, response and orientation of research and extension to respond to the needs of food processors and related agro-industries. Gaps to resolve these issues were identified, as well as recommended actions. Section four of the workshop proceedings include presentation of six invited selected papers .

We hope the exchange of experience and consultations documented in this workshop proceedings will contribute to enhancing technology transfer and commercialisation of agricultural technologies in Nigeria.

On behalf of OAU/STRC-SAFGRAD, I seize this opportunity to express appreciation and since gratitude to USAID for its financial support to organize the workshop; to IITA for its usual technical support and hosting the workshop and to the Government and people of Nigeria for creating the enabling environment and hosting the workshop.

Taye BEZUNEH
International Coordinator
OAU/STRC-SAFGRAD

STAKEHOLDERS CONSULTATION WORKSHOP FOR ENHANCING THE TRANSFER AND COMMERCIALIZATION OF AGRICULTURAL TECHNOLOGIES IN NIGERIA 9 TO 11 APRIL, 2001 – IITA – IBADAN

I. OPENING SESSION

The Stakeholders Workshop on the Transfer and Commercialization of Agricultural Technologies in Nigeria took place on 9-11 April, 2001, at IITA, Ibadan. 36 participant from key National Agricultural Research Institutes (NARIs), the IITA, ADPs (Agricultural Development Programs) of few states, the private sector such as oil mills, agric entrepreneurs, informal and commercial seed producers in Nigeria attended the workshop. Furthermore, a senior economist from ECA, as resource person, the Executive Secretary, OAU/STRC, and the representative of USAID Mission in Nigeria also attended and facilitated the deliberations of the workshop.

The International Coordinator of the OAU/STRC-SAFGRAD briefly discussed the primary purpose and objectives of the workshop. Representative of USAID Mission Nigeria emphasized the expected out put of the workshop first, to delineate key areas of program interventions and plan of actions; and second, to establish partnership mechanisms and linkages among key stakeholders but centered on improving the livelihood of farmers through effective transfer and commercialisation of agricultural technologies.

The Executive Secretary, OAU/STRC, first extended the best wishes for successful workshop on behalf of the Secretary General of the Organization of African Unity. He stressed, however, that OAU/STRC promotes the application of science and technology as an instrument for establishing a vibrant African Economic Community. Furthermore, he recalled that there has been fruitful collaboration of OAU/STRC and CGIAR institution, for example, partnership with IITA involved in the initiation and facilitation implementation of Africa wide biological control of mealy bug on cassava are the implementation Semi-Arid Food Grain Research and Development Program (SAFGRAD). Furthermore, he stressed the successful implementation of West African Small Grants Program i.e. promoting technology transfer and commercialisation of agricultural technologies calls for dynamic collaboration and partnership of key stakeholders

In his concluding remarks, the Executive Secretary, STRC, expressed sincere gratitude to IITA for its technical support and partnerships; to USAID and its Mission in Nigeria, for its financial support and the Government of Nigeria and IITA for hosting the workshop.

PURPOSE

Technology options that could substantially increase agricultural productivity of various crop commodities including livestock production in Nigeria do exist. But farmers and other end-users of agricultural technologies have yet to fully benefit from results of research to improve their livelihood.

The Primary purpose of the workshop has been to:

- Facilitate the sharing of experience among key stakeholders engaged in technology transfer, provision of improved production inputs and financial services that enhance commercialization of agriculture by small-scale farmers;

- Take stock of the economically feasible and environmentally sound technology options and best practices that promote their transfer and commercialization;

- Establish institutional mechanism and guiding principles for implementing the project on agricultural technology transfer and commercialization in Nigeria.

OBJECTIVES

The main objectives of the workshop include but are not limited to:

- Identify key areas of program intervention (actions i.e. technology domains/or options) that enable small-scale farmers and food processor micro-enterprises to generate income and employment.

- Facilitate the exchange of lessons learned and best practices in other countries of the sub-region, the transfer and commercialization of

agricultural technologies through the implementation of the West African Small Grants Program (WASGP).

- Establish common guidelines and principles for elaborating and developing projects that enhance the transfer and commercialization of agricultural technologies.

- Identify key partners, (private and public sector institutions, farmers, women groups, agro-industries, NGOs, and other beneficiaries of the program) engaged in the commercialization of agriculture by promoting agribusiness through the transformation of farm produce into value-added products.

- Establish institutional and procedural mechanism for project planning, implementation and monitoring.

- Establish common approaches and methodologies for incorporating innovative interventions in each project activity that enhances food security, and income and employment generation.

During the plenary and separate sessions, participants reviewed technology transfer pathways and make analysis with particular reference to input delivery systems and identified lessons learned and best practices first, to enhance food security; second, to document (if any) experiences or success stories linking small-scale agriculture to market outlets, to generate income and employment and third, to identify areas of comparative advantages and opportunities of Nigerian agriculture to develop agribusiness for both domestic and export markets.

OUTPUTS

Among the expected outputs of the workshop include:

- Identification of definite areas of program intervention and plan of actions;

- Delineation of project target groups and the nature of small grant activities;

- The setting of mechanism for strengthening linkages and partnerships between farmers and agro-processing industry so as to broaden market opportunities;

- The evolution of guidelines for project development and screening; and

- The establishment of institutional mechanisms for co-ordinating and managing project activities in Nigeria. These include:

    - The organization of a National Steering Committee involving key stakeholders to provide guidelines and an oversight on project implementation; and

    - The future establishment of Focal Units to monitor implementation of pilot projects in collaboration with appropriate agricultural research institutes and development organizations.

II. TECHNICAL SESSIONS

The focus of the first technical session of the workshop has been on:

2.1. Agricultural micro-enterprise development.

Three types of micro-enterprises were identified i.e. production, manufacturing and trading. These types have various units within them and are characterized by low-level linkages with modern agricultural technology. The micro-enterprises although in size, collectively they make monumental and significant economic and social contributions.

The presentation identified the constraints to agricultural micro-enterprise development in Nigeria. These constraints could be institutional or operational. The presentation proffered strategic framework and options for enhancing agricultural micro-enterprises. These include among others:

- The need to increase the organized private sector participation in agricultural MES such as multiplication and dissemination of improved seeds. A community based system was proposed.

- Establishment of workable extension programs that can tackle specific problems with measurable indices of performance for each expert/extensionist.

- Donor support of functional and effective micro-credit NGOs that target farmers.

- Forging of sustainable partnership among key stakeholders in technology generation, transfer and utilization.

- Strengthening linkages between donors and communities involved in technology transfer.

- Developing programs that link local and export markets to agro-industries.

2.2. An overview of the Technology Transfer and Commercialization Program in Nigeria

The presentation highlighted the issues relating to and problems of agricultural development in Nigeria. The technology transfer and commercialization project in Nigeria has the goal of improving the livelihood of resource poor framers through the promotion of agribusiness. The project will undertake an inventory and document experiences in technology transfer and commercialization, help to identify promising agricultural technologies, limitations to their commercialization, and intervention required to promote commercialization. The project will also help to establish and revitalize linkages towards the stimulation the growth of the agricultural sector. The presentation emphasized the need for NARS to conduct demand-or user-driven research.

One of the major assumptions of the project is the availability of improved technologies. It was emphasized that the technologies in mind for the West African Small Grants Program (WASGP) must not only be commercially viable but environmentally sustainable. The presentation stressed the necessity for intervention in the production and distribution of improved seeds and in post harvest activities to minimize losses of agricultural produce. The criteria to be used for

screening proposals for the WASGP were discussed. It was emphasized that Focal units will coordinate the implementation of projects at the national level. In addition, the established of a National Steering Committee comprising of NARIS, representatives, the private sector, food processor and agro-industries was discussed. Among the function of the National Steering Committee include to review and screen of proposals.

2.3. Current policies and practices in seed increased related input distribution.

The presentation addressed two major issues viz. Seed and fertilizer. Efforts at making seeds available to farmers through the on-going community seed development program was highlighted. The paper pointed out ADPs as the driving force of agricultural development in the states, through the promotion of improved seeds and other promising technologies. Less than 10% of the required certified seeds will be available by 2003. It acknowledged the need for greater private sector participation in the seed industry. Two reasons for low use of improved seeds were given as:

2.3.1. high prices; farmers are not highly empowered.

2.3.2. non availability of seeds within close proximity of farmers. Farmers are not willing to look for seeds beyond 80 km from their locations.

The problem of leakage in the fertilizer distribution network was stressed as a major problem of agricultural development in Nigeria. Liberalization and greater participation of the private sector in fertilizer procurement and distribution is imperative. An information system that makes statistics of fertilizer and cost available across Nigeria is required.

2.4. Experience of technology transfer and commercialization from other West Africa countries.

Lessons learned from the West African Program (WASGP) in Burkina Faso, Senegal and Ghana was discussed. Among the lessons of WASGP in technology transfer and commercialization in the above mentioned countries reported include:

i) NARS and IARCs, as technology providers have unfinished work to pursue, for example, in assessing the cost of agricultural production technologies. Recommendations regarding varieties, hybrids, etc. without determining the profitability and the market demand of technologies will not lead to improving the competitiveness of African agriculture. Linkages and partnerships of NARS and IARCs to clients, such as farmers, food processors in particular and agroindustries in general, are crucial to broaden market opportunities and promote the transformation of agricultural production into value-added products.

ii) Contractual agreements are crucial in formally linking farmers to market opportunities, securing the provision of quality products and services, reducing transaction costs, and fostering accountability among parties. Contract between farmers and industrial processors are an efficient arrangement to ensure supplies of quality raw materials for processing units. However, the capacity of farmers to negotiate and sign legally binding and enforceable contracts with industrial partners is weak. Provision of market information and storage facilities can strengthen the ability of farmers to negotiate contracts. There is, therefore, a need to organize and train farmers to improve their management capacity, and access credit to avoid distress sales, etc.

iii) Small farmers and/or their associations can meet the demand of certified seed at the community level. Assistance to private seed producers enterprises requires sustained linkages to research and extension, training in seed business management, easier access to financial resources and physical facilities for seed cleaning, storage and processing and organization of farmers. Meeting these conditions requires further technical and financial assistance to enhance the sustainability of the seed production enterprises.

iv) Institutional mechanisms established at the national and regional levels, such as the Focal Unit in NARS and Regional Technical Committee have not only linked research to development but also improved ownership and the desire to manage country – level projects. Furthermore, the mechanism put in place has minimized the hurdles for moving research results to clients by forging partnership among key stakeholders.

v) The model employed for technology transfer, utilization and commercialization involved strengthening partnerships among key stakeholders, such as the suppliers and users of technologies. The model has revitalized not only the technology generation, transfer systems and linkages to market as a continuum process, but also improved the generation of income and employment of the involved communities.

2.5. Mechanism for implementation the project

The International Coordinator of SAFGRAD presented a paper on ***"The Framework for Developing and Implementing the Project on the Transfer and Commercialization of Agricultural Technologies in Nigeria"***. Initially, the paper outlined the main issues that constraints that impeded growth of the agricultural sector in Nigeria. These include:

- Neglect for developing the agricultural sector over the last two decades.
- Steady decline of per capita production since 1980s
- Lack of market liberalization to enhance the transition of agricultural production support services from public to private sector.
- Lack of private investment led agricultural development .
- Enhancing the participation of women in technology transfer and in agribusiness by accessing technologies that will lead to microenterprise development.

The paper also emphasized that the primary goal of this project in Nigeria is to improve the livelihood of resource poor farmers, small to medium-scale food processors by improving the efficiency of technology transfer. The main thrust of the project activities will be to promote agribusiness and on-farm micro-enterprise development to particularly generate income and employment. Micro-enterprise activities are known to contribute between 40 to 70 per cent of gross domestic product in Nigeria.

The concept and strategic framework of the West African Small Grants program (WASGP) was discussed. The purpose of the West African Small Grants Program in Nigeria is first, to enable small holders farmers improve food productivity beyond their immediate household needs; second, to diversity farm income by identifying and linking market opportunities to smallholder farmers and food processing; third, to optimize the utilization of post harvest technologies to enhance the transformation of agricultural produce into value added products and fourth, to improve the nutrition quality of basic diets through food processing and formulations and improvement of technical skills. The paper also discussed the key areas of the program interventions. These include:

- Innovative interventions for enhancing food security
- Interventions in post harvest activities to minimize loss of food and to add-value to agricultural produce.
- Strengthen linkages between producers (farmers) and agro-industries to produce quality raw material and to create market demand for food and industrial crops.
- Interventions for improving the nutritional quality of basic diets in Nigeria.
- Promoting private seed production enterprises.
- Capacity building
  - Training and seminars in post-harvest technology
  - Organizing producers association to enhance collective marketing of farm produce
  - Improving the governance of cooperatives, women groups, etc.

The International Coordinator, also discussed the strategy for coordinating and managing the project. The project implementation strategy include:

- Strengthening of partnership between stakeholders such as suppliers and user of technology.
- Determining innovative options, economic feasibility and market demand for agricultural technologies/commodities.

- Improving institutional enabling environment for enhancing technology transfer by establishing Focal Units (to strengthen linkages) with appropriate NARIS or ADPs.

- Organize national workshop to address issues that affect technology transfer and commercialization.

The Framework for Implementing the Project include the following:

i) Establishing operational Memorandum of Understanding (MOU) between OAU/STRC-SAFGRAD and selected National Agricultural Research Institute or ADPs of Nigeria to put in place a Focal Unit for technology verification and transfer. This MOU specifies the role and responsibility of partners in the implementation of the project.

ii) The establishment of Focal Units (FU). Three Focal Units will be established within appropriate institutions of research and development to facilitate the flow of technology and related services. Each Focal Unit will have Coordinator who is identified through consultation between particular NARIs or ADPs and OAU/STRC-SAFGRAD.

Within the framework and agreed MOU, Focal Units are to:

- Coordinate the implementation of projects at national level;

- Assist groups such as farmers, micro food processors, and women's groups in the development of projects as well as to linking NARS research to development;

- Organize national workshop to address issues that affect technology transfer and commercialization;

- Submit bi-annual 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 of funds from SAFGRAD, as well as to follow-up the justification of the use of funds by project beneficiaries.

iii) Operationalizing National Technical Steering Committee (NTSC)

This National Working Committee will be comprised of NARIS Directors, representatives from the private sector, food processors and agro-industries, farmers and IARCs networks.

Some of the function of the committee will be 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.

iv) Coordination and Management Mechanism

OAU/STRC-SAFGRAD coordinates and follows up the implementation of project activities. Some of SAFGRAD's other responsibilities include the disbursement and management of grant funds, and the facilitation of program reviews and evaluations. Accountability of the fund used in relation to achievement of project activities is the responsibility of the OAU/STRC-SAFGRAD.

SAFGRAD operates as an autonomous agency within the institutional legal framework and support of the Organization of African Unity. Strengthening partnerships with various research and development organizations including the private sector, agro-industries, etc. has been the key strategy of OAU/STRC-SAFGRAD for enhancing commercialization of agriculture.

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 five years, SAFGRAD has developed partnerships with agro-industries, medium-scale food processors in several countries.

While the above institutional framework has been endorsed, the paper also outlined general criteria that should be taken into consideration in the elaboration and development of proposals. These include:

Type of Program

- Relevance to objectives of the project
- Private sector orientation
- Objectives achievable
- Sustainability

Choice of Technology

- Simplicity to transfer
- Income generation potential
- Demand for technology

Work Plan

- Activities address achievable objectives
- Schedule of plan attainable within indicated time frame (2 years)
- Attainment of expected output

Linkages and partnership

- Potential for strengthening linkages and complementarity
- Private sector involvement

The participants, however, stressed of the need to develop guidelines and formats and distribution to facilitate the development of proposals.

III. WORKING GROUP SESSIONS

Group one: Issues discussed

Access and affordability to improved agricultural technologies to small scale farmer.

i) What technologies are available?
ii) Where are they located?
iii) What stage/Stages are the technologies at?
iv) What are their costs and technical easibility?
v) What gender issues are likely to impact on the accessibility and affordability of these?

Group Submission:

i) Technologies are available across the different agroecological zones

ii) They are also related to the different agricultural commodities

iii) Specific technologies reviewed are easily transferable and can be commercialized. In the livestock subsector, two specific technologies are identified:
- Peri-urban dairy project and
- Animal fattening

iv) Commercializable technologies available from NCRI, Badegi include:
- Seed Production
  * Rice
  * Soybean
  * Beniseed
  * Sugarcane
- Processing/Utilization
  * Soybean
  * Rice
  * Brown Sugar
- Onion Production
- Millet Processing

From Sahel-Sudan Savanna Zone

v) Other technologies:
- Fruit/Vegetable Processing
- Fish Drying (Dakar Technology)

Identification of Gaps for Improving the Efficiency of Technology Transfer

Gap:

- Seed Production Technology Transfer
- Paucity of funds to support the activities of the NSS, ADP and out growers
- Weak seed delivery system in rural areas (collapse of farm development centers in ADP operational areas).

Recommendations

- Strengthen the linkage between seed producers and farmers
- Creation of awareness of seed availability, seed cost and seed characteristics
- Encouragement of the participation of the private sector
- Minimization of government involvement in direct seed production
- Major commercial seed companies can work within existing framework to enhance community Seed Enterprise.
  - this will increase the production of critical seed need of farmers

Recommendation for Livestock Sector

- Development of local feed sources should be encouraged to sustain the profitability of the livestock technologies (referred to earlier)
  - specific mention was made of the utilization of cassava peels for feed formulation.

Extension Delivery

Major Problem: Declining effectiveness of the Extension Services as a result of:

- Increasing gap in the Extension Agent – Farm Family ratio
- Reduction in the mobility of Extension agents
- Inadequate and irregular funding of the Extension system
- Declining focus in the training and human resource development the ADP system

Recommendations

- Maintaining a ratio of at least one extension agent per 1000 farmers
- Provision of necessary mobile facility
- Improving the regular training of East
- Providing sufficient sustainable operating funds and timely too.

Identification of Best Technology Options to Enhance the Transformation of Agricultural into Value-Added Products

- Processing at the level of farmers and agro-industrialists is implicated in the overall transformation of produce to enhance value-added status. The group noted the

- Gap in information regarding availability of affordable processing units for the small-scale farm operators.

- Absence of commercialization of prototypes of equipment designed at research centres:

Recommendation

- Awareness of the existence of equipment phototypes should be created amongst farmers and fabricators

- Fabricators should be encouraged to make more efforts at commercialization.
- Developers of phototypes can be induced to commercialization.

- Developers of phototypes can be induced to commercialize developed equipment as a means of proving their applicability and reliability.

Access to Microfinance, Constraints and Best Practices

Problems

- Access and availability of funds for agricultural development are major limiting factors.

- Prevailing collateral requirement by lending institutions.

- Current government policies or lack of these seem to limit the scope of farmers' operations.

- Constraints in farmers knowledge of available financing institution and requirement.

Recommendation

- Creation of Revolving Fund to administered using Extension Agencies and NGOs working with farmer' groups.

- Syndication of Banks to provide needed financing to farmers with the government providing the collateral backing.

- Syndication of Banks to provide needed financing to farmers with the government providing the collateral backing.

- Training of farmers by Extension Agents to build their own capital with which they can service their operations.

- Training of bankers on working with farmers – a new orientation which can change banker's attitude and relationship with the farmer.

- An innovative and best practice approach can be adopted as is the case in Kano Fadama Farmers Association – An FAO "See Capital" was provided in farm of equipment and other inputs. However, the "Seed Capital" could be used as a "base revolving fund" which is owned by the farmers themselves.

3.2. GROUP TWO: Issued Related to Strengthening Linkages Between Producers and Agroindustries, Research and Extension

Constraints and problems of agroindustries in relation to supply of raw materials

Major problem: insufficient supply of quality raw materials because of the following reasons:

- Poor linkages between agroindustries and producers

- High price: high cost of production within Nigeria compared to imported goods
- Poor quality: no standardization to allow quality control at supply level
- Difficulty in collecting outputs
- Absence of futures market (FM)
- Type of grain available not suitable to flour that is demanded
- Industry not innovative enough to induce change in tastes and preferences by promoting new products.

RELEVANCE OF REASONS BY TYPE OF AGROINDUSTRY:

REASON	BREWERIES	OIL MILLS	FLOUR MILLS	FOOD PROC	TEXTILES	FEED MILLS	SUGAR CONFEC-TIONNARY	PHARMA-CEUTICAL
1.Poor linkage	X	X	X	X	X	X	X	X
2. Price		X	X			X	X	X
3. Poor quality	X	X	X	X	X	X	X	X
4. Diff. Collec.	X	X	X	X	X	X	X	X
5.No FM	X	X	X	X	X	X	X	X
6. Not suitable grain			X					
7. Not innovative			X			X		

Poor Linkages: related to the structure of the agricultural sector, which does not facilitate direct links between agroindustries and farmers, but allows the presence of intermediaries.

Recommendation:

- Industry should establish direct links with intermediaries(which could be individuals or Farmer Associations) through Futures Markets.

- Contracts under the Futures Markets scheme should be in writing, legally binding and enforceable.

- Industries need to be innovative: introduce new products.

Another Problem: Storage

- WASG Program assistance needed at farm level

- Agroindustries need to improve their storage capacity

Response of Research and Ag Development Agencies to Meeting needs of Agroindustries and Food Processors.

Agroindustries

Link research centers with agroindustries for:

a) Specification of needs with respect to:
   - Type of inputs: seed, others
   - Yields
   - Quality
   - Other product attributes: shape, form, etc.

b) Packaging materials

c) Industry technology research center for the provision equipment, spare parts, and general maintenance.

d) Downstream assessment of consumer response to products: feedback to research.

Food Processors

Link research centers with food processors in the areas of:

a) Training of food processors in processing technology
b) Packaging of final products
c) Small equipment development for processing

Strengthening Partnerships between Producers and Agroindustries to Enhance Production of Raw Materials

- Need for constant exchange of information between producers and agroindustries through:
  - extension agents
  - field days
  - ag radio and TV programs
  - field visits by agroindustries to farmers and vice versa

- Establishment of futures markets arrangements to encourage producers to produce specifically for agroindustries.

- Backward contracting with specific producers through timely provision of inputs.

- Involve agroindustries in REFILS (Research Extension Farmer Input Linkage System) through participation and funding.

- Establish farm-level storage and agro processing infrastructure using NTC model.

ACCESS TO MICROFINANCE: CONSTRAINTS AND BEST PRACTICES

Constraints

1. Non organization of farmer associations with common interest
2. Poor access to micro finance by farmers
3. Non registration of many existing farmer associations inhibit assistance to them
4. Absence of regular monitoring of grants to farmers
5. Lack of flexibility in administering grants

Best Practices

- Farmers with common interest need to be organized at community and ADP level
- Access to microfinance is better in kind than in cash
- Need for farmer association to be legally registered
- Need for constant monitoring of grant management
- No rigidity in the process of administration of grants

Identifying Gaps and Recommendation for Action

GAP 1: Farmers are not producing enough quality raw materials needed by agroindustries

ACTIONS:

- Agroindustries should provide required inputs and/or information to farmers to encourage them to produce to specification.

- Need for backward contracting with farmers and for forward contracting (futures markets) with agroindustries.

GAP 2: No coordination, cooperation, collaboration among agroindustries to streamline messages sent to producers of raw materials.

ACTION:

- Need for agroindustries to cooperate, collaborate and coordinate actions towards producers of raw materials.

GAP 3: Lack of trust in implementing contracts

ACTIONS:

- Lobbying groups should be established to represent farmers and agroindustry interests
- Need for press to provide back up support and fight for the interest of farmers and agroindustries.
- Extension agents should educate farmers on their civic duties and rights.

In conclusion, the group recommends that strong linkages should be established between farmers, agroindustry, research and extension.

IV. SELECTED TECHNICAL PAPERS THE SEED INDUSTRY IN NIGERIA

4.1. CURRENT POLICIES AND PRACTICES IN IMPROVED SEED AND RELATED INPUT DISTRIBUTION IN NIGERIA

Extracted from paper presented
By: Dr. Salisu Ingawa, Director, PCU

4.1.1 INTRODUCTION

The Federal Government of Nigeria formulated its first comprehensive agricultural policy in 1985. The policy instrument were composed of macro-economic policies, agricultural sector policies and policies for the support services.

The macro-economic policies included commodity pricing, trade, exchange rate and agricultural land policies. The sector specific policies included food production, input supply and subsidy administration while the support services policies included agricultural technology generation and extension, agricultural credit, insurance, produce marketing and research. The major objective of these policies was to reinforce agriculture's contribution to food security, employment, and provision of raw materials and foreign exchange in the Nigerian economy.

4.1.2. Current situation/seed sub-sector policy

The national seed policy guidelines for the development of the seed sector. The national agency responsible for coordinating development, monitoring policy and implementing quality control in the national seed system is the National Seed Service (NSS) within the Federal Department of Agriculture, (FDA) of the Federal Ministry of Agriculture and Rural Development (FMARD).

Government's commitment of the development of an effective national Seed Program has been shown through several intervention programs in the past – the National Seed and Quarantine Project (NSQP), the National Accelerated Industrial Crops Production Program (NAICPP) and the on-going Community Seed Development Program (CSDP) which is essentially a Seed diffusion strategy aimed at popularizing the use of improved, high quality seed among

rural farmers who usually rely on seed either saved from their farms or exchanged with their close farmers in the same vicinity. The National Seed Policy led to the development of a National Seed Plan up to the year 2000. The key goals of the Seed Policy are to:

- Support varietal improvement, registration, release and multiplication of released varieties,
- Improvement in quality of seed sold to farmers,
- Re-orientation of the operation of public sector agencies along commercial lines and;
- Encourage greater private sector participation in seed operations through appropriate policies and promotional activities.

4.1.3 Strategy of the National Seed Policy

The National Seed Policy has rationalized roles and responsibilities of the public and Private sector agencies in the seed industry. This is in furtherance to the objective of making high quality seed within easy reach of farmers. The rationalized roles are as follows:

National Agricultural Research Institutes (NARIS)

a) Cultivar Research and Development
b) Variety Testing and Release
c) Varietal Maintenance
d) Breeder Seed Production.

National Seed Service (NSS)

a) Foundation Seed Production and Distribution to certified seed producing agencies in the States/Local Governments and Private Sector;

b) Certification and Quality Control for all classes of seed (i.e. Foundation and Certified Seed);

c) Seed Law Enforcement for all traded seeds in the states and Local Government Areas;

d) Development of National Seed Industry through provision of promotional activities.

Agricultural Development Projects (ADPs)

Agricultural Development Projects have a major role in promoting the use of improved seed in their respective states since they are the custodians of agricultural development activities in the states. The roles below are by no means exhaustive but it is our belief that those highlighted are very crucial to the survival of the seed industry in Nigeria.

Adaptive Research and Extension

The activities aimed at promoting the use of improved seed through ADPs are:

i) On-Farm-Adaptive Research (OFAR)/Small Plot Adoption Technique (SPAT) on:

a) Certified/uncertified seed comparison
b) Hybrid/Open pollinated
c) Disease/Pest control e.g. downy mildew gall midge, etc.

ii) Participation in the in-house review/cropping scheme meetings of the NARIs as well as zonal extension workshops and Monthly Technology Review Meetings (MTRMs).

iii) Highway demonstration trials.

iv) Field days.

Local Government Areas (LGAs)

a) Community Seed Development activities.

The Private Sector

The private sector is involved in the following:

i) Cultivar development of privately bred lines, over which they enjoy proprietary rights (Hybrids/Open pollinated).

ii) Certified seed production and distribution

iii) Exclusive right for production and marketing of Hybrid seeds.

iv) Support for seed promotion/marketing activities.

v) Establishment of Internal Seed Quality control System.

vi) Seed Export: Take advantage of enabling environment created by Government to export seed.

These rationalized roles and responsibilities are in consonance with the policy of decentralizing seed production and marketing to States and the Local Governments with greater private sector participation aimed at providing ready access to improved seeds by farmers.

4.1.4. Improved Seed Distribution in Nigeria

Improved seeds offer not only one of the cheapest and basic potential means of increasing yield from unit area, but it is also one of the critical determinants of benefits derivable from other agro-inputs such as fertilizers, herbicides, insecticides and irrigation water, etc. However, production and distribution of improved seeds developed by Researchers have been seriously hampered by several factors, especially in the rural areas. Several reasons have been adduced for this apparent low use of improved seed. Some of these reasons include:

- High price of improved seed as compared to traditional varieties.
- Unavailability of improved seeds within close proximity to farmers. (a recent survey conducted by erstwhile APMEU, shows that the maximum range farmers are willing to travel in order to get improved seeds is within 0-80 km radius).
- Lack of proper awareness on the potential benefits of improved seed over and above traditional varieties.

Consequently, the adoption rates for many of the very popular crop varieties in Nigeria have been estimated to range between 2% in Millet to about 25% in Maize, which happens to be one of the most popularly adopted crop in Nigeria.

Classes of Seed

The Crop Variety and Livestock Breeds, Registration and Release Decree of 1987 and the National Agricultural Seeds Decree 72 of 1992 currently regulate seed production and distribution. The existing regulations recognize three classes of seed:

- Breeder Seed – BS;
- Foundation Seed – FS
- Certified Seed – CS

Breeder Seed Production

The National Research Institutes (NARIs) (i.e. Institute of Agricultural Research IAR, National Cereals Research Institute – NCRI, National Root Crops Research Institute – NRCRI. Institute of Agricultural Research and Training – IAR 1 T, Lake-Chad Research Institute – LCRI and National Horticultural Research Institute – NIHORT have the responsibility for cultivar development, maintenance and Breeder Seed Production of their respective mandate crops. The International Agricultural Research Centres (IARCs) support the NARIs to realize these responsibilities. The NARIs and their mandate crops are shown below:

TABLE 1: RESEARCH INSTITUTES AND MANDATE CROPS

RESEARCH INSTITUTE	LOCATION	MANDATE CROP
IAR	Zaria	Sorghum, Maize, Groundnut, Cotton, Cowpea
NIHORT	Ibadan	Vegetable and Horticultural Seeds
NCRI	Badeggi	Rice and Soybean
LCRI	Maiduguri	Wheat and Millet
IAR & T	Ibadan	Maize
NRCRI	Umudike	Cassava, Yam, Irish, Potato
IITA	Ibadan	Cowpea, Yam, Maize, Soybean, Cassava
ICRISAT	Kano	Sorghum, Millet, Pigeon pea, Groundnut, etc.
WARDA (IITA)	Ibadan	Rice

Foundation Seed (Uptake by ADPs) production 2000/2001

The Agricultural Development Projects (ADPs) lift Foundation Seeds from the NSS and produce Certified Seed of Open-Pollinated varieties through their out-growers

and market them through the Farmers' Supply Companies (FASCOMs), or the Agric/Input Supply Companies (AISC) and the Commercial Units of the ADPs. These out-fits reach the rural farming communities through the Farm Service Centres (FSC)/Agro-Service Centres.

TABLE 2: **FOUNDATION SEED (FS) UPTAKE BY ADPS 1999-2000**

CROP	YEAR	
	1999	2000
Soybean	**6.8 tons**	**5.8 tons**
Groundnut	**12.2 tons**	**7.8 tons**
Wheat	**5.5 tons**	**7.0 tons**
Rice	**93.9 tons**	**51.8 tons**
Cotton	**302.8 tons**	**455.6 tons**

The low uptake of FS by the ADPs was partly due to poor seed market generally, lack of funds by the ADPs and partly due to over-recycling of seed by certified seed growers and the farmers.

Certified Seed Production

In 1999 total certified seed production was 4,324 metric tons which represents just about 5-10 percent of total seed required to meet expected grain production of 32.471 million metric tons as envisaged by the vision 2010 report (PRSD, 1996). This implies that the bulk of seed planted by farmers is sourced from informal sources notably farmer saved seed or from open market. Table 3 presents available certified seed for the year 2001 as a percentage of seed used by Nigeria farmers in their current food production effort.

TABLE 3: ESTIMATED % CERTIFIED SEED IN RELATION TO TOTAL SEED USED BY FARMERS FOR NINE (9) ARABLE CROPS

CROP	TOTAL NATIONAL LAND AREA FOR EACH CROP HA (M)	TOTAL QTY OF SEED REQUIRED (MT)	AVAILABLE CERTIFIED SEED USED AS % OF TOTAL SEED REQUIRED BY FARMERS			SEED MULTIPLICATION FACTOR USED
			2001	2002	2003	
MAIZE	5.0	125,000.0	1.14	3.3	2.7	50
RICE	3.0	151,900.0	0.42	5.6	6.1	40
SORGHUM	5.2	51,930.0	0.13	3.4	4.9	60
SOYBEAN	4.1	42,490.0	0.18	1.1	0.2	27
COWPEA	1.7	42,925.0	0.07	1.2	0.9	24
GROUNDNUT	3.8	150,400.0	0.04	0.6	0.02	20
MILLET	1.1	10,640.0	0.05	4.7	2.3	50
COTTON	1.5	30,000.0	NA	NA	NA	20
WHEAT	0.2	18,225.0	0.01	3.2	2.2	20

SOURCE: AGRICULTURAL STATISTICS – TIME SERIES DATA PRSD, FMARD (1998).

As shown in table 3, if a strict observance of limited generation cycle is to be up-held the available certified seed will be covering barely less than 10% at the total seed used by our farmers even by the year 2003.

The current trend therefore needs to be reversed so that many farmers will cultivate the habit of replacing their seed annually. The implication of this trend suggests that farmers keep on saving their seeds from previous harvest to meet the over 90% balance.

4.1.5 Constraints

A number of factors still work against effective seed delivery system in this country. These factors range from production to marketing. Some of the major ones include:

- Lack of reliable data on various components of the seed business. This means proper planning for seed is virtually impossible.
- Poor grain market prices, which often discourage farmers from seed purchases or shift their interest from producing such crops.

- High cost of other production inputs and sometimes their non-availability e.g. fertilizers and agro chemicals.

- Lack of credit facilities for seed production activities.

- Inadequate promotional activities to effectively demonstrate the optimum potential of improved seeds to farmers.

4.1.6. OTHER INPUTS

Current Situation

Prior to 1976, the state governments were responsible for the procurement and distribution of fertilizer until the Federal Government established the Fertilizer Procurement and Distributor Division, (FPDD) within the Federal Ministry of Agriculture as the central procurement and distribution point. Between 1976 and 1995, several variants of the procurement and distribution arrangements between the FGN and the States were experimented with. They included the involvement of the States and the State organs in the transportation and distribution of imported and domestically produced fertilizer, the establishment of fertilizer depots as distribution points to the states and the involvement of the National Fertilizer Company of Nigeria (NAFCON) in the distribution of locally produced fertilizers.

As consumption of fertilizer increased, the inadequacies of public sector controlled procurement and distribution arrangements began to manifest in leakage and transit losses, late and non-deliveries of fertilizer to designated depots artificial scarcity and unsustainable subsidy.

The government, realizing that an efficient and sustainable fertilizer supply system could be achieved through the participation of the private sector, adopted a fertilizer liberalization policy in 1997. That policy was aimed at improving production, procurement and marketing efficiency and encouraging transparency and competition. The Federal government completely withdrew from procurement and distribution activities and discontinued the subsidization of fertilizers. In order to give relief to farmers, it reduced the import tariff on fertilizers from 10% in 1996 to 5% in 1997 and zero percent in 2000, it also abolished the Value Added Tax (VAT) and excise duty on fertilizers. The private sector and some states have now assumed greater responsibilities for production, procurement and marketing activities. Most of the States have

established blending plants to boost domestic supply while others procure fertilizers from major private sector producers and importers at market prices and distribute them to farmers at subsidized prices.

Of recent, however, the Federal Government has again introduced some level of subsidy at production points.

The Government strategy on agro-chemicals supply is to encourage the establishment of plants to manufacture or process agro-chemicals in Nigeria. For imported agro-chemicals, the government's strategy is to ensure their timely supply in adequate quantities by providing the necessary assistance for their importation. There is currently no manufacture of Crop Protection Products, (CPPs) in the country although some companies have formulation and packaging plants.

Constraints

The major problems facing the supply and distribution of fertilizer and other agro-chemicals in Nigeria include:

- The instability of the policy environment leading to inadequate investment in the establishment of distribution channels, capacity building and promotional activities.
- Weak legal and regulatory framework supporting the liberalization of the market leading to the flooding of the market by dubious quality products.
- Lack of market information on prices, availability, supply sources and overall market conditions.
- Poorly developed rural infrastructure leading to high transportation and high costs of products at the farm gate.
- Low demand for inputs arising from the weak purchasing power of farmers.

Suggested way forward

- In order to create awareness in the use of improved seed and other related inputs, there is greater need for an efficient Management Information System (MIS) in the country which can provide all participants (both private and public sector) with regular and accurate update of basic statistics on the agricultural input sub-sector. The statistics required include sales, imports, stocks, prices and

availability of inputs. Others are regional agronomic requirements, seasonal consumption of inputs at farm levels, domestic production, farm level input prices, crop output prices, etc.

- Government may consider giving concessionary lending rates for the agricultural sector. In the absence of such concession, government should provide other incentives, which can enhance the profitability of agricultural investments.

- The private sector operators in the agricultural input sub-sector should play a more positive role in research and extension activities. The private sector has been almost totally dependant on the public sector commercial oriented research and extension facilities and on imported technologies which have probably been developed for other climatic and agricultural production environment.

FERTILIZER PRODUCTION

There are two major government-owned granulation plants in Nigeria, namely, National Fertilizer Company of Nigeria (NAFCON), Onne, Rivers State and Federal Superphosphate Fertilizer Company (FSFC), Kaduna, Kaduna State. NAFCON has an installed capacity of 1000 mt per day of amonia; 1500 mt per day of Urea; 1000 mt per day of NPK and 586,000 mt blending capacity. However, the plant was shut down in 1999. Though it has been reactivated of recent, the plant is projected to produce at about 55% capacity after the 1st phase of the major repairs it is undergoing, increasing to 80-85% capacity after the second phase of repairs estimated to be completed at the middle of 2001.

FSFC has installed capacity of 100.000 mt of SSP. the plant is under repairs at the moment.

BULK BLENDING PLANTS

There are 19 bulk blending plants of varying capacities located in different parts of the country. Six of these are privately owned while the others were established by the Federal and State governments. In 194, before the liberalization of the fertilizer sector, there were only 6 blending plants in the country. The major Fertilizer Companies and blending plants operating in Nigeria are shown in table below.

MAJOR FERTILIZER COMPANIES OPERATING IN NIGERIA, AUGUST 2000

COMPANY	LOCATION
1. ACCAD Group of companies	LAGOS/KANO
2. BUA Nigeria Ltd	LAGOS
3. Chemimex	KANDUNA
4. Fertilizer and Chemicals	KANO
5. Dan Hydro	KANO
6. Dantata	KANO
7. Golden Fertilizer	LAGOS
8. Moris Nig. Ltd	MINNA
9. Muka Nig. Ltd	SANGO
10. Rim Merchant Bank	LAGOS
11. Vis pharm	LAGOS

BLENDING PLANTS AS AT AUGUST, 2000

COMPANY	LOCATION
1. FSC Blending Plant	KADUNA STATE
2. Morris Blending Plant	NIGERIA STATE
3. Zungeru Fertilizer company	NIGERIA STATE
4. Funtua Blending plant	KATSINA STATE
5. Bauch Blending plant	BAUCHIR STATE
6. Gombe Blending plant	GOMBE STATE
7. Borno Blending plant	BORNO STATE
8. Agro Nutrient and chemical company	KANO STATE
9. KASCO Blending plant	KANO STATE
10. Edo State Blending Plant	EDO STATE
11. Scentum Al Fertilizers	ENUGEN STATE
12. Gaskiya Fertilizer company	KANO STATE
13. Sastsa Fertilizer company	KANO STATE
14. Zamgava Blending Plant	ZAMGAVA STATE
15. Sokoto Blending plant	SOKOTO STATE
16. Kebbi Blending	KEBBI SATE
17. Adamawa Blending plant	ADAMSWA STATE
18. NAFCON plant	RIVERS STATES
19. Crystal Fertilizer Blending plant	NIGERIA STATE

Fertilizers imported into the country by the fertilizer companies or produced/blended locally by the blending plants enter the market through both public sector and private sector channels. The States distribute their products to farmers through the Agricultural Development Projects (ADPs) and the Farm Service Centers (FSCs). The private sector use their network of distributors and to retailers to reach the farmers and also, to limited extent, through the ADPs and FSCs.

Fertilizer Consumption

Between the mid 1970s and 1990, there was an intense promotion of fertilizer use in Nigeria. There was an increase in the coverage and the intensity of delivery of extension services which were directed at showing the farmers the benefits of modern inputs utilization, especially fertilizers. Also, high level of subsidy was applied to fertilizers during the period. Fertilizers were brought as near as possible to farmers to facilitate adoption. Hence, between 1975 and 1990, fertilizer consumption increased by an average of 59%. The consumption increased from 54,000 mt of fertilizer nutrients in 1975 to 400,000 mt in 1990. The use level of fertilizer in the country increased from an estimated 0.5 kg per ha in 1973 to 10 Kg per ha in 1988 and 12.8 kg per ha in 1992.

Recent statistics on fertilizer consumption level are difficult to obtain because there has been no systematic monitoring of fertilizer use. There are no records of actual fertilizer sales at all the sales outlets. Also, the Micro Agronomic Survey (MAS) of the ADPs, which was a major source of statistics on the intensity of fertilizer use was discontinued probably for lack of adequate funding. In consequence of the above reason, it is impossible to give current actual fertilizer consumption level and consequently the actual demand for the commodity in the country.

Fertilizer Consumption by Agro-Ecological Zone

The consumption of fertilizers in Nigeria varies significantly with agro-ecological zones for a number of reason which include: the hectarage under cultivation, crops being produced, rainfall level, soil nutrient status, etc. Unsung available information, Sudan Savannah has the highest consumption, followed by Southern Guinea Savannah, Northern Guinea Savannah and East Zone in that order (see table below). The pattern of consumption is being taken into

consideration in the planning of distribution points and sales outlets by the suppliers of fertilizers.

FERTILIZER ALLOCATION BY AGRO-ECOLOGICAL ZONES, 1990 – 1994 (MT)

YEAR	SAHEL	SUDAN SAVANNAH	NORTHERN GUINEA SAVANNAH	SOUTHERN GUINEA SAVANNAH	FOREST	COASTS SWAMPS	BUTTER STOCK	TOTAL TONS
1990	6,000	339,000	214,325	228,125	219,500	60,970	246,080	1,314,000
1991	7,600	285,400	216,450	254,250	176,220	35,000	25,80	1,000,000
1992	10,100	441,02	208,220	355,810	254,110	50,770	89,970	1,410,000
1993	10,662	382,958	278,790	348,230	267,018	66,906	35,436	1,390,000
1994	13,140	414,570	297,772	384,140	276,793	70,255	193,330	1,650,000
Total	47,502	1,862,948	1,215,557	1,570,555	1,193,641	283,871	589,896	6,764,000
Percentage of Total	0.70	27.54	17.97	23.22	17.65	4.20	8.72	100.00

Source: FPDD Reports.

4.2. COMMERCIAL SEED ENTERPRISES: Experience and Opportunities in Nigeria

Extracted from paper presented by
Dr. A. Joshua, Managing Director, Premier Seed Nig. Ltd.

EXPERIENCE AND LESSONS ON COMMERCIAL SEED ENTERPRISES IN NIGERIA

A summary of the emerging National seed industry development in Nigeria from 1076 – 2001 is presented. The achievements, and constraints facing the provision of adequate quantities of improved seeds to Nigerian farmers, and the problems confronting the emerging private seed industries are presented. Recommendations on how to solve the problems for fulfillment of the National improved seed requirements and sustainable privatization of the national seed system are outlined.

one of the greatest problems, constraints and challenges facing Nigerian farmers, is the use of low-yielding seeds, which leads to low yield/ha and unprofitable farming. Farmers who use and plant high-yielding hybrid maize seeds through the SG 2000 program have tremendously increased their productivity with significantly very high-yield, abundant harvests and very profitable farming. Reasons for farmers who do not use improved seeds and hybrids seeds are either due to non-awareness and insufficient access and/or high seed prices. Improved seeds are needed for better harvest/bigger profits for the Nigerian farmers.

The Nigerian farmers, will be greatly improved with the government support interventions on agricultural inputs, such as high-yielding improved seed/hybrids, agro-chemicals mechanization equipments, credit facilities and reduction of post-harvest losses, and provisions of market outlets for fair prices.

Govt. and special projects needs to support and motivate farmers for the use of high-yielding improved seed for better harvests and bigger profits. The economic benefits derived from the use of improved seed are many thousand times greater than the cost and prices paid for the seed.

Government and projects investments in proving enough improved seed, will make Nigerian farmers obtain bumper harvest, similar to their counterparts in

USA. Europe, Asian, East and Central African and other successful Green Revolution countries. This will boost food production and the agric development programs. The private seed companies are more than ready to provide whatever quantities of improved seeds and hybrids, for which government might provide firm indent for fulfilling the Nation/State improved seed requirements. There is the need to provide necessary incentives for Private sector participation, and to enhance the capacity utilization of existing private seed companies to ensure cost-effective, sustainable timely provision of adequate quantities of improved high-yielding sees to the different categories of Nigerian farmers.

Both the formal and informal seed systems have to be improved, strengthen and coordinated to make the inputs and the source sustainability after special project support are over. In addition to the Pioneer/Premier seeds operations. Which is the oldest/biggest/best and most reputable private seed company in Nigeria, there are now 23 other private seed companies, a situation which enhance competitive quality seed production and effective delivery services.

Nigerian Farmers need be advised enlightened and sensitized to plant well tested high-yielding hybrids and other improved seeds to ensure maximum yields and profitable returns to their investments in farming. To promote ready availability wider adoption by rural farmers, access and affordability, there is need to adopt government seed price support program (subsidies) to promote the use and awareness of the high economic benefits of using high-yielding improved seeds especially hybrid seeds.

The economic and social benefits derivable by government and farmers from seed price support program will be many thousand times greater than the costs and prices paid for such promotional seed support and enhance on use of improved seed by Nigerian farmers.

To motivate farmers, all the three (3) tiers of Govt. in the country are urged to come up with programs that would enable them purchase surplus farm products from the farmer (market of last resort). There s the need to improved, strengthen and coordinate both formal and informal seed systems, to maximize improved seed impact. The seed must be viable to be profitable for farmers.

To enhance adequate and timely supply of improved seed to Nigerian farmers rural seed and agric input delivery systems, improved seed campaigns, demonstration plots, depicting the very high cost benefits of using improved seeds, field days seed extension programs. Micro-financed credits, readily

availability of the seed produced, markets and fair prices for the incremental agric produce, must be put in place to ensure success and sustainability after the special project supports are over.

Greater production and use of improved seed in Nigeria, will lead to tremendous increased productivity, cost-effective, abundant food production to the Nation at prices profitable for farmers and affordable to the populace. It will also enhance sustainable and successful poverty eradication, food self-sufficiency/job creation/forex earning and food security.

4.2.1. INTRODUCTION

i) The experience on commercial Seed Enterprises in Nigeria; on production, management issues, and market opportunities are highlighted.

ii) The aim is to boost agric production, accelerate National food self-sufficiency, make farming profitable; enhance commercialization of agricultural businesses and input delivery systems; increase the returns to investments on farming enterprises, and achieve food for all at affordable prices. It is also to improve the nutritional quality of the basic diets, through the use of improved seeds and good management practices.

iii) Possible areas of collaboration between Premier Seed Nig. Ltd., and the new OAU/STRC-SAFGRAD program in Nigeria, are outlined. The importance of improved seeds in boosting farmers productivity; how to improve timely and adequate availability of high yielding improved seeds to farmers; how to improve technical skills on seed production technology, seed marketing and to support farmers as part of the strategies to move the agenda forward. Key areas of program interventions that would enhance the achievement of the objectives, enhance commercialization of agriculture by small scale farmers are discussed.

4.2.2. Objective

The primary goal is to contribute to successful measures and strategies to enhance quantities of improved high-yielding seeds to Nigerian farmers, improve the productivity of small scale farmers/accelerate National food self-sufficiency efforts; enable farmers to improve and diversity their income and profitability, improve linkages between technology development/technology

transfer/technology commercialization/technology, adoption with appropriate emphasis on the importance of improved seeds.

4.2.3. Importance of Improved Seed on Effective Technology Transfer/ Adoption and Commercialization

- A vital features for the program intervention is the provision of a well packaged technology capable of significantly improving the farmers productivity and income.

- One of the greatest constraints and challenges facing Nigeria farmers is the use of low-yielding seeds, which leads to low harvest yield/ha and unprofitable farming.

- The use of high-yielding improved sees, will significantly increase the productivity of farmers: (ii) accelerate National food self-sufficiency; (iii) increase farmers income (iv) provide very high investment returns to the use of related expensive inputs like fertilizers, etc (v) reduce the risks from pests and diseases. The use of improved seeds is the most cost-effective, easiest technology for boosting agric production by both small and large scale farmers and for successful poverty alleviation and sustainable food security.

4.2.4 Implementation Strategy:

- Identify the constraint militating against Nigerian farmers and how to solve the problems.

- Enhance diffusion of the improved technologies to farmers with necessary emphasis on improved seeds.

- Strengthen linkages between research/extension services/private sector input delivery agencies, and farmers in order to transfer the developed improved technologies from researchers to farmers.

- Enhance the development of reliable, effective sustainable private sector seeds and related agric. input delivery systems.

- Strengthen extension service through provision of logistic support, training enabling environment, demonstration plots, workshops and public enlightenment activities.

- Facilitate the provision of technological packages and ensure that the packaging farmers practically apply fully the beneficial technological packages in time, so that the expected optimum yield is achieved.

4.2.5. An Overwiew of the Emerging Seed Industries in Nigeria:

- Highlights of the National Seed Policy/Decrees/rules and regulations guiding commercial seed operation in Nigeria.

- Structure and Components of the Emerging Seed Industry development in Nigeria is outlined and shown in Table..

- The Achievements of the National seed systems 1976 – 2001 are summarized in Table.. & Annex.

- The Enormous untapped potentials of the Seed Markets in Nigeria is outlined (Table..)

- Lessons of Experience on Privatization and Commercialization of Seed Industry Development in Nigeria.

- The constraints/how to solve the problems and the way forward are synthesized.

- The potential national improved seed requirements is high and enormous; supply must lower than demand requirements.

- Vital project interventions to enhance seed sector and national agric growth objectives.

- Public sector/private sector partnership to develop cooperation.

- Possible areas of public Sector/NGOs/Private seed company partnership for achieving the above.

4.2.6. Lessons of Experience on Privatization and Commercialization of the Seed Industry Development in Nigeria

i) The Emerging Private Seed Companies and Enterprises

With the successful development of superior hybrid maize seed, by the IITA and National Scientists, and availability of numerous public sector developed improved high yielding improved seeds in Nigeria; the private commercial seed operations became possible, feasible and currently sustained in our developing country like Nigeria.

ii) Impact of Improved Seeds on Nigerian Agriculture

Today, the dividends of superior, high-yielding improved OP seeds and maize hybrids developed by the International Research Institutes (IITA, ICRISAT and WARD/National Seeds at the NARIs and Private sector participation in the seed industry development, are very significant with consequential increase in yield/ha; improved crop quality; risk maximization; better profitable farming, improved consumer respectability and greater structure of the economic benefits of investment on research efforts forum fields and the National food baskets (i.e. Good seeds for better harvests).

iii) Three (3) seed companies are currently in operations, and contributing enormously to the production of improved seeds to Nigerian farmers. However, the availability and use of improved seeds is still greatly insufficient.

- Despite the fears about feasibility, profitability, viability and possibilities of success for commercial seed operations, possibilities of small, medium Nigeria farmers being able to use hybrid seeds; all of above have been successfully proved sustainable and possible in the Nigerian seed system.

- The achievement of the Private Seed Companies in Nigeria has been commendable.

4.2.7. Challenges Facing the Emerging Private Seed Companies and Seed Enterprises

- Constraints facing the Use of improved seeds have been summarized.

- Among the major barriers to entry of the private sector into the seed business is the issues of seed pricing and public sector competing seed programs/capacity under-utilization/insufficient awareness of the high economic benefits of improved seed. Weak rural seed marketing outlets/high selling costs to rural farmers.

- Returns to investment on seed enterprises is still very low in a business of long gestation period, and high capital investment, high interest lending rate system.
- The efforts and the checkered path of the initiated fallen/sustained private seed companies in Nigeria is summarized.

- These require appropriate seed policy enabling economic environment to encourage greater private sector commercial seed production and marketing.

- Political awareness of the vital needs for improved seeds to enhance food self-sufficiency for the Nation at prices profitable for farmers and affordable to the populace is needed.

- Specific policies and operational relief's in terms of incentives for greater private sector participation are needed.

4.2.8. Hybrid Seed Adoption and Lessons of Experience: Supply demand and Adoption of Improved Seeds

- Nigeria's seed companies had face significant challenges as a result of changes in national economic conditions. Some years ago 1984 – 1989, the customers for hybrid seed were largely scale farms and government agencies. Sales were made in truck-loads.

- Government purchase had declined (1991-1994) as Nigeria's economic conditions deteriorated.

- Small and medium scale farmers, and the few large scale farmer now constitute the Hybrid seed and patronage with NSS and SG 2000 Open-pollinated and hybrid seed adoption, collaborative promotional efforts.

- For hybrid, small scale farmers who know do buy and annually come back. Those who do not use hybrid seeds, are constrained by awareness, accessibility, price factors or misconceptions about hybrid and O.P.

- Its costs much more to sell 100 tons to 10.000 small farmers than to sell 100 Tons to five medium/large scale farmers.

4.2.9. Rural Seed Marketing

- A major challenge and burden on the seed companies is to build retail networks that reach the farmers timely in rural areas, to mount-demonstrations of their varieties including extension work with farmers.

- In the absence of a transformation of Nigeria's seed industry, farmers will revert to seeds of Open-Pollinated varieties or poor-quality farmer-saved seeds.

- As a result of the successful high average yields of farmers participating in the SG 2000 the MTPs, using hybrid maize seeds by private companies are growing. Nigeria has reported that maize seed sales double between 1994 and 2000.

4.2.10. The Emerging Seed Companies

- High interest rates, high cost of rural seed marketing sales outlets, lack of effective law enforcement to protect privately bred genetic materials and scarcity of trained commercial seed technicians are among the barriers facing private seed companies on marketing to meet the potential national seed demand.

- Otherwise the effects of the privatization has been positive. If well managed, seed privatization is possible, returns to investment as this stage, is low and would increase with increasing volumes of production and marketing.

Constraints

Constraints facing successful privatization have been categorized on economic policy and technical categorizations i.e. highlight of these include, slow variety release mechanism, public sector seed pricing policy, farmers awareness, faked seeds, weak rural seed marketing outlets and the need for improving, strengthening and coordinating both the formal and informal seed systems.

Possible Areas of Cooperation between Private Seed Companies and the New USAID Assisted OAU/STRC-SAFGRAD Project

Public/NGO/Private Sector Partnerships

A vital instrument of development cooperation/focal points and stimulating of efficiency and maximizing impact.

Objective

- A partnership to increase efficiency and sustainability after external project supports are over.
- To increase efficiency, and sustainability after external project supports are over.
- To enhance achievement of the project goals and goals of the Private sector business.

Areas of Cooperation

- Getting farmers aware of the high economic benefits of improved seeds.
- Developing seed and related rural agric. input delivery system/facilitating rural agric. input delivery enterprise.
- Strategies to promote efficient rural seed + related rural agric. input delivery systems.
- Regional seed program development network and marketing opportunities.
- Improved quantities of seeds produced.
- Ensure how to market the seeds produced.
- Training and Development Programs.

Program Components (Developing Seeds and Related Agric. Input Delivery Markets)

- Programs to avoid undue delays between variety development/testing and release.

- Farmers participatory variety selection and variety release mechanism.
- Improve rural seed demand and empower the farmers to buy improved seeds.
- Improving seed market structure/constraints and market opportunities.
- Facilitating rural agric input delivery systems and rural seed marketing enterprises
- Enhance fair prices and market outlets for the expected incremental agric produce.
- Improve, strengthen and coordinate both the formal and informal seed systems to maximize their impacts.
- Seed technology training programs for growers/and provision of technical support for seedmen/and seed extension agencies/seed marketers.
- Improve the skills and entrepreneurship ability of seed growers, private seed entrepreneurs and rural seed marketers.
- Projects to strengthen rural community seed delivery system while public seed sector is promoting internal rural community seed production systems.
- Seed extension/improved seed campaign.
- Seed program and seed enterprise management workshop/training/demo. Plots/field days.
- Institutional building and capacity building/project farmers/stakeholders.
- Utilizing Radio/TV/Public system sloter/improved seed campaigns and farmers participatory variety selection activities.

Projects

These are on projects intended: (i) to provide financial and technical support to agric business enterprises, promoting technology development, technology transfer, technology commercialization and adoption. (ii) Programs to assist rural agric business enterprises, functional farmer organizations and promote community rural agric input delivery system (iii) Programs and activities to tackle operational and investment problems apt to improve and increase the

income – generating and productivity of rural farmers, and input delivery systems. (iv) Programs to enhance both improved seed production and marketing.

Premier seed has very strong field potential to function as one of the partners (i.e. focal point) that could be used for implementing seed related programs to be used to maintain touch with the beneficiaries, to have close oversight over related agric business beneficiaries in our areas of specialization and zone; and for conducting necessary technical and rural seed input delivery system, training, workshop on seed production practices, seed program management studies and for project monitoring, evaluation and impact studies.

METHODOLOGY

- Cost-effective achievement of the goals of the development cooperation and goals of the Private sector business.

- Specific project information activities – highlighted in Program Intervention Specifics.

4.3. POST HARVEST FOOD PROCESSING

4.3.1. Transforming Agricultural Produce into Value added Products: Experience and Opportunities in NIGERIA

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4.3.2. Significance of Food Processing

Food processing constitutes a major sector of manufacturing in most developing countries. Food being basic to human needs, traditional food processing has evolved since man's history. Manufacturing-added value in Africa is highest with food processing constituting over 40% compared with 14% for textile, 4% for machinery and transport equipment and 6% for chemicals (World Bank 1989). Some of the economic impact of food processing include:

- Import substitution role of their produce
- Contribution to GDF through substantial value added
- Employment generation
- Taxes.

Apart from the above, food processing has a stimulating effect on agricultural production. A notable example is that of Nigeria which has attained the rank of the largest producer of cassava, the position which is in part due to the popularization of cassava processing machinery facilitating higher usage of cassava and creating more demand. The food processing sector is a large employer of labour and has a unique pluralism in terms of the scale of operation. The small-, medium and large-scale operators can thrive each with its own or complimentary market. The importance of food processing to food security is also very significant because it helps in reducing food wastage and the utilization of local raw materials. It is estimated that up to 20% of grains could be lost to insects and mould infestation while up to 60% of perishable fruits and vegetable produce could be lost.

4.3.3. Structural Characteristics of the Food Processing Subsystem

i) The informal Sector (ISFPS)

This sector is made up of millions of micro-enterprises and artisinal industries located in both rural and urban areas. It is informal and unorganized. It provides self employment for millions of Nigeria through processing as well as marketing of products. It is a major source of rural employment apart from farming. The bulk of processed food eaten in Nigeria is produced by this sector. The foods produced by this sector in Nigeria are shown in annex – 1, 2, 3 and 4. The informal food processing enterprises contributes substantially a substantial to the GDP of the country. In addition ISFPS contributes to Nigerian tax base through payment of fiscal taxes or registration fees. Because they do not enjoy concessionary tariffs, they buy their inputs from local retailers absorbing the cost of taxes on sales, inputs, fuel, etc. The cost of low start-up cost, entry and exit into the business are easy. This makes ISFPS an outlet for the skills of local engineering firms and another consideration is that the cost of the locally fabricated machinery are not very attractive. This is due to the fact that the machinery have a high content of imported components-materials, motors, controls, etc. Hence these also suffer from lack of spare parts.

ii) Process technology

Many SSFP are based on a few processed such as milling, grating and drying. These are satisfactory at artisinal levels. Beyond this level modernized technologies have not been developed. There is need for upgrading many traditional food processes. With the notable exception of cassava processing into gari, fufu, most SSFP concentrate in traditional processes at artisinal level. Research institutions and universities could play a role in developing processing techniques for these foods. Some of the notable successes in Nigeria are mechanized cassava gari production and palm wine pasteurization (FIIRO, Nigeria); iru production (Odunfa 1985).

To assist commercialization of these processes, technology incubators initially proposed by UNDP may be useful in overcoming the teething problems as they are nurtured under the umbrella of R & D institutions and venture capital where available may also assist in the financing.

Most large-scale food processors are foreign-based and usually produce "foreign" foods such as biscuits, lager beer, soft drinks margarine, etc. Few

have ventured into traditional food processing. Nestle produce dadawa cubes from local African locust beans.

Another area where efforts are needed is in the production of food ingredients. Many food industries including the SSFP now use stabilizers, food colors, emulsifier, flavours, preservatives, etc. This has created a high demand for these products. Industries producing these will provide vital linkage within the food sector. Unfortunately in Nigeria all these are imported. From the enormous biological diversities in Nigeria, this could be sourced locally. For example, there are numerous plant sources suitable for extraction of natural colors and essential oils which are important favour components. Collaboration between R&D institutions and those in developed countries could accelerate the development of technologies for the utilization of these resources. Technologies for producing some natural food colors are now available at FIIRO.

Many of the small traditional food processing enterprises usually run into problems because they do not embrace new technologies. Because they are small they do not have the capacity to innovate. They can be assisted by industrial information services offered by FIIRO or the use of the internet. If the traditional small food micro enterprises are to survive in a competitive environment, they should integrate viable emerging technologies into their processes. Such technology as microencapsulation for spices, membrane technology for juice and other food processing, are within the reach of small scale food processing industries.

iii) Energy

In food processing both the traditional and modern processing methods use energy in various forms. The traditional food processing methods consume a lot of energy. Fuel wood is usually used which could lead to deforestation a serious problem in the dry, marginal lands of the north.

Energy consumption should be important consideration in the design and fabrication of equipment for use in Africa. An example is the first mechanized gari processing plant designed by Newel Dunford of U.K. which consumes high diesel oil and electricity.

About 60 litres are required to produce a ton of gari mainly for the gelatinization and frying phases. These among other issues contributed largely to the commercialization problem of the technology. Plants designed

later are more fuel-efficient. The ultimate is probably the use of biogas generated from cassava waste peels.

Other traditional food processing such as dehulling process of African locust beans are energy demanding and would therefore require investigation of the energy requirement. There development should consider the most economical form of energy – diesel, gas, kerosine, agricultural waste, etc.

iv) Limited access to credit

The small scale processors generally have low capital bases. Due to their poor earning capacity, they are unable to accumulate capital on their own. These organizations lack adequate collateral or equity capital to make them qualified for loans and credits. It therefore becomes difficult to obtain capital to purchase modern machinery, retool when necessary, and even to have operating funds, particularly for bulk purchases of raw materials, most of which are seasonal. Some of the enterprises are not fully operational due to shortage or lack of raw materials. The informal food processing sector has been very vulnerable to market and micro-economic changes and this accounts for their high mortality rate. Banks therefore consider lending to them as highly risky. Because of these they are not able to modernize and grow.

The people's Bank (now defunct) was established to address the needs of the informal sector while NEFUND address the needs of the formal small scale industries.

v) Lack of Management know-how

At artisinal level, the level of formal education is usually low. There is a lack of management training with the result that the industries are poorly managed and a lot of wastage and financial losses occur. The low education makes them ineligible for institutionalized training to upgrade their skills. This may also generally lower receptiveness to new technologies and innovations. With regard to formal small-scale industries, the processors are much better educated and informed. However, experience has shown that the managerial capabilities of the people in this sector are still low.

Training in the informal sector is by acquisition of skills through appreticeship with entrepreneurs in the family or established formal entrepreneurs. This arrangement, however, has its limitations. In Nigeria the government established the National Open Apprenticeship Scheme which allows the

government agency to attach apprentices to workshops in informal sectors by paying the trainer and providing the trainee with some stipend; the quality of the training is also monitored. Another scheme which was also established for similar purpose is processing inclusive. The last of such schemes is the Family Economic Advancement Program (FEAP) which was terminated in 1999.

vi) Quality control and standardization

At artisinal level, there are no set standards or quality control parameters. Even the weights and other unit structure are not standardized. However, in the formal SSFI quality control is hardly established because of the expensive instruments required. Research institutes and quality control laboratories could offer these services for a fee.

The problem actually starts from lack of control of raw materials. If there has been a grading system as used for cocoa beans processed for export, this would have aided standardization and quality control.

Another program that has been highlighted at some meetings is the poor or lack of standard of hygiene in many small-scale food processing plants and this has led customers to distrust the quality. Regular training programs on food plant sanitation might be useful in this direction.

vii) Packaging

Traditional packaging of processed foods have been found unsuitable for modern day requirements. It is common knowledge that modern packaging adds value to products. Packaging materials are currently very expensive. It has been found that for some products such as cornflakes and canned products, the cost of packaging could be as high as 70% of the product price. Processors settle for the relatively cheaper but less effective and attractive ones. Ultimately, the end products are unable to bear the high additional costs or packaging with already high cost of production and the demand would be very low due to their exorbitant prices.

In order to bring the cost of packaging down it may be necessary to have centres for packaging research in some industrial research institutions. The centre could focus on sourcing packaging materials using local resources. Centres of this type have been fairly successful in India.

viii) Poor infrastructural facilities

Infrastructural facilities in Nigeria is very poor, these are pipe-borne water, electricity, accessible roads. As such, the processors cannot depend on the public sources of the facilities. They need to provide alternative sources. A substantial amount of money is required to provide these alternatives e.g. electricity generating plants, water wells and bore-holes with treatment plants. These constitute overhead costs to the end products and as such they become too expensive. The results is poor demand for the products.

Furthermore, water quality has also been identified as a problem to many small to medium scale food processing industries. A report showed that poor quality and the deposits contained in some of the supplies led to higher energy consumption and poor performance of the equipment. Energy cost in countries without fossil fuel could account for as much as 25% of production cost.

It is unlikely that Nigerian Government will have enough funds now or in the near future to guarantee an optimal infrastructural level to support SSFI located everywhere. A possible approach which has been tested is the establishment of industrial estates/technology incubators where land as well as access roads, electricity and water are provided. This has proved an effective instrument for stimulating local entrepreneurship. Some of the benefits are:

* induction of modernization, expansion and diversification of existing ones
* promotion of inter-industry relations such as subcontract production
* economy in operation of common service facilities.

ix) Storage Problems

The warm and humid climate of Nigeria encourage rapid deterioration of food materials. This calls for much more challenging systems. As previously discussed, up to 60% losses could occur in fruits and vegetables and 20% loss in grains mainly due to insect infestation. Cassava and other roots crops rapidly deteriorate after harvest; losses of 50-60% have been reported for potatoes and yams. Rancidity develops rapidly during storage of oilseeds. Investment of SSFI in storage could therefore be a heavy expense.

Communal storage facilities which are available for rent have been found feasible in parts of Asia. Because of the seasonal availability of raw materials, and additionally suggested approach is the development of versatile multipurpose machinery which can be used to process more than one raw material. The possibility is shown in the case of a mango, fruit juice, machinery designed in Zambia; it is a containerized mobile factory capable of being moved to other areas after the cropping season, for pulping other fruits which could be in season.

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Annex 1.

FRUIT AND VEGETABLES

Crops	Present Products	Other Possible Product
Cirus, pineapple, Paw paw, egg plan Mango, guava, carrots	Juice, jams, marmalade wines	Enzyme clarified fruit juice (banana, mango, paw paw).
		Mayonnaise Canned fruits
Leafy vegetables	Dried leafy vegetable	
Tomato	Juice, paste, puree, Ketch-up, powder	
Onion	Onion powder, flakes	
Mushrooms	fresh or dried mushroom	Mushroom Powder, soups canned Products, Dried okra.
Okra	Dried okra	
Peppers	Dried pepper	
Banana, plantain	Chips, *Elubo*, plantain	powder, flakes Puree

Annex 2.

GRAINS

Crops	Present Products	Other Possible Product
Sorghum, Maize	Malt for brewing, Malt extract, breakfast Flakes, brewers, grits, corn Corn meal *(tuwo)* *Kuunu* drink *Ogi* (fermented corn) Local alcohol bevrages Animal feed (component) Waring food Starch	Extruded products – snack foods, noodles, pasta, etc. high fructose syrup soy-fortified *O*gi high lysine *Ogi*
Rice	Destoned rice Parboiled rice	Noodles
Legumes (beans)	bean flour (for moimoi And akara)	

VEGETABLE OILSEEDS

CROPS	Present Products	Other Possible Product
Oil palm Groundnut, Cottonseed, soybean, Coconut, benniseed	Edible oil, palm kernel oil, Margarine, Cakes,	Distilled fatty acids, Red palm oil (olein)
Groundnut	Salted or surgared roasted, nuts Peanut butter, kulikuli	
Soybean	Soymilk, yoghurt	

Annex 3.

ROOTS AND TUBER

Cassava	Gari, fufu, chips flour, pellets	alcohol Starch – modified Adhesives & glues, Glucose, dextrin Maltase emulsifier
Yam	lustaut ponwded yam, Elubo	
Coco yam	soup thickener	
Ginger	ginger oils, oleoresin	

MISCELLANEOUS

Crops	Present Products	Other Possible Product
Aromatic plants Lemon gram	Essential oils Lemon oil, citronella oil Eucalyctus oil	
Roselle calyx	'Zobo' drink	
African locust bean	Iru (dadawa)	
Melon	Ojiri	
African oil bean	Ugba	
Cocoa pods	traditional black soap	
Bixa, roselle, tumeric, Red pepper	Natural food colours	

Annex 4.

ANIMAL PRODUCTS

Crops	Present Products	Other Possible Product
Cattle, sheep	Meat, milk	Bloodmeal, bone meal,
Goat, pig	Sausages and bacon, Fillings in pies. Traditional products Kundi, kilishi Suya/tsire	adhesive from bone Abbatoir products Peptones
Milk	Milk – powdered, Evaporated. Yoghurt, Traditional products – Nono, wara	
Poultry Eggs	Dressed chicken Egg powder	
Fish	Smoked fish Canned fish Frozen fish Dried fish	Peptones

4.4. INDUSTRIAL UTILIZATION OF CEREALS: the Case of Sorghum and Maize

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INTRODUCTION

Sorghum and maize are the most important cereal crops grown in Nigeria in terms of hectarage and total output (Ogungbile et al., 1996). Sorghum occupies about 45% of total land area under major cereal crops and about 30% of total arable crop land (NARP, 1995). Currently annual sorghum production is about 8.4 million tons with an average yield of one ton per hectare. With current annual production of about 6.5 million tons, maize ranks second to sorghum in terms of total output. It occupies about 20% of the total land area put on to major cereal crop production with an average yield of 1.8 tons per hectare. Maize has emerged from being a backyard crop in 1970s to now become one of the most important food and industrial crops in Nigeria. Maize is grown in virtually all parts of the country except in the drier northern Sudan savanna and Sahel. The production and expansion of maize in recent time have been concentrated in the northern states where the environmental conditions of the northern Guinea savanna suits its cultivation most.

Sorghum and maize are principally major staple food crops that are used in various ways. However, the ban on imported cereals especially wheat, barley maize and barley malt into Nigeria had initiated rapid changes in the demand and utilization of sorghum and maize (ICRISAT, 1990). Following the ban on barley in 1988, the brewing industry in Nigeria has been using sorghum and maize as raw materials for alcohol and non-alcohol drinks and beverages. The food industries use their malt extracts and nutritionally fortified the products to produce balanced food. Bakeries experiment on substitution of wheat flour with local flours and more of the locally production.

Industrial utilization of sorghum and maize is presently noticeable in the brewing and beverage, food and feed industries (Jojo, 1998). While sorghum has a greater potential in being used as raw materials in the brewing sector, maize has a better advantage in animal feed production. Potential for the utilization of these locally produced grains may not be realized unless suitable cultivars with high extract yield

and comparable qualities of imported barly and wheat are found. Research efforts have therefore been devoted into developing suitable varieties that can be used as industrial raw materials in place of barley and wheat. This is expected to increase the demand for these crops and ultimately improve the income and welfare of the farmers. This paper presents some of the findings and observations experienced from a study to promote production and utilization of sorghum products in Nigeria. The study was sponsored by IFAD with ICRISAT as the regional facilitating institute.

Supply and Demand for Sorghum and Maize

Import restrictions on cereals and other food items and the abolition of commodity boards have increased producer prices. As a result, total agricultural production including food grains has grown by about 4% per annum (CBN, 1998). A decline in real incomes and bans on imported foods have caused a shift in consumption of expensive food to staple foods. The shift has also induced additional production. An analysis of the production trend of major cereal crops shows that sorghum experienced a growth rate of 5.6% per annum between 1988 and 1992 and 5.9 between 1996 and 1997. The current annual production of sorghum is 8.5 million tons (Table 1).

In the case of maize, production rose from 2.0 million tons to about 6.6 million tons during 1991-1996 (CBN, Ahmed et al., 1998). Since then aggregate maize production has stabilized to approximately 6.5 million tons. The stagnation in production of maize can be attributed to scarcity of fertilizers and fluctuations in maize grain prices.

The government has gradually been easing the import restrictions on wheat, rice, maize and barley primarily to moderate food price increases and in conformity with its trade liberalization policy. The removal of import restrictions may likely reduce the incentives for farmers to grow these crops. The demand for staple foods is expected to continue to grow because of high population growth rate and deteriorating purchasing power of consumers and the likely further depreciation of the Naira which would make imported products more expensive. The present trade liberalization in the grain market will require high efficiency not only in the production of these crops but also in their uses as industrial raw materials in order to be competitive.

Marketing of Cereal Grains

Marketing of cereal crops has basically two distinct patterns. The first pattern consists of producers and itinerant petty traders carrying their grains to local periodic market for sale themselves. This type of marketing channel involves relatively short

distances and essentially serves local markets and customers for local consumption. The second pattern involves relatively long distance trade which connects the food-deficit population and industrial centres with the producing areas. Sorghum and maize marketing for industrial purposes belongs to this category of market. Merchants or their agents purchase grains directly from farmers or village market wholesalers. After the industrial firms had tried in vain to get into direct production of the grains, they have resorted to purchasing in bulk from merchants. A survey of sorghum markets reveals that farmers do not sell directly to processors (users). Buyers of sorghum for use as food or for industrial use procure from agents or middlemen (Fig. 1). Farmers as individuals could not deal directly with the industries because of the large quantities of grains involved and the cleaning and quality standards required by the industries. SK 5912 (short kaura) and KSV 8 (farafara) are mostly the preferred varieties in the brewing industry, but the firms are not prepared to pay any premium price for their purchase for brewing are not available in sufficient quantities. Fig. 2 shows the trend of retail prices of major cereals in Nigeria from 1989 to 2000. Sorghum and maize prices were consistently lower than that of rice. Sorghum prices fell below those of maize and millet as from 1994. There is the need to promote marketing strategies and training that will enable farmers as a group to sell there produce directly to the users.

Utilization of Sorghum in Nigeria

A baseline survey was conducted in 2000 to four States in northern Nigeria (Kaduna, Kano, Katsina and Plateau) as benchmark to determine constraints to commercial utilization of sorghum grain. Focus group approach was used to interview three categories of participants in the sorghum industry. The first group consisted of farmers and processors involved in the production of porridge, snacks, beverages and drinks produced from sorghum locally. Three selected groups were chosen each from Katsina and Kano States. The production activities of these products were dominated by women. The second group consisted of communities using sorghum to brew local opaque drinks known as "Pito" and Burukutu". Communities interviewed were located in Kaduna State. The third set of participants interviewed comprised commercial (industrial) companies and processors of sorghum, sorghum malt, beer and beverages, baby weaning foods, non-alcoholic drinks, confectioners and animal feed producers.

Sorghum utilization was broadly grouped into two categories: local and industrial.

Local Utilization

About 20 products are made out of sorghum locally for human consumption (Maigida et al. 2001; Atala et al. 1999). Most important of these products are Tuwo (thick porridge), Burukutu/pito (opaque beer), Kunu and Koko/Akamu. Other minor products are the various snacks produced by small scale processors such as Danwake, Kosai, Jollof dawa, Fura, Dashishi popped sorghum Pate, Buza, German rice amongst others (Table 1).

Direct human consumption up till date remains the most important source of demand for sorghum, hence much of the varieties under cultivation today follow sorghum grain consumption trait preferences of households importantly consistency and keeping qualities (Akingbala and Rooney, 1990). Thus corneous flour particle produced from intermediate and hard grains irrespective of size, produce harder and more viscous pastes, most preferred quality for tuwo by households; while soft and intermediate grains were most preferred for snacks and drinks. A recent survey on sorghum utilization in Kaduna State by Atala et al 1999 showed that red guinea variety of sorghum was most preferred for burukutu and pito making followed by "Fari" type (white guinea and Farafara varieties) Table 2.

Industrial Utilization

Although the percentage of domestic sorghum production used in industry had been low in the past (Baidu-Forson and Ajayi, 1998), current reports show that there is a significant increase in the amount of sorghum used by industries. A survey on industrial utilization of sorghum in North and Central States of Nigeria by Ogungbile and Marley (1999) has revealed that many industries now use sorghum/or sorghum malt as a major raw material in alcoholic and non-alcoholic, beverages. Currently, the malting and brewing industry represents the largest industrial user of sorghum grains. The International Beer and Beverages Industry (BBI) Nigeria Ltd which has five other breweries use 100% sorghum grain as raw material using about 48,000 t/annum. Jos International Breweries Ltd also uses 100% sorghum grain for its products utilizing at peak production about 7,680 t/annum. Sorghum grain utilization in malt drink production accounted for 55% of Guiness turnover in 2000 (O.A. Bello – personal communication). Labande Cereals Ltd, a malting company produces malt for up to 6 brewing/beverage companies at current production levels of about 21,600 t/annum.

Further, the study showed that 42 beverage and baby weaning foods products contain sorghum malt as malt base. Other industrial uses of sorghum include production of sugar confectioneries and biscuits (Aluko et al. 1994) and the livestock feed subsector. However, use of sorghum grain in feed mills and in million/baking remains small in comparism to sorghum utilization in the brewing and malting industry. Although several constraints such as customer preferences for 100% wheat confectioner, continue to stunt progress of sorghum utilization in this direction, technologies for production of quality composite wheat sorghum bread and confectionery have been developed in IAR laboratory (Aluko et al., 1994) and are currently been extended to bakers and millers in Nigeria (chindo et al, 2000). The use of maize in feed mills as source of carbohydrates is much more acceptable than sorghum grain due primarily to cost and losses associated with milling of sorghum. With over 34 breweries, several beverage, livestock feeds companies it is estimated that current sorghum malt and grain utilization is in excess of 350,000 metric tons/annum.

All industries that utilize sorghum grain or malt maintain that it is cheaper to use than to import barley grain or malt, this has led to the resuscitation of many breweries that had gone out of business. Table 3 shows industries that utilize sorghum in their production systems. These show clearly, the prospect of sorghum replacing imported barley which large sums of money has been spent on it's importation. Baidu-Forson and Ajayi, (1998) reported that between 1980-1990, a total of $601 million was spent on the importation of 1.13 million and 54.8 thousand metric tons of malt and barley grain respectively.

Although current trade liberalization policies of Nigerian government may have indirectly lifted the ban on barley malt and grain importation, it appears however, that some industries e.g Nigerian Breweries Ltd have resorted to importation and use of barley malt and grain. Thus this appears to be a serious impediment to current commercialization and utilization efforts. Further, most farmers in the Sudano-sahelian zone of Nigeria that are to benefit from commercialization tend to detest the use of sorghum for alcohol production on religious grounds. This has constrained efforts to extend and popularize recently developed high yield varieties that are suitable for industrial use.

Commercialization and Utilization: Benefits

Various groups such as the producers and users have short medium and long-term benefits as industrial utilization of sorghum increases. Currently, short and medium term perspectives show that the brewing industry, grain merchants and sorghum selling fames make substantial financial gains. As earlier mentioned, host brewing industries indicated their intention to continue using sorghum a raw material due to

substantial foreign exchange savings. Grain merchants and sorghum selling farmers who in most cases serve as processors make substantial gains because they procure at low prices, store and resell to end users especially when processed at high prices. Most small-scale farmers will benefit in the medium to long-term through productivity gains and also through ensuring that their produce meet the requirements of end users. In this regard, various strategies have been deployed by an on-going project to make small-scale farmers benefit in the short and medium term.

These are:

1) Varietal purity – From earlier reports and surveys conducted across industrial users (Ogungbile and Marley, 1999), small-medium and large scale opaque makers (Atala et al., 1999) and other local snacks and drinks producers (Maigida et al., 1999), five varieties of sorghum, SK 5912 (SAMSORG 17), KSV 8 (SAMSORG 14) ICSV 400 (SAMSORG 39), ICSV 111 (SAMSORG 40) and red guinea (local) were identified as most suitable varieties for malting. In the 2000 cropping season, 4.2 tons of certified seed of SK 5912, KSV8 and ICSV 400 were produced and are ready for distribution to 420 farmers in Kano, Kaduna and Katsina States. (Aba and Marley, 2000). This is to ensure supply of pure seeds into the sorghum production system, thus maintaining varietal purity.

2) Assessment of new varieties – although about 41 sorghum varieties have been released in Nigeria over 35 years of research by IAR (Aliyu et al. 1997), many of these and other promising lines have not been evaluated for their malting qualities. In 2000, IAR in collaboration with JIB characterized 4 varieties for their malting qualities. Results (Table 3) show that SK 5912 had the lowest malting loss of 1.1% followed by ICSV 400 with 4.1%, ICSV 111 with 4.4% and KSV 8 with 8.9%. Further, IAR evaluated 10 varieties in laboratory, and found that KSV4 (BES; SAMSORG 3), KSV 12, KSV 13, NR 71176 were suitable for mating similarly to KSV 8 and ICSV 111 (Table 4).

3) Training of farmers on sorghum grain quality maintenance and marketing – IAR in collaboration with partners such as grain merchants, maltsters and brewing industry organized a workshop to train farmers on the quality of grain required by end users. Further, farmers were advised on how to perform production, harvesting, threshing and storage operations to ensure good quality grains. Farmers were further taught marketing channels for all grain that met end-users requirements.

These strategies which we hope are sustainable were directed to make small-scale farmers obtain short and medium terms benefits of commercialization and utilization of sorghum in Nigeria.

CONCLUSION

Brewing industry in Nigeria is using sorghum and maize extensively in the production of beer and food drinks. Lager beer brewers need to use imported enzymes. Researchers should concentrate on developing cultivars that would require little or no artificial enzymes or work on the production of locally manufactured enzymes in order to make our beer internationally acceptable and save foreign exchange from importing enzymes.

Products of composite flour such as bread and biscuits are still not acceptable to the Nigerian consumers. While efforts should be made to improve the quality of these products, Nigerians may have to change the taste for foreign food. At present, farmers sell their grains raw without cleaning and processing. Until farmers begin to do some processing to add value to their grains, they may not be able to reap the benefit of increase in the demand as a result of industrial commercialization of their crops.

Table 1: Output of some Agricultural Commodities ('000 tons)

YEARS	SORGHUM	MAIZE	MILLET	RICE
1986	5455	1336	4111	283
1987	5455	4612	3905	808
1988	5182	5268	5136	2081
1989	7265	5008	4770	3303
1990	4185	5768	5136	2500
1991	5367	5810	4109	3226
1992	5909	5840	4501	3260
1993	6051	6290	4602	3065
1994	6197	6902	4757	2427
1995	6997	6931	5563	3203
1996	7514	6217	5803	3122
1997	7954	6285	5997	3230
1998	8401	6435	6328	3486
1999	8505	6515	6423	3522

Table 2: Products made from sorghum in Nigeria

S/no	Local products (Drinks/snacks)	Industrial products
1.	Tuwo	Beer
2.	Burukutu/Pito	Stout
3.	Kunu	Malt drinks
4.	Koko/Akamu	Malt extract
5.	Pate	Livestock feeds
6.	Dambu	
7.	Danwake	
8.	Tubani	
9.	Gauda	
10.	Jollof dawa	
11.	Waina	
12.	Fura	
13.	Wasa-wasa	
14.	Dashishi	
15.	Kosai	
16.	Buza	
17.	Popped sorghum	
18.	Jiko	
19.	Alkaki	
20.	German Rice	

Table 3: Preliminary Compilation of Firms using Sorghum in Nigeria

Livestock Feed	Food, confectionary and beverages	Breweries	Starch and additives	Processors
Medecowa, Kano	Northern Nigeria Four Mills, Kano	Sava Malt, Kano	Gaskiya Textile Kano	Labande Cereales Ltd, Offa
Nom Feed, Kano	Kaura Biscuits and Makaroni, Kano	IBBI Limited, Kaduna	Dangote Textile, Kano	
Pfizer, Kaduna	Capital Food Company, Kaduna	Nigeria Breweries Ltd, Kaduna, Lagos	Northern Textile Manufactures, Kano	
Sanders, Kaduna	Kaduna Grains Processing company Ltd. Kaduna	Jos International Breweries Limited, Plateau	Teridex, Kano	
Feedmaster, Kaduna	Ideal Flour Mills Limited, Kaduna	Sona Breweries Ltd Ota, Ogun State	African Textile, Kano	
Feedex, Kaduna	Nestle Food Products, Lagos	Guinness Nig. PLC, Lagos	Spinner and Dyes, Kano	
Nargata, Kaduna	Cadbury Nigeria Limited, Lagos	Golden Guinea Breweries, Onitsha	Angel Spinner and Dying	
Pillar Feed, Kaduna	Grand Cereals and Oil Mills, Jos.		Arewa Pharmaceuticals, Kaduna	
Silvers, Kaduna	Pioneer Milling Co. Ltd. Jos.		Arewa Textile, Kaduna	
Guinea Feed, Kaduna	Jos Flour Mills, Jos		Kaduna Textile, Kaduna	
NAPRI, Kaduna	Lifecare Ventures, Offa		Nigeria Tobacco Company, Kaduna	
Vita Feed, Jos			Rigidpack Ltd., Kaduna	
ECWA Rural Development Ltd, Jos			Sterling Products Nigeria Limited	
			Supertex Nigeria Ltd., Kaduna	
			United Nigeria Textile PLC, Kaduna	
			Untiex Nigeria Ltd., Kaduna	

Table 4: Varieties Preference by Ranking

RANK	VARIETY	N° OF RESPONDENTS	% PREFERENCE (N=9)
1st	Red	7	78
2nd	Fari	6	67
3rd	Mori	2	22
4th	Kaura	1	10
5th	Any	1	10

Table 5: Result of Malting Loss and Moisture Content Analysis

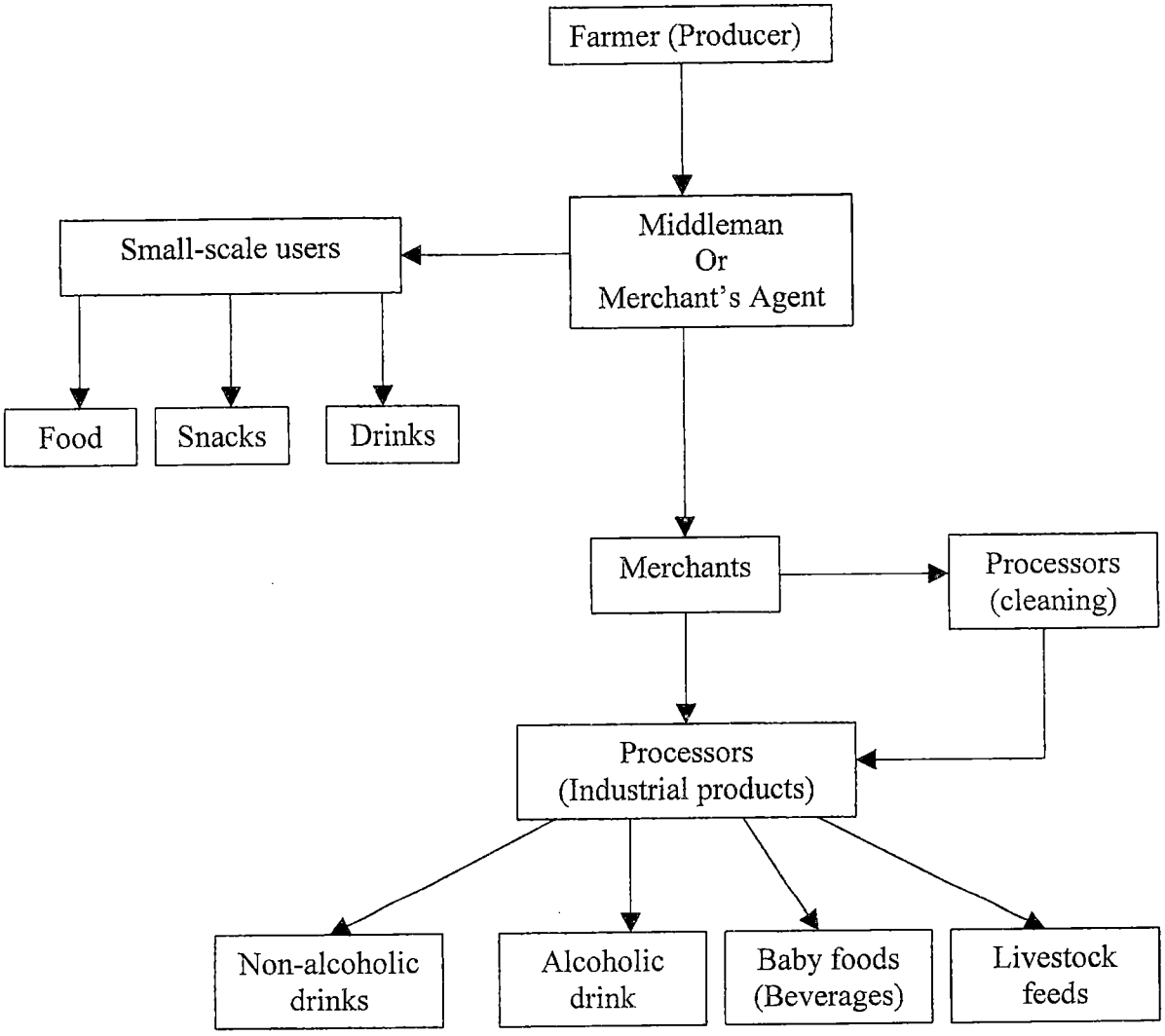
1. Malting Loss	**ICSV 400**	**Kg**
Weight of sorghum before steeping weight of sorghum after		270
Germination drying.		259
Malting Loss		11kg or 4.1 %
2. Moisture Content Analysis		
Moisture content during germination		37.18-39.5%
Moisture content after sun drying		5.86%
Moisture content after kilning		0.58%
	SK 5912	
1. Malting Loss		**KG**
Weight of sorghum before steeping		270
Weight after germination and drying		267
Malting Loss		3kg or 1.1%
2. Moisture Analysis		**%**
Moisture content during germination		36.07-38.14%
Moisture content after sun drying		6.38%
Moisture content after kilning		0.92%
	ICSV 111	
1. Malting Loss		**KG**
Weight of sorghum before steeping		270
Weight after germination and drying		258
Malting Loss		12kg or 4.4%
2. Moisture Analysis		**%**
Moisture content during germination		3708-38.97%
Moisture content after sun drying		7.46%
Moisture content after kilning		0.97%
	KSV 8	
1. Malting Loss		**Kg**
Weight of sorghum before germination		180
Weight after germination and drying		164
Malting Loss		16kg or 8.9%
2. Moisture Analysis		
Moisture content during germination		33,35-36.04%
Moisture content after sun drying		6.35%
Moisture content after kilning		0.86

Table 6: Percent Malting Loss of Ten Sorghum Cultivars

DAY	KSV4	KSV8	KSV12	KSV13	KCSV111	SRN 4841 (improved)	SSV 98001	NR 71176	NR 71168	NRL3
1	3.33	3.33	6.67	11.92	6.67	6.68	12.50	3.33	9.06	6.06
2	8.33	11.67	8.00	13.03	10.00	12.90	13.13	8.33	11.36	12.12
3	10.00	13.33	13.33	13.41	13.33	16.13	15.63	10.00	13.64	15.15
4	10.00	20.00	16.67	15.71	20.00	24.19	18.75	10.00	18.18	16.97
5	11.67	21.67	16.67	19.54	23.33	25.81	21.88	13.33	22.73	18.18
6	13.33	26.67	20.00	23.37	26.67	27.42	37.50	15.00	29.55	19.70

Values are means of triplicate determinations.

Figure 1 : Chart showing marketing structure in the sorghum industry



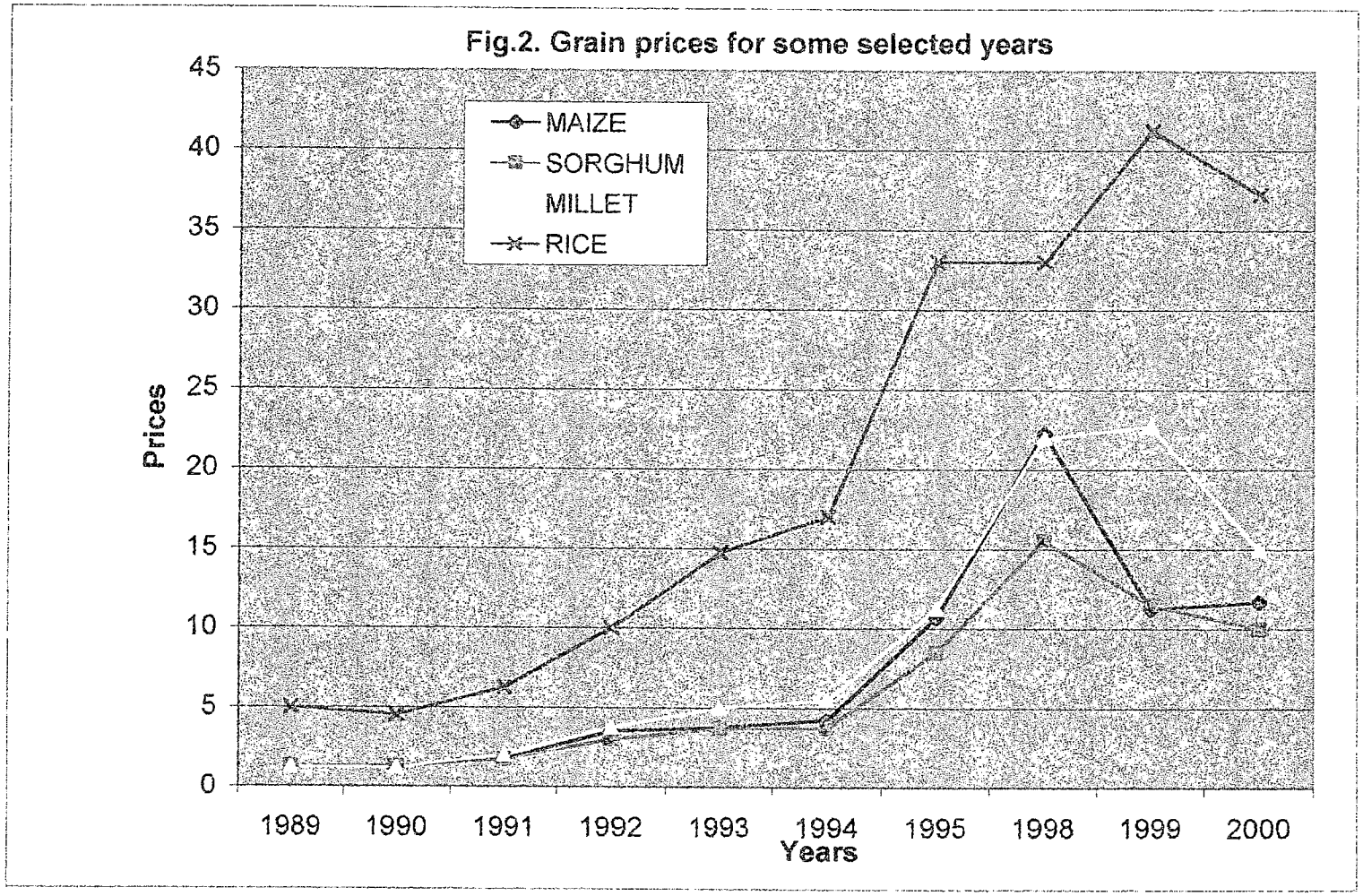


Fig.2. Grain prices for some selected years
45
40
35
30
25
20
15
10
5
0
Prices
MAIZE
SORGHUM
MILLET
RICE
1989
1990
1991
1992
1993
1994
1995
1998
1999
2000
Years

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SOME LESSONS ON TECHNOLOGY TRANSFER

The following two papers presented during the workshop gave highlights of experiences and lessons on the transfer and commercialization of agricultural technologies

4.5. Progress Report on Implementation of the USAID-Funded Project on Accelerated Dissemination of Improved Agricultural Technologies in Nigeria.

BACKGROUND

The author outlined background rational for launching the project as follows:

- Most developmental aids to Nigeria were suspended during the Military regime that annulled democratic election in 1993.

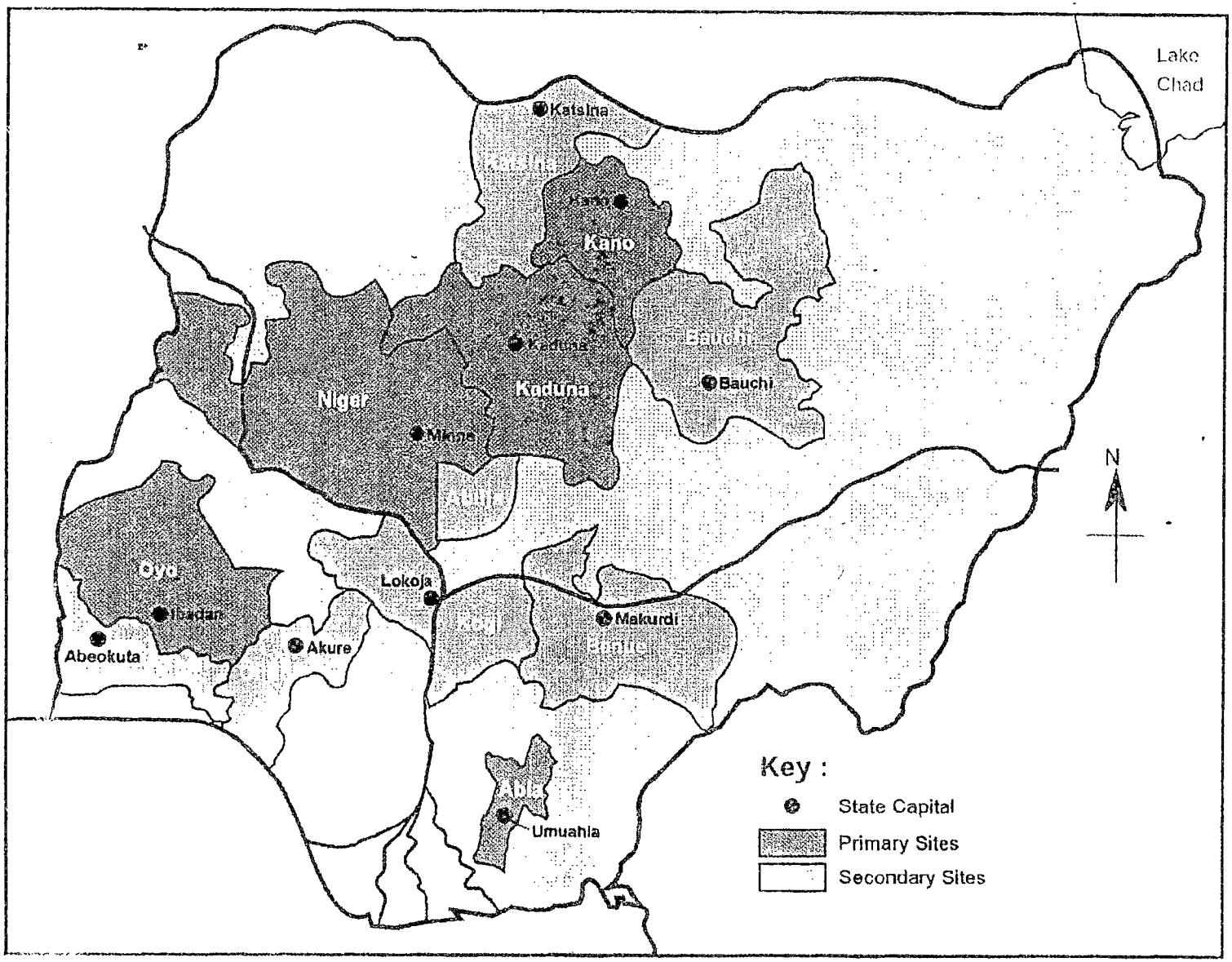
- With the success transition program that cumulated into the inauguration of a democratically elected Government in May 1999 lifting of sanctions imposed during Military regime commenced.

- In June 1999, USAID initiated discussion with IITA on funding of a short-term project to jump-start USAID agricultural development programs in Nigeria as part of USAID/Nigeria Strategic Framework evolved at a Stakeholders Workshop in IITA, December 10-12, 1999.

USAID/NIGERIA: Strategic Framework

- In August 1999, a project on Accelerated Dissemination of Improved Agricultural Technologies in Nigeria was conceived with an indicated budget of $500,000.

- March 2000, green light for release of the fund to IITA was received with implementation commencing in April by inviting proposals from potential



Map of Nigeria showing ADIATN implementation sites

- collaborators from the National Agricultural Research and Extension System (NARES) in 5 selected States (Abia, Kaduna, Kano, Niger & Oyo).

- Implementation Agencies:

IARC (IITA, ICRISAT, ILRI)	Seed Production and technical backstopping
NARES (NARIs, Universities Of Agriculture, ADPs)	Community-based Seed Multiplication and Technology Dissemination.
NGOs	Technology dissemination and training

- 52 proposals submitted by various collaborators and partners were screened by a technical committee.

- 39 proposals were selected

- Breakdown

Multiplication of seed and planting materials	15
Dissemination of existing technologies	8
Participatory testing of best bet technologies	4
Training in Crop Utilization	4
Livestock management improvement	4
Technical Backstopping	4

Implementation Strategies

- Seed and planting materials of improved varieties of maize, sorghum, millet, rice, cowpea, soybean, groundnut, cassava, yams and planing/banana were to be produced by IARCs, NARIS and ADPs to support community-based seed production programs that will make certified seed of improved crop varieties readily available to small-holder farmers at affordable cost.

- Dissemination of selected technologies through participatory on-farm demonstration, farmer managed on-farm testing and small-plots adoption techniques (SPAT).

- Training of farmers, small-scale food processors and retail marketers of grain (soybean, maize), root crops (cassava) and plantain/banana in improved methods of home and cottage level utilization.

- Community-based dissemination of improved health, feeding and housing management technologies for livestock.

Results

Table 1: Seed and Planting Materials Production under ADIATN Project in 2000.

AGENCY	CROP	QUANTITY OF SEED PRODUCED
IITA	Yam	5000 minitubers
	Cassava	585,000 stakes
	Maize	18.9MT
	Soybean	6.8MT
IITA Kano	Cowpea	4.0MT
ICRISAT	Millet	5.9MT
	Sorghum	0.3MT
IAR	Soybean	3.1MT
	Groundnut	0.6MT
	Sorghum	1.4MT
	Cassava	4.2 Hectares
IAR & T	Maize	1.0MT
NCRI	Rice	3.4MT
	Soybean	1.3MT
NRCRI	Cassava	22 hectares
Abia ADP	Yam	1.0 hectares of minisetts
OYSADEP	Maize	7.5MT
	Cowpea	3.8MT
	Soybean	0.7MT
KNARDA	Cowpea, Soybean Groundnut, Sorghum and millet	17.9MT
NSS	Maize	3.3MT
DDS	Maize, Cowpea, Soybean	13.8MT
Bountiful Harvest	Rice	0.7MT

Table 2: Dissemination of Improved Technologies under ADIATN in 2000

Technology Disseminated	Dissemination Agency	Number of Farmer's
Maize (Striga resistant)	CRC	89
Soybean (Striga suppressing)	"	89
Soybean/Cassava intercropping	FADU	95
Maize-Striga resistant	UNAAB	34
FYM ½ rate with High N_2 fixing soybean	IAR	50
High yielding stress-tolerant rice varieties	NCRI	40
Early maturing soybean	NCRI	23
Insect resistant cowpea variety	IAR	48
Dual purpose sorghum for food and malting	IAR	18
Higher yielding cassava edible with boiling	IAR	20
DMR-Maize	IAR & T	72
High yielding rice varieties	Bountiful Harvest	22
Stem-borer resistant maize variety	NM/RC	30
DMR-Maize variety		65
Improved varieties of cowpea, soybean, sorghum, millet and groundnut	KNARDA	500
Striga suppressing soybean variety	UAM	80

Table 3: Training in crop utilization under ADIATN in 2000

Crop on which utilization Training is conducted	Trainer	Number trained in 2000
Maize	IITA Maize Utilization Unit	50
Cooking Banana	TDO/Abia ADP/IITA-Onne	614
Soybean	IAR	40
Sorghum/Cassava Composite flour	IAR	2 Bakeries
Cassava/Soybean	OYSADEP	4 women groups
Soybean	IITA Food Technology Unit	115
Cassava	" " " "	45
Cassava	EFDI	1 community with 16 members

Table 4: Improved Livestock Management Practices disseminated under ADIATN in 2000

Livestock Management Practice	Technology Transfer Agency	N° of Livestock farmers in 2000
Improved health feeding and housing for sheep and goats	Abia ADP	60
Improved Health feeding and housing for cattle	NLPD	5 Associations with 60 livestock farmers and 3000 animals
Improved health feeding and housing for sheep and goats	OYSADEP	189 farmers
Peri-Urban Cattle Fattening and Dairy Production	U.I	2 Demonstrations in 2 LGAs

Lessons Learned

i. Adoption faster for technologies that address farmers-perceived problems e.g.

- Downy mildew resistant maize variety which eliminates use of costly seed treatment fungicides.
- Stem borer resistant maize in the pest hot spots in the SE
- Striga-suppressing soybean variety TGX 1448-2E
- Striga-resistant maize variety

ii. Farmers use certified seed of improved varieties provided seed is readily and timely available and at affordable cost. Smallholder farmers best served by community seed growers outfit for open-pollinated varieties. Bigger seed companies should emphasize hybrids for large-scale farmers.

iii. Collaborative technology transfer through establishment of Technology Transfer Team in each State enjoys confidence of farmers and government as demonstrated by the team of IITA, ICRISAT, IAR and KNARDA in Kano state.

iv. Establishment of Community-based Seed Growers Association producing certified seed of OP crop varieties with marketing system initiative that would create a revolving fund.

4.6. The West African Small Grants Program: Best Practices and Lessons Learned in Technology Transfer and Commercialization

OAU/STRC - SAFGRAD

Introduction

The West African Small Grants Program (WASGP) funded by USAID initially has been implemented in Burkina Faso, Ghana, and Senegal. One of the objectives of the program was to document best practices and lessons learned in order to facilitate the replication of success stories and to avoid the shortcomings in other countries.

Constraints and Issues

- Agricultural policy has not encouraged farmers to invest in more productive technologies.
- Information on product markets to influence farmers' decision to invest in improved inputs, such as more productive technologies has been lacking.
- Poor linkages have existed between agriculture and agro industry/food processing units to enhance the transformation of agricultural produce into-value-added products.
- The public sector delivery of agricultural inputs and technological services has been poor and costly, contributing to shortfalls in food production in several West African countries.
- The perception that the generation of agricultural technology is a separate activity from that of its transfer has contributed to the inefficient delivery of research results and to the continuous decline in productivity and income earned.

Goal of WASG Program:

Improve the livelihood of resource poor farmers and small-scale food processors by enhancing the efficient transfer and commercialization of agricultural technologies with particular emphasis on attaining food security and generating income and employment.

Assumptions of WASG Program

- Technology options that could substantially increase agricultural production and productivity do exist. But farmers and other end-users have yet to benefit from research results largely due to inefficient technology delivery systems.

- Market liberalization and economic policy reforms will create an enabling environment for the private sector to play a key role in the provision of agricultural production support services and the development of agro businesses.

The West African Small Grants Program (WASGP) Implementation Model

Basic principles:

- Technology transfer and commercialization is a **continuous process** that requires an **enabling environment** to stimulate growth of the agricultural sector.

- Creating that enabling environment requires **adequate and appropriate government policies, investment and institutional responsiveness.**

Model:

The model employed (Fig. 1) shows the key **stages of the processes** and the **partnerships** required for enhancing the transfer and commercialization of agricultural technologies.

Key features: three important and interlinked stages:

i) **The Technology Supply and Choice Phase**
First step in project development: **identify and package workable technology options.**

The orientation and priorities toward **demand-driven research** by NARS, IARCs, Networks, Universities, etc. are crucial **to enrich technology options for clients** such as farmers, food processors, agro industries, private and public sector organizations, women's groups, farm associations, etc.

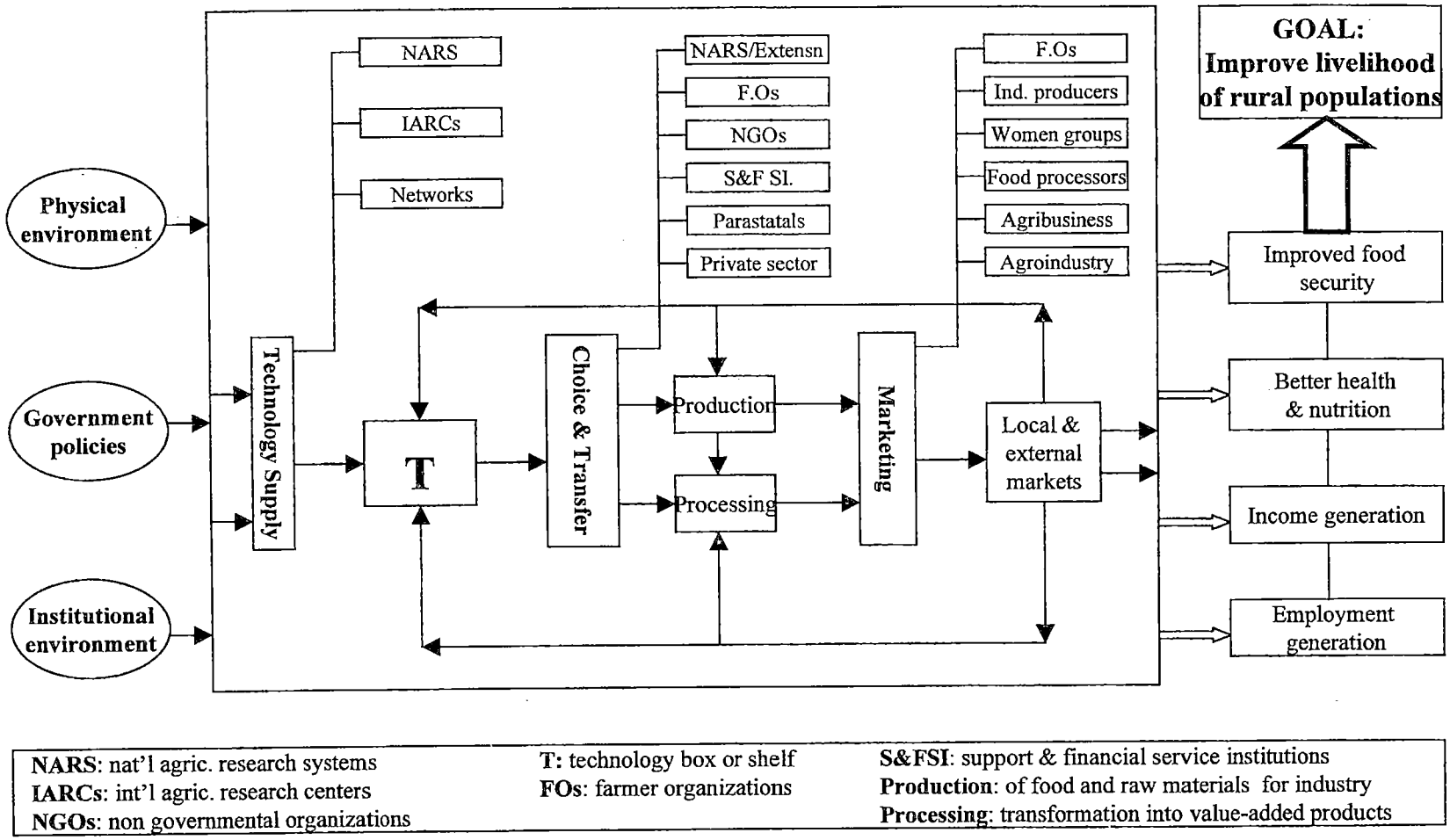


Fig. 1 : Framework for the Technology Transfer and Commercialization Continuum

ii) **The Technology Transfer Phase** Main thrust of WASGP is to test new innovations and promote the transfer of technology.

Key strategy: recognize that beneficiaries of research results (farmers and their organizations, food processors, agroindustries, women's groups, private sector organizations) are **key players in the technology transfer** and get them involved.

iii) **The Technology Commercialization Phase**
Market research identify demand by end-users of technologies and linkages to agro-industries and to local and export markets to enhance the commercialization of processed and agricultural produce is an important component of this model.

Key **stakeholders** include agribusiness micro enterprises, agro industry as buyers of raw materials and sellers of value-added products, farm organizations and women's groups as micro-entrepreneurs, etc.

Implementation Strategies

i) **Strengthening Innovative Partnership Formation**
Involving key actors and major stakeholders engaged in technology development, transfer and commercialization, as well as in the provision of production support and financial services.

ii) **Capacity Building**
Improving technical skills in agricultural productivity, as well as the delivery of technologies to clients.

iii) **Promoting on-farm linkages** through the development of microenterprise (for example, agribusiness).

iv) **Survey and inventory** – To characterize available technological options and markets, as well as to determine the type of production support and financial support services required.

v) **Networking** – For testing, dissemination and sharing innovative options.

The West African Small Grants Program (WASGP)
Lessons learned in the Transfer and Commercialization of Agricultural Technologies.

Initially, 18 small grants projects have been implemented in Burkina Faso, Ghana and Senegal.

The Development of Seed Production Enterprises

i) **Potato and onion planting material increase.**

- Seed increase of improved potato and onion cultivars in the Sudano Sahelian zone of Burkina Faso. The Yatenga Seed Producer Association (APSY) increased tubers of improved potato tubers of (Sahel variety) and onion improved varieties (Galmi and Garango).

- In 1998/99 APSY produced 11 tons of potato seed tuber meeting 66 percent of the demand. Fifteen producer associations purchased all of the potato tuber seed produced which was distributed to several locations in Yatenga province. The gross income generated from potato and onion sales amounted to twelve thousand ($12,000) and seven thousand ($7,000) per hectare, respectively.

- Furthermore, the project offered practical training to producers groups in potato, onion and tomato production.

- Reinvestment of project income by APSY has improved capacity of its enterprise by reinvesting income generated in 1998. This financial investment enabled APSY to purchase farm implements build an improved storage facility and repair of a cold room for keeping the seed, and acquisition of equipments for land preparation.

ii) **Seed increase and distribution of improved millet and maize cultivars in Senegal Foundation seed of improved millet (Savana 3 and IBV-8001 and 8004) and new cultivars of maize** (3 varieties).

Among ways to boost grain production, is promoting the timely access to sufficient quantities of high quality seeds. Technologies are available, especially at ISRA for seed production. But these results have not been transferred successfully to farmers because of some of limited use of inputs,

lack of credit, etc. Sufficient seeds of improved cultivars of millet and maize, two important food crops for farmers, are still lacking.

Improved maize and millet seed were multiplied for farmers use in various parts.

Indicators of success

Success of this project is evidenced by:

- Production and sales of millet and maize seeds; Over the two years of the project, about 17,000 kg and 13,000 kg of certified seed of millet and maize respectively, were produced under contract by 9 and 7 private producers. 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.

- The bulk of the seed was purchased by farmer organizations, the private sector, NGOs, research extension and development agencies the poverty alleviation program of UNDP, World Vision, and the Rodale Institute.

- Contracts were signed with two groups of farmers which allowed them to get substantial income from seed production; and, the farmer groups successfully produced and sold certified seeds, which met the standards of UPSE/ISRA.

- A total of forty-nine people were successfully trained in seed production, treatment and conservation: thirty as pilot producers in different production zones; fifteen in collaboration with other partners (UNDP, AQUADEV, NGO); and, four students in agricultural engineering from ENCR.

In Senegal, the increased seed of improved cultivars of millet and maize has been distributed to ten administrative regions of Senegal. The bulk of seed was purchased by farmer organizations, the private sector, NGOs, development agencies, the poverty alleviation program of UNDP, World Vision and Rodale Institution.

Lessons Learned in Development of Private Seed Production Enterprise

- The crucial factors for evolving small farmer associations into seed enterprise services are sustained linkages to research and extension and the available of credit to collectively use facilities for seed cleaning and processing.

- An encouraging innovation of the APSY enterprise in Burkina Faso has been the reinvestment of its first year's income to improve both production capacity and management. An internal stimulating process of revolving funds that helps broaden the activity base and secure its continuation through potentially sustainable funding is a good management practice. This dynamic internal recycling mechanism of project funds is critical for sustainability of the enterprise.

- In Senegal, small scale farmers or their association, can fill the gap of certified seed production at the community level. Contracting farmers as out growers of certified seed production of millet and maize cultivars improved both their skills in seed technology and their income.

DIVERSIFICATION OF FARM INCOME

One of the thrusts of WASG has been to improve the efficiency of the technology transfer and delivery and linkages of agricultural produce to market outlets, for example, agroindustries.

Case One: Production and commercialization of cowpea in Burkina Faso involving 95 producers of Farmers' Association Song-Koaadba (ASK). OAU/STRC-SAFGRAD/INERA and the Research and Development Unit of NESTLE established a cooperation agreement to promote cowpea improvement and production for industrial use. Partnership of key stakeholders were established among the farmers' Association de Song-Koaadba (ASK) with more than 2100 members based in the Donsin district 35 km northeast of Ouagadougou, SAFGRAD, the Burkina NARS, and the University of Ouagadougou. The program facilitated contractual agreements between NESTLE and farmers' Associations for the production of raw materials (cowpea) for industrial processing. NESTLE, through SAFGRAD and INERA, provided inputs and technical services to farmers in particular to increase cowpea production. The agreement also included negotiated prices that farmers agreed to the beginning of the season. The partnerships of interested groups established a reliable system for commercial production of cowpea. Ninety-five farmers, members of ASK, were involved in commercial production and participated in the technology transfer and cost of production studies. The aim was to:

- to provide technical assistance in cowpea production for yield increase
- to improve farmer income through commercialisation of cowpea to industry
- achieve sustainability through establishment of revolving funds;

Problem addressed: promote cowpea production to help farmers diversify their production and generate income. Revenue from cowpea sales represented an important share of income.

Four improved cowpea varieties (i.e. KVx 61-1, KVx-414-22-2, KVx 414-22-72 and IAR 7/180-4-5-1 and agronomic practices have been disseminated.

The commercial production of cowpea gave the impetus to raise small ruminants not only to further diversify income, but also to improve the fertility of the soil, restore and protect the environment, and improve food security. 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 the regional extension and NARS included concentrates, cotton oil cakes, cowpea, fodder, groundnuts and crop residues. The fattening of sheep was undertaken twice per year, targeting holiday seasons.

Indicators of success

- 25 farmers of the Farm Association (ASK) took up sheep fattening (10 heads/household) and continue the activity at the end of the project.
- Annual income gains per participating farmer averaged 171,857 F CFA ($286 US) for the two groups operating under the project. These earnings helped diversify income.
- Furthermore, the long term gains for cultivating cowpea and raising small ruminants has been the improvement of soil fertility from the application of crop residues and animal manure.

Case two : Increasing vegetable oil production and processing in Northern Ghana. High yielding with good oil content soybean varieties were made available and cultivated by about 300 farmers in Karaga district, Northern Ghana.

Soybean production in Karaga district Northern Ghana has been on the increase in recent times. Yields are, however, low due to the use of non-certified seeds by farmers. This has been attributed to inadequate supply of improved seeds.

To overcome these problems, the Savanna Agricultural Research Institute (SARI) in collaboration with the Ministry of Food and Agriculture (MOFA) and Bosbel Oil Mills established the project titled 'Increasing Vegetable Oilseed Production and Processing in Northern Ghana.

WASGP supported the above soybean project, first, to enhance the dissemination of improved soybean cultivars by SARI and the extension unit of the sub-region; second, to evaluate an alternative approach of technology transfer such has the Nuclear (lead) farmers approach; third, to introduce cultivation of the crop; and fourth, to enable farmers particularly women to generate income.

The Nucleus Farmer Scheme is a private investor driven approach. The lead farmer has invested on his farm and also serves as key agent for seed multiplication, and transfer of technology to members.

Because of the availability of improved seed and the transfer of related improved agronomic practices farmers increased their soybean production by over 55% between 1997 and 1999.

The project has helped to improve the socio-economic welfare of the farmers, especially women through increased income generation from soybean production. Studies undertaken by Gyasi et al. (2000) on the relative importance of major cash crops revealed that farmers ranked soybean as the most important source of household income. Gender analysis revealed that 23.9% more women (85.7 %) than men (61.8%) ranked soybean as the important cash crop. Increasing proportion of income accruing to women as a result of soybean production can have significant contribution to household food security status, health and welfare of children.

In spite of the growing industrial demand for the crop, marketing is constrained by the poor organization of farmers and the lack of effective linkages to industrial the crop. Also, liquidity problems have limited purchases of raw materials by the BOSBEL Company. The largest oil mills in the country. The proportion of farmers who sold in the open market (to wholesalers/retailers in local and urban markets) fell from 65% in 1996 to just 9% in 1999. On the other hand, those who sold directly or through associations to oil mills increased from 2% in 1996 to about 52% in 1999. The involvement of the Nucleus Farmer in marketing arrangements improved from 4.5% representation in 1996 to 20% in 1999.

Evidence was found that soybean production has had positive impact on the income of farmers, accounting for over 50% of household income, particularly during the project period. Major constraints to soybean production range from lack of improved seeds and labor to ready markets. Oil Mill industries, for example, BOSBEL, drastically improved soybean marketing in northern Ghana, manifested in higher industrial purchasing of the grain. However, these linkages still remain weak, causing some concern about the sustainability of the market.

Case three: The Medina Sabakh Millet Production and Commercialization Project in Senegal.

In the Senegalese Peanut Basin, the production of millet has been plagued by various constraints ranging from low use of improved inputs, insect damage to manual threshing, unstable prices compared to cash crops (peanut and cotton), etc. As a result of limited supplies of good quality grains, industrial processors operate below capacity.

Under the WASGP, a millet production and marketing project has been supported with a formally organized producer group in Medina Sabakh, Senegal. Under this project, group members used certified seed produced by research (ISRA/UPSE).

Under the project, the farmer's Association cultivated 50 ha using certified seed (Souna 3), fertilizer, urea, and extension services. A total of 23 tons of millet was introduced into the market. Farmers attributed this poor production performance to adverse climatic condition during flowering.

Unfortunately, the industrial processor did not fulfill its promise to buy the millet produced. The producer group then turned to the open market to sell the millet produce to local traders and food processors at a negotiated price of 92.5 FCFA/kg, generating more than 2 million FCFA in sales receipts. Pricing was the main reason the sale arrangement did not go through with the industrial grain miller (SENTENAC). The industrial processor offered low prices prevailing on flooded cereal markets and stalled negotiations to force the producer group to resort to distress sales. This instance raised important questions about the capacity of producer groups to negotiate and draw legally binding and enforceable contracts with industrial partners. Training in management and access to market information, credit, and storage facilities are enabling factors that will help farmers to get a better negotiating position in the future.

The mechanized threshing introduced through the project reduced post-harvest losses, and alleviated labor burden, especially for women (who were doing manual threshing).

DECREASING POST HARVEST LOSSES

Case One: Post harvest processing and drying mango and vegetable for export and local market in Northern Burkina Faso

Throughout the Sahel, mango is an important tropical fruit both for the domestic and export markets. During the peak season, post harvest losses from 10 to 25 percent are common. Minimizing post harvest losses of various fruits and 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 included the women's group (Women's Association) of Basnere, based in Ouahigouya about 170 km north of Ouagadougou. The assistance to this group of women included capacity building and the introduction of technology for drying mango, potato, banana, papaya, tomato, onions, etc. both for export and local markets.

Technology introduced: **4 Gaz drying units, sanitation, quality control and grading of mango fruits**

Indicators of success

- More than 80 tons of mango processed in 2000.
- Introduction of technology for drying mango, potato, banana, papaya, tomato, onions, etc. both for export and the local market
- This activity has generated employment for 20 additional women on a permanent basis.
- The Women's Group raised their business gross income to the level of 12,513,000 FCFA (US$20,855) in 1999 and 17,249,000 CFA (US 28748) in 2000.
- This, in turn, raised the gross income of permanent members of the association to the level of 1,808,000 FCFA (US$3,000) in 1999 and 5,490,540 FCFA ($9000) in 2000.
- Other beneficiaries of the project include farmers who sold mango to the women's association for a total of 3,209,980 FCFA (US$5,350 dollars) in 1999 and 4,350,460 ($7250) in 2000; transports (trucks and donkey cart, etc Fig. 11), that generated income of 899,275 FCFA (US$1,500 dollars) in 1999 and 1,560,000 FCFA ($2,600) in 2000.
- Increase in dried mango exports to a number of countries like Germany, England, Belgium, France, Italy, and Switzerland.

Case two: Improving the Nutritional Quality of Basic Diets through Utilization and Commercialization of Soybean Products

Among the local legumes and other available sources of protein, soybean has a tremendous potential for alleviating malnutrition in developing countries. It is an economical source of high quality protein, consisting of about 40% protein with a good balance of amino acids.

The utilization study of soybean at the household and small-scale enterprise levels was undertaken in two farming villages, *Samsam Odumase* and *Mimpemihoasem*. This project was, therefore, conceived to extend the experiences gained in earlier projects to two villages in Ghana's Central Region: *Samsam Odumase* and *Mimpemihoasem*. The project started in June 1998 and was completed in June 2000.

Indicators of success:

- The status of soybean production, processing and utilization in *Samsam Odumase* and *Mimpemihoasem* villages was documented in a report on the baseline study of soybean utilization at the small-scale enterprise level in the Greater Accra area.
- The food consumption patterns and food preparation techniques in the two villages were also included in the report on the baseline study of soybean utilization at the small-scale enterprise level in the Greater Accra Area.
- Two soybean-based products (full fat soy flour and soybean paste) with good nutritional and microbiological characteristic were developed using village level techniques.
- Village level processing technologies (equipment) have been fabricated for the production of soy flour and soybean paste.
- A total of 17 recipes with desirable nutritional qualities (energy, protein, vitamin B and B2, calcium and iron) and sensory characteristics were developed [(a) soy based recipes for eight staple foods; (b) five soy recipes for soups and stew; and, (c) soy milk and chocolate soy milk]. The recipes adequately cover a range of traditional dishes for effective impact on their nutritional status. The recipes are categorized into whole soy products (including pastes, flour and drinks); soybean wheat stews and soups; soybean incorporated into basic staple foods and soybean in cassava flour.

- The technologies developed are being used by small-scale enterprises for the production of high-protein weaning foods. These products are on sale in the supermarkets and health shops in urban areas. Some hospitals in the greater Accra Region have been making regular orders for the supply of soy flour from entrepreneurs for sale to expectant women and mothers.

- The two rural communities and extension personnel were trained in soybean production, processing, and utilization techniques.

Lessons Learned

- Adoption rate and commercialization of new technologies will be improved when built on existing practices or knowledge of local communities.

- The determination of sensory attributes of any new crop, or the utilization of an improved variety of a crop already in use in a local community facilitates adoption and eventual commercialization of the crop.

Case three: Utilization of Ditax tree fruit (Detarium Senegalense) as source of vitamin C.

Ditax tree is widely adapted in the Sahelo-Sudanian and Sudano-Guinean ecologies that extend over 13 countries in West Central and even East Africa. In Senegal, the main producing regions are in the south (coastal and middle Casamance) and the center (Saloum Islands). The tree can reach 15 to 20 meters in height. Flowering occurs between March and June and fruits mature between October and December.

In Senegal, the West African Small Grant Program provided support for the exploitation of Ditax fruits (*Detarium Senegalense*) as a source of vitamin C. This forest tree product is increasingly consumed in fresh and processed forms.

> Problem addressed: high demand for fresh and processed fruits which are highly perishable and in a form not suitable for conservation. Their potential in nutritionally rich-derived products (drinks, marmelade, etc.) is untapped. From the supply side, little is known about how these fruit trees are grown, and how they could be domesticated and disseminated for expanded production.

With a funding from the WASGP, ITA collaborated with rural households, producer groups, processors, and other local and international research institutes (ISRA/DRPF and CIRAD/France) to carry out this Ditax valorization project over the 1998-2000 period.

This project can be characterized as a mixture of research, and development of technology. The research focuses on supply side issues of the raw material (plant); and the technology development component focuses on processing of the fruits. Consequently, it does not meet the condition of "Technology Transfer" and "Commercialization" of the WASGP.

Indicators of success

- Success is evidenced by the achievement of the following: determination of ditax flavors and conservation of Ditax; training on Ditax collection has been conducted for 13 village residents; an agroforestry study was done on characteristics, production zones, marketing channels; determination of the optimum period of harvest; and determination of biochemical composition of ditax based products.

- Five products (natural pulp, sugared pulp, nectar, marmalade and dried paste) have been developed; and village level processing technology has been developed.

- The training of producers and processors has helped with the diffusion of harvesting methods, and processing and conservation techniques. Optimal harvesting methods can reduce harvest losses, increase production, and therefore income from sales.

- Partners in the production and utilization of Ditax fruit are individuals, men's and women's group farmers, and local processing industries through local and international research institutes. Other potential users of project results are producer groups, rural populations, especially those in production areas (islands), women groups that process the fruit, and local industrial units (ice cream, fruit drinks, etc.).

Annex 1.

OAU/STRC-SAFGRAD/USAID CONSULTATION WORKSHOP FOR FOR ENHANCING TRANSFER AND COMMERCIALIZATION OF AGRICULTURAL TECHNOLOGIES IN NIGERIA
IITA, IBADAN – NIGERIA: April 9-11, 2001

By: ***Kolawole O. ADENIJI***
Executive Secretary a.i.
OAU/STRC
P.M.B. 2359, Lagos – NIGERIA

Mr. Chairman,

Representatives of International Organizations and Members of the Diplomatic Corps.
Distinguished Invited Guests,
Ladies and Gentlemen:

I wish to extend to this very distinguished gathering of Government functionaries, members of the Diplomatic Corps, Eminent Scientists and Research Administrators, the greetings and best wishes of His Excellency, Dr. Salim Ahmed Salim, the Secretary General of the Organization of African Unity. In my capacity as the Executive Secretary a.i. of the OAU/STRC, it is my pleasure and priviledge to welcome you to the OAU/STRC-SAFGRAD/USAID Consultation Workshop for Enhancing Transfer and Commercialization of Agricultural Technologies in Nigeria in this beautiful green village IITA Compound, Ibadan. Also, I seize this opportunity to express our sincere gratitude to the Director General of IITA, Ibadan, Nigeria, Dr. Lucas Brader for the wonderful hospitality and welcome accorded us since our arrival in IITA.

We very much appreciate the excellent arrangement made and the facilities placed at our disposal to ensure a successful stakeholders consultation workshop to enhance transfer and commercialization of agricultural technologies in Nigeria.

Mr. Chairman,
Distinguished Delegates,
Ladies and Gentlemen:

The Scientific Technical and Research Commission of the OAU was founded in 1964 on the recognition that real and sustainable social and economic development of Africa depended on innovative scientific and technological policies. The Commission serves Africa in all matters relating to science, technology and research by coordinating joint projects as stated in the OAU Charter, the Lagos Plan of Action, Africa's Priority Program for Economic Recovery, and the Abuja Treaty establishing the African Economic Community.

The OAU/STRC operates a system composed of the Executive Secretariat based in Lagos and four sub-regional offices namely: -OAU/IBAR, based in Nairobi (Kenya) – deals with all matters relating to Animal Health and Production in Africa; OAU/IAPSC Yaounde (Cameroon) – deals with Plants and Phytosanitary Inspection in Africa as well as facilitate plant quarantine measures; OAU/Fouta Djallon Integrated Development Highlands Project, based in Conakry (Guinea) – coordinates studies on watershed management and natural resources in Africa; OAU/STRC-SAFGRAD i.e. The Semi-Arid Food Grain Research and Development, located in Ouagadougou (Burkina Faso), has the mandate to facilitate the improvement, production and utilization of food grains; the development of sustainable farming system, technology verification and transfer in rural Africa.

In view of the restructuring reform process currently in place in OAU and the emergence of African Economic Community which fused Regional Economic Communities (RECs), these offices are undergoing technical and administrative evaluation exercise presently to determine their relevancy, retention or abolition as sub-regional offices of the OAU.

In the implementation of its activities, the Commission sets up Expert Committees composed of the representatives of Member States who are specialist in identified areas. The most active to-date of those Committees are:

- The Inter-African Committee on Soil Science;
- The Inter-African Committee on Oceanography, Sea and Inland Fisheries;
- The Inter-African Committee on Science and Technology;
- The Inter-African Committee on Medicinal Plants and Traditional Medicine.

The place of Agriculture in the economic well-being of the African population cannot be over-emphasized. Consequently, STRC program thrust has been towards improving animal health and production, enhancing the generation, transfer and adaptation of food grain production technologies; regulation of plant quarantine and crop protection; as well as the development of sustainable farming systems.

In spite of the efforts of various stakeholders engaged in strengthening capacity of National Agricultural Research Systems (NARS) in general and the development of agricultural sector in particular, Africa faces serious food security and poverty problems; which are socially, environmentally and financially unsustainable. STRC has collaborated with a number of CGIAR institutions either to initiate and or assist the implementation of numerous projects.

Among the collaborative program has been the project of the Africa-wide Biological Control of Cassava Pest (Mealy bug and green spider mites), jointly initiated with IITA and implemented in 35 Member States. The project has been successful and has benefited several million farmers in Sub-Saharan Africa (SSA). Training through this project has strengthened biological control program in several NARS.

The first and second phases of the Semi-Arid Food Grain Research and Development Program (SAFGRAD) have been implemented in collaboration with ICRISAT for the improvement of sorghum and millets and in collaboration with IITA for the improvement of maize and cowpea. The development of several agricultural research networks within the framework of OAU/STRC-SAFGRAD has also involved the collaboration of ICRAF, NARS Farming Systems Networks, ILRI, IITA, ICRISAT and a number of Universities.

Through STRC, OAU promotes the application of Science and Technology (among member States) a s an instrument for establishing a vibrant African Economic Community. However, despite the concerted effort of the African Agricultural Research and extension systems, development agencies, etc. the living conditions of millions of people in rural Africa have improved very little. Farmers are yet to fully benefit from improved technologies and produce more food in sustainable manner beyond the needs of their families.

Over the last four years, SAFGRAD has revitalized and broadened its program scope to make small-farm holdings more profitable. The new niches of SAFGRAD include first, to promote linkage of agricultural production to small and medium-scale industries to enhance the transformation of agricultural produce into value-added products; second, to promote demand driven research and packaging of more productive technological options to substantially increase agricultural productivity and income and third, to promote the development of agribusiness by exploiting both local and export market.

OAU/STRC-SAFGRAD in collaboration with NARs, IARCs, Agricultural extension and development organizations of Nigeria and through financial support of USAID will facilitate the implementation of the Agricultural Technology Transfer and Commercialization Project. Owing to the importance of this program in improving the

livelihood of farmers, STRC is determined to provide institutional and management support to meet the goal and objectives of the program.

On behalf of the Organization of African Unity, I take this opportunity to sincerely express our gratitude and appreciation to USAID and its mission in Nigeria for its financial support, IITA and the Government of Nigeria for hosting this workshop.

I wish all participants successful deliberation that will lead to implementable recommendation which will improve livelihood of farmers.

On behalf of the organizers, I wish to declare the workshop open.

Annex 2.

Stakeholders Consultation Workshop for Enhancing the Transfer and Commercialization of Agricultural Technologies in Nigeria In IITA, Ibadan, Nigeria 9 to 11 April, 2001

Tentative Agenda

Monday, 9 April

Arrival of participants

Tuesday, 10 April

09:00 - 10:00 — Opening Session

- Chairperson: Prof. J.O. Voh, Director, IAR
- Rapporteur: Dr. Mahama Ouedraogo, OAU/STRC-SAFGRAD
- Keynote address: Policy orientation for agri-business and related micro-enterprises development in Nigeria: Mr. O.A. Edoche, Director, Federal Department of Agriculture

The purpose and the objectives of the workshop: Dr. Taye Bezuneh,OAU/STRC-SAFGRAD

The expected out of the workshop by representative, USAID/Mission Nigeria

- Opening remarks by the Executive Secretary, OAU/STRC, Mr. A.O. Adeniji

Opening of the workshop: Dr. Moronkola Thomas (Commissioner of Agric., Oyo State)

10:00 - 10:15 — COFFEE BREAK and GROUP PHOTO

Plenary Technical Session I: 10:15 - 12:30

Chairperson: Prof. G.I. Abalu, Senior Regional Advisor, Food and Agriculture Policy and Planning, ECA
Rapporteur: Victor O. Adetimirin, Maize Breeder/Agronomist, University of Ibadan

10:15 - 10:45	Framework of action for agricultural micro-enterprises development in Nigeria: Prof. A. Ikpi, SAFGRAD Consultant, Agricultural Economist, University of Ibadan
10:45 - 11:05	The Technology Transfer and Commercialization project in Nigeria: An overview: Dr. Taye Bezuneh, International Coordinator, OAU/STRC-SAFGRAD
11:05 - 11:20	Current policies and practices in seed increase and related input distribution: Dr. Salisu Ingawa, Director, PCU
11:20 - 11:40	The experience of the West African Small Grants Program (WASGP) in other countries in the sub-region - OAU/STRC-SAFGRAD: Drs. Mahama Ouedraogo/Bocar Diagana, SAFGRAD Regional Agronomist and Agricultural Economist
11:40 - 11:45	Maize improvement and production for enhancing industrial utilization in Nigeria: Dr. Abebe Menkir, Maize Breeder, IITA, Ibadan
11:45 - 12:00	Sorghum and millet improvement and production for enhancing industrial utilization in Nigeria, ICRISAT West Africa Representative
12:00 - 12:30	DISCUSSION
12:30 - 14:00	LUNCH BREAK
Plenary Technical Session II ***14:00 - 17:45***	
	Chairperson: Dr. Salisu Ingawa, PCU Rapporteur: Dr. Dayo Phillips, Agric. Economist, University of Agriculture, Abeokuta, Nigeria
14:00 - 14:15	Technology transfer for enhancing cowpea production, utilization and commercialization: Dr. B.B. Singh, IITA, Kano
14:15 - 14:30	Commercial seed enterprises: Experience and opportunities in Nigeria: Dr. A. Joshua, Managing Director, Premier Seeds
14:30 -14:45	Progress on ADIATN Project implementation: Dr. Peter Oyekan, IITA-Consultant
14:45 - 15:00	Post harvest food processing for transforming agricultural produce into value-added products: Experience and opportunities in Nigeria: Prof. Sunny Odunfa, Director, FIRRO

15:00 - 15:15	Industrial utilization of cereals: the case of sorghum and maize: Prof. O. Ogunbile, Agricultural Economist, IAR, ABU
15:15 - 15:30	Comments by flour and oil mills representatives
15:30 - 15:45	Agricultural raw material (i.e. sorghum and maize) production for breweries: current status, future needs and opportunities: Mr. S.A. Bello, Guinness Breweries Nigeria Ltd
15:45 - 16:00	Cereal Production for Agroindustries: J.L. Chaumeil or Nestle Food Nigeria Ltd
16:00 - 16:15	Comments by food processors
16:15 - 16:30	COFFEE BREAK
16:30 - 16:45	Microfinance to enhance microenterprise development: Lessons learned and best practices in Nigeria: Mr. Ade Adedoja, Coordinator, FADU
16:45 - 17:00	Rapid appraisal survey to identify key stakeholders and to establish parameters for project development to define parameters to project development: Prof. George Abalu
17:00 - 17:30	Discussion
17:30 - 17:45	Organization of Working Group
18:30	RECEPTION

Wednesday, 11 April

08:30 - 12:30	Working Group Session
Working Group 1	**Lessons and best practices on technology transfer to enhance food security and commercialization of agriculture (Moderator Prof. George Abalu)**
	Rapporteur - ADP, Abia State
	i) Access and affordability to improved agricultural technologies to small scale farmer (ADPS and farmers comments)
	ii) Identification of gaps for improving the efficiency of technology transfer

	iii) Identification of best technology options to enhance the transformation of agricultural produce into value-added production
Working Group 2	**Strengthening linkages and partnership among stakeholders (i.e. research, extension, farmers, food processors, small and large scale industries, etc.) for enhancing the production of quality agricultural raw material for food and related industries to improve income of farmers (Moderator Dr. Taye Bezuneh)**
	Rapporteur: Dr. Bocar Diagana, OAU/STRC-SAFGRAD
	Issues include:
	i) Constraints and problems of agro industries in relation to supply of raw material
	ii) Response of research and the agricultural development agencies in the supply of profitable technologies to meet the needs of industries including food processing establishments
	iii) Strengthening producers partnership and support services to enhance production for food security and raw material for agro industries
	iv) Identifying gaps and recommendation for action
Working Group 3	**Promoting agribusiness and microenterprise development in Nigeria (Moderator Prof. Anthony IKPI)**
	Rapporteur:
	The issues:
	i) Access to microfinances - key constraints and opportunities
	ii) Best practices and options
	iii) Identifying gaps and recommendation for action
10:30 - 10:50	COFFEE BREAK
10:50 - 11:50	Working Group Session (Continued)
11:50 - 12:45	Preparation of Rapporteurs Report
12:45 - 14:00	LUNCH BREAK
14:00 - 15:30	Preparation of Rapporteurs Report

15:30 - 16:30	Rapporteurs Report Presentation
16:30 - 16:45	COFFEE BREAK
16:45 - 17:00	CLOSING OF THE WORKSHOP

Thursday, 12 April

09:00 - 12:00	Meeting of the Rural Appraisal Team
15:00 - 16:00	Wrap-up session with consultants

Annex 3.

OAU/STRC-SAFGRAD/USAID WORKSHOP

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