

Proceedings of FAO Eastern Africa Subregional
Strategic Workshop on Crop Production and Protection



4–5 August 2011
Addis Ababa, Ethiopia



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Executive Summary

The FAO Subregional Office for Eastern Africa (FAOSFE), intends to regularly document regional approaches and best practices regarding crop production and protection aimed at promoting increased crop productivity and production to contribute to increased food security in the subregion. The Workshop was convened in order to consultatively engage stakeholders to review relevant crop production and protection activities which included plant genetic resources for food and agriculture (PGRFA), seed delivery systems, post harvest handling for key commodities, inputs strategies, pesticide risk reduction and pesticide management, and integrated pest management with a view of obtaining input for the subregional reports on crop production and protection strategies and approaches. The Workshop was attended by participants who comprised representatives of governments from the Ministry of Agriculture (two senior officers per country). In addition, some participants and facilitators were invited to represent regional organizations for Eastern Africa (ASARECA and the DLCO-EA) as well as FAO Africa and Regional Offices (RAF, EARO and FAOSFS). The countries represented were Burundi, Ethiopia, Kenya, Republic of South Sudan, Rwanda and Uganda.

In the opening remarks, Mr. Castro Camarada, Coordinator – Subregional Office for Eastern Africa and FAO Representative in Ethiopia to AU & ECA welcomed the participants to the Workshop which he highlighted as a very important event. He reminded the participants of the current food crisis prevailing in the region and expressed his concerns about the fact that the regular occurrence of the phenomenon was a disturbing feature and challenged the participants for the need to come up with strategies to address this situation. He also advised the participants to come up with tangible deliverables so that the Workshop was not an end in itself but a means to an end through identification of specific action points for addressing crop productivity challenges for the subregion.

Main Workshop Highlights:

- a) The Workshop started with the identification of the priority commodities (food crops) in the region as well as outlining the major production constraints for the listed crops. The list produced from the exercise revealed similarities in the major crops for the different countries with the main food crops being maize, rice, cassava, sweet potatoes, Irish potatoes, bananas, beans and groundnuts. In addition, the major production constraints were also similar for the different countries. Chief among the constraints listed were the problems of soil infertility, high incidence of pests and diseases, inadequate seed of improved varieties; inadequate use of improved technologies; poor input and output markets; poor infrastructure (particularly irrigation), low value addition and inadequate technical advisory support for farmers.
- b) The country presentations and those of the regional organizations were followed by group work sessions that aimed at identifying relevant interventions to address the priorities identified during the presentations and discussions. The Workshop deliberated on the main aspects of crop production and protection work and their contribution to the development of appropriate policies, strategies and frameworks for the subregion. The groups also identified what the expected role of FAO would be in implementing the identified interventions in the subregion.
- c) As follow up to the Workshop, FAOSFE will prepare 4 Reports that will be shared with the participants for review and further input before final documents are produced. The Workshop output will also be the basis of the planning process for FAOSFE for the RBM process for the next biennium (2012-2013), based on identified recommendations.



Key Workshop Deliverables:

- 1) The Workshop recognized the need to address the availability of all the necessary inputs for achieving sustainable crop production and intensification of the major food crops in the subregion. The key inputs discussed were fertilizer, seeds, tools and equipment as well as water focusing on irrigation facilities. The discussions on strategies for inputs identified among the main challenges experienced when dealing with input supply systems, the following issues: aspects related to targeting of beneficiary farmers, use of innovative market oriented approaches as well as exit strategies to ensure that accessibility to inputs is sustainable.
- 2) It was observed that the informal seed sector remains an important component of the seed systems for all countries including where there is substantial presence of private seed companies (e.g. Kenya) as the percentage of seed supplied to farmers through the formal sector still remains quite low. In view of this, proven approaches that improve the quality of seed from the informal sector including the adoption of the Quality Declared Seed class need to be considered and up-scaled in the subregion.
- 3) In addition to demonstrating the benefits of using quality seed to farmers to create and maintain demand, the involvement of private sector for both the formal and informal sector is an important element for establishment of a viable seed delivery system. In this regard, community-based seed systems should include the development of seed entrepreneurs among the farmers to serve as seed growers of the foundation seed for new varieties and for the replenishment of fresh stocks of recycled seed.
- 4) The Eastern Africa FAO Subregion office should build capacity to create awareness and support obligation to known crop production and protection standards for each member country of the subregion. FAOSFE should build capacity for pre-breeding procedures and promote diversity in germplasm of the identified priority crops.
- 5) Regarding post harvest handling best practices, the Workshop observed the fact that good examples of household level storage structures and national level storage facilities are available in the subregion. It was noted however, that for effective management, substantial investment is required.
Such establishment of facilities should be accompanied by awareness creation and training of farmers on improved methodologies to reduce crop losses in storage. As much as possible any indigenous methods that have worked should be proactively promoted as well.
- 6) The Eastern Africa FAO Subregion office should promote harmonization of policies, procedures and standards in the member countries of the region to bring all counties to same level.
- 7) It was observed that implementation of GPA-PGRFA in the member countries was not very satisfactory and that technical support was required to improve the situation. It was clear that awareness creation about the obligations of the GPA-PGRFA and the relevant activities required for adequate implementation was required.
- 8) The Workshop observed the problem of invasive species and noted that more attention was required to address the problems caused by such pests in the subregion. In general, it was observed that weed problems were not adequately addressed as pests even under the IPPC. This oversight needs to be brought to the attention of the NPPOs.
- 9) The lessons learnt from community based monitoring for pest outbreaks was recognized as an approach that needs scaling up at subregional level and that opportunities be sought to also use similar approaches in working with monitoring of pesticide poisoning and environment effects.

Abbreviations and Acronyms

ABUCO	Burundi Consumer Organization
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
AU	African Union
BBN	Burundi National Bureau of Standards
CBAF	Community Based Armyworm Forecasting
CBO	Community Based Organization
CNS	National Seed Council
CNTA	National Food Processing Technology Centre
COMESA	Common Market for Eastern and Southern Africa
DLCO-EA	Desert Locust Control Office for Eastern Africa
EAC	East African Community
ECA	United Nations Economic Commission for Africa
FAO	Food And Agriculture Organization of the United Nations
FAOSFE	FAO Subregional Office for Eastern Africa
GDP	Gross Domestic Product
GPA-PGRFA	Global Plan of Action for Plant Genetic Resources for Food and Agriculture
IAPC	Inter-African Phytosanitary Council
IGAD	Intergovernmental Authority on Development
IPM	Integrated Pest Management
IPPC	International Plant Protection Committee
ISABU	Agricultural Research Institution of Burundi
ISTA	International Seed Testing Association
LGB	Larger Grain Borer
MOA	Ministry of Agriculture
NARO	National Agricultural Research Organization
NARS	National Agricultural Research System
NCCB	National Control and Seed Certification
NFSCC	National Food Safety Coordination Committee
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development



PGR	Plant Genetic Resources
QDS	Quality Declared Seeds
RADA	Rwanda Agricultural Development Authority
RAF	Regional Office for Africa
REOA	Regional Emergency Office for Eastern Africa
RC	Rotterdam Convention
SO-A	Strategic Objective A
SACCAR	Southern African Centre for Cooperation in Agricultural and Natural Resources Research and Training
SRC	Subregional Coordinator
TOTs	Training of Trainers
WFP	World Food Program

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1. INTRODUCTION

FAO Subregional Office for Eastern Africa (FAOSFE), based in Addis Ababa, Ethiopia organized a Workshop to document regional approaches and best practices with regard to crop production and protection aimed at promoting increased crop productivity and production to contribute to improved food security in the subregion.

The meeting conducted a review of the seed systems (current production and distribution) of member countries as well as seed development policies and regulatory frameworks in the member countries of the subregion; initiated a consultative process for the implementation of the inputs strategies; conducted a review on 'best practices' in post harvest handling for the main commodities of the subregion and prepared a strategy for scaling up; documented promotion of early pest/disease detection/warning and information exchange systems in SFE countries; followed up implementation of the Rotterdam Convention (RC) and regional participation in International Plant Protection Convention (IPPC) activities and its subsidiary bodies; prepared an implementation work plan for FAOSFE on priority commodities (cereals, oil crops, vegetables, legumes and root crops) and proposed follow up actions for the implementation of the recommended policies and strategies.

The objective of the participatory workshop was to consultatively engage key stakeholders (government officials and representatives of regional bodies operating in the subregion) of SFE member countries to review, document and harmonize regional approaches and best practices on intensified crop production and protection.

Based on the Workshop's deliberations, FAOSFE prepared the following documents:

- 1) Report on Strategies for Intensification and Crop Diversification in Sub-Region
- 2) Report on Seed Systems Strategies on Inputs (cereals, root crops and fruits/vegetables)
- 3) Report on Best Practices for Post Harvest for Key Commodities (Cereals and Food Crops)
- 4) Report on Integrated Pest Management use and Phytosanitary Regulatory Frameworks

Examples of good crop production stand and practices in the Subregion



Good crop stand of Wheat



Drip Irrigation "Best practice"



2. ORGANIZATION OF THE WORKSHOP

The Workshop was organized to consultatively to engage key stakeholders (government officials and representatives of regional bodies operating in the subregion) of SFE member countries to review, document and harmonize regional approaches and best practices on intensified crop production and protection.

Day One: Official Opening, Major Crops, Input Strategies, Seed Systems, Policy and Post Harvest Management

Bernard Mtonga, International Consultant - Crop Production and Protection for FAO Sub-Regional Office for Eastern Africa, and main Facilitator of the Workshop, introduced Mr. Castro Camarada, Coordinator – Subregional Office for Eastern Africa, and FAO Representative in Ethiopia, to AU and ECA, to give his opening speech. Mr. Camarada welcomed the participants to the workshop and urged them to contribute meaningfully during the deliberations, emphasizing the need to implement outcomes of the Workshop. Thereafter, Ms. Joyce MulilaMitti - Crop Production and Protection Officer for FAO Sub-Regional Office for Southern Africa, (also representing FAO Africa Regional Office), welcomed participants to the Workshop and challenged them to fully participate and make useful contributions during the Workshop. All participants were thereafter requested to introduce themselves. All invited senior government officials from the eight SFE member countries attended the Workshop except those from Djibouti and Somalia. Participants and Facilitators were also invited from the Subregional Office for Southern Africa, ASARECA, RAF, REOA, DLCO-EA, IGAD and EAC. However invited participants from IGAD and EAC were not able to come for the Workshop.

The first day focused on consultative identification of commodities (crops) and crop production constraints, presentations and discussions on identifying strategies for inputs, post-harvest technology/handling and best practices, seed systems, seed policy, market and trade in SFE and harmonizing seed policies as well as reviewing the institutional capacity for seed production in the subregion.

Day Two: PGRFA Strategies, Pesticide Risk Reduction, IPM, Phytosanitary Regulatory Frameworks and Action Plans

The first part of the second day was dedicated to presentations and group discussions on harmonizing seed policies (including seed supply systems and seed certification schemes) and reviewing institutional capacity for seed production of public and private sectors in the SFE countries. This was followed by developing country action plans on implementation of PGRFA strategies and policies that reinforce linkages between PGRFA components of conservation, plant breeding and seed systems, in the implementation of Global Action Plan on PGRFA (GPA-PGRFA). Thereafter, attention was focused on following pesticide risk reduction strategies through emphasizing pesticide management, early pest/disease detection/warning systems, IPM and the use of bio-pesticides and Rotterdam Convention. The Workshop also consultatively discussed IPM and Phytosanitary Regulatory Frameworks and ended with development of action plans for the Subregion and follow up of agreed policies, strategies and frameworks.

3. TECHNICAL PRESENTATIONS AND CONSULTATIVE DISCUSSIONS

Technical presentation sessions were held and chaired by Mr. Mohammed Salih, Ms. Joyce MulilaMitti, Mr. Bateno Kabeto, Mr. Bernard Mtonga and Mr. Abdurahman Abdulahi.

Session 1: Consultative Identification of Commodities (Crops) and Crop Production Constraints (Chairperson: Mohammed Salih)

Major root crops grown in the region are cassava, banana, Irish potatoes and sweet potatoes; Oil crops and vegetables include Ground nut, sesame, egg plant, tomato, leafy vegetables), Niger seed, and flax; Legumes are haricot, chick peas, peas, beans, green-gram and groundnuts; Cereals are maize, wheat, rice, teff, sorghum, millet and barley.

Crop production constraints were identified as poor soil fertility, shortage of improved seed, high cost of inputs, poor finance contribution, no clean planting materials, pests and diseases, unreliable weather, poor cultural practices, poor policies, soil erosion, poor irrigation, high cost of fertilizers, post harvest losses, poor market information, soil infertility, poor credit, use of traditional tools, climate variability, poor infrastructure, poor technology, poor extension systems, insecurity, poor rains and soil degradation.



Tabulated in Table one, are the priority commodities and production constraints identified, discussed and agreed for each specific country, by all participants.



Table 1: Priority Commodities and Production Constraints identified

	Burundi	Kenya	Ethiopia	Rwanda	South Sudan	Uganda	Somalia	Djibouti
Root Crops	Cassava, Banana, Irish potatoes	Irish potatoes, Cassava, Sweet potatoes, Banana	Sweet Potatoes, Irish Potato	Cassava, Irish potatoes, Banana	Cassava, Sweet potatoes	Sweet potatoes, Cassava, Irish potatoes, Banana	Banana	
Oil Crops/ Vegetables			Sesame, Niger seed, Flax		Ground nut, Sesame, Vegetable (egg plant, tomato, leafy vegetables), fruits			Vegetables
Legumes		Beans	Haricot, Chick peas, peas	Beans	Cow peas, Green-gram	Beans, Ground nuts	Beans	
Cereals	Maize, Rice	Maize, Wheat, Rice	Teff, Maize, Wheat, Sorghum, barley	Maize, Rice, Wheat	Sorghum, Maize, Rice, Millet	Maize, Rice	Sorghum, Maize	
Production Constraints								
	Shortage of improved seed, Poor soil fertility, Poor finance contribution	High cost of inputs, No clean planting materials, Pest and disease, Unreliable weather	Shortage of improved Seed, Pest and diseases, Poor cultural practices, Unreliable weather, Poor policy	Soil erosion, Poor irrigation, Shortage of seed, High cost of fertilizers, Post harvest losses, Pest and diseases, Poor market information	Shortage of improved seed, Pest and diseases, Soil infertility, Poor credit, Use of traditional tools, Climate variability, Poor irrigation, Poor infrastructure	Poor technology, Limited infrastructure, Poor extension systems	All constrains highlighted for the other countries and insecurity	Weather variability, Poor rain, Soil degradation

Session 2: Strategies for Inputs, Post-Harvest Technology/Handling and Best Practices (Chairperson: Joyce MulilaMitti)

Presentations on strategies for inputs, post-harvest technology/handling and best practices that were specific to the countries were made as detailed below.

2.1 Burundi

Input Strategies, Best Practices in Post-harvest Handling for the Main Commodities

In Burundi, the important institution for analyzing food products is the National Food Processing Technology Centre (CNTA). Crop safety and quality institutional framework is ensured by the

Ministry of Agriculture and Livestock, Department of Animal and Plant Health Protection, CNTA, Ministry of Commerce and Industry and the Burundi National Bureau of Standards (BBN). Each institution is responsible for the safety and quality of the food products under its jurisdiction. The Ministry of Health has overall responsibility for public health issues but not food production and quality. There is a decentralized system in which the actual inspection and enforcement of crop product standards are delegated to local authorities at urban and province council levels.

Specifically, the stakeholders that are responsible for ensuring crop safety are Government officials; Food Inspectors; Food Producers and Processors; Trade Associations and Academics; and Consumer Organizations such as ABUCO (Burundi Consumer Organization). The Components of the National Food Control System include food control management, legislation, inspection, laboratory services, information and communication institutions. The CNTA aims (from the farm to the final stage of the food chain) at producing food that is safe and suitable for human consumption, reducing the risk of unsafe crop/food consumption, reducing the likelihood of introducing any hazards at any stage of the food chain and improving post harvest technologies (improving processing facilities – reducing loss of harvests, especially for fruits and vegetables).

2.2 Kenya

Input Strategies, Best Practices in Post-harvest Handling for the Main Commodities

In Kenya, overall post harvest losses stand at about 40 percent while cereals loss stands at 20.5 percent, fruit loss stands at 11.2 percent and vegetables at 7.85 percent. These levels of losses are high. They affect food availability, raw materials, incomes, and job opportunities for Kenyans. Losses are due to diseases and storage pests e.g. LGB, weevils, bean bruchid, fungal diseases, bacterial diseases and weather.

Major challenges to post harvest handling of produce in the country are unpredictable weather patterns due to global climatic change, poor/inadequate on-farm storage structures, lack of appropriate post harvest technologies in the rural areas for perishable produce, poor adoption of recommended crop post harvest technologies and lack of investments in agro-processing due to unreliable supply of raw materials. At the farm level, inadequate drying facilities, high cost of storage materials and pesticides (fumigants), poor distribution of NCPB storage facilities, poor infrastructures (road networks), poor and/or lack of grading of produce especially by small scale farmers, poor/slow adoption of ware house receipt system, are the challenges.

Kenya has developed post-harvest loss intervention/mitigation measures which include stakeholder coordination (i.e. formation of National Food Safety Coordination Committee (NFSCC) to harmonize efforts to address post harvest losses), awareness creation/training, surveillance, drying of produce, storage and transportation strategies.

In awareness creation/training, the Ministry of Agriculture (MOA) has held over 200 000 farmer barazas (public meetings) since 2004, distributed about 158 000 posters on recommended post harvest messages, distributed 59 840 kg of storage pesticides for demonstration against storage pests and trained 808 field staff as TOTs.

Technologies promoted for field crops included early harvesting at physiological maturity, proper drying to the recommended moisture content, recommended shelling/threshing method using recommended chemical dusts and rates, using recommended storage materials at both farm and off farm levels, appropriate time of harvesting, proper handling of the produce, sorting, construction and use of grading sheds and transport using well ventilated vehicles.

Furthermore, surveillance is one the post-harvest loss intervention/mitigation measures. This is



very important in order to detect agents responsible for production of toxins such as Aflatoxin. Moisture meters are used to determine moisture content of harvested and stored produce. Since 2008 MOA has acquired and distributed 1 768 moisture meters for use by Extension Officers to advise farmers and traders accordingly. Drying of produce is another post-harvest loss intervention in Kenya. Most farmers, sun-dry their produce after harvesting before storage. Global climatic change has resulted at times in wet weather conditions during harvest. Sun-drying method is therefore wanting and hence cannot be relied on for effective drying of grains. To address this problem MOA, has acquired 36 mobile driers with a capacity of drying five tons per hour. They were distributed in 36 major maize growing regions. On-farm storage of field crops account for 60 percent of the total storage in the country. NCPB has 90 depots with a total capacity of 21 million 90 kg bags. Eighty percent of farmers store their produce in their houses as opposed to the recommended storage structures.

As a mitigation measure, Ministry of Agriculture has introduced warehouse receipt system in some NCPB depots, embarked on a campaign to popularize this system, is encouraging the establishment of community based produce stores and constructed eight cold storage facilities with a capacity of 195 tonnes per day for horticultural produce. A majority of small-scale farmers and the middle men transport both horticultural and field produce in open and un-hygienic transportation manner. Poor transportation leads to both mechanical damage and contamination of the produce and high post harvest losses.

Strategies for scaling up best practices in post harvest handling of produce in Kenya include up scaling ware house receipt system in all grain producing areas in the country, fast tracking and up scaling establishment of community based storage facilities, subsidized storage pesticides and storage materials for famers, up scaling of crop post harvest massages during harvesting seasons, up scaling the training of TOTs and development and distribution of training materials.

Other strategies for scaling up are equipping NCPB stores in Aflatoxin hotspots regions with stationary driers, introduction of mobile driers in areas without NCPB drying facilities, promotion of appropriate drying technologies, exploring innovative breeding to produce more tolerant cereal/pulses to fungal infection, instituting routine surveillance of all food and feed stores, registration of all grain traders and dealers for ease of monitoring the movements of the produce in the country, as well as procurement and distribution of more moisture meters for use by extension officers for better coverage. Up-scaling of irrigated agriculture, water harvesting technologies for crop production, protected agriculture technologies such as greenhouses and netting, market oriented production, exploration of new global markets especially for horticultural produce and promotion of sustainable agriculture are additional strategies in Kenya. Improved collaboration with stakeholders involved in crop post harvest activities will result in positive synergies for reduced produce losses. Encouraging transportation of grains/pulses in clean, closed or covered vehicles to avoid contamination and popularization of insulated horticultural produce vans also reduce post harvest losses in Kenya.

2.3 Rwanda

Input Strategies, Best Practices in Post-harvest Handling for the Main Commodities

Rwanda's aim is to reduce post-harvest losses from the estimated 23 percent. By December 2011, Government storage capacity was estimated to have increased to 40 000 tonnes in Kigali and 10 000 tonnes in Eastern Province. The current Government storage warehousing capacity across country is 7 000 tonnes while private storage (warehousing capacity) is 20 000 tonnes across the country. Plans are in place to buy grain (i.e. 20 000 tonnes of beans and 20 000 tonnes of maize for 2012).

Government strategies to reduce post harvest losses include organizing formal markets of agricultural produce at district and sector levels, establishing national strategic reserves, organizing storage at community level, facilitating food purchasing for grain reserves (enforcement by contract-cooperatives and private operators implementation), publicizing market days per district (i.e. location and day) and providing weekly situation analysis of food security status. Furthermore, the Government has introduced a crop intensification program to increase and improve crop yields through input distribution, land consolidation and access to extension services. The Government led irrigation and mechanization drive is a permanent risk-mitigating infrastructure to secure long-term food basket. Post-harvest handling and storage strategies aim at improving storage and reducing post-harvest losses. The integrated livestock development program is aimed at increasing the distribution through decentralization of “One Cow Program”, poultry and fish farming, improved integration with farm households to reduce malnutrition and promote kitchen gardens.

2.4 South Sudan

Input Strategies, Best Practices in Post-harvest Handling for the Main Commodities

The reduction of food losses by 50 percent in 1985 was set as a target by the seventh special session of the United Nations General Assembly in 1975. Since then, many activities in most developing countries including the Republic of South Sudan are motivated to reach this objective to ensure availability of food for all people and prosperous economic growth. Technically, post-harvest loss is defined as a measurable quantitative and qualitative loss in a given product. Harries and Linblad (1976), defined losses as any change in the ability, edibility, wholesomeness or quality of food that prevents it from being consumed by people.

South Sudan is one of the developing nations that is similarly faced with a huge problem of food production and storage of the little produced to sustain the livelihoods of the citizens. The efforts being made are intended to recuperate the deplorable standards of South Sudan’s economic growth and become self reliant on food security issues. The major crops grown in the Republic of South Sudan include cereal crops (maize, sorghum, rice, pearl millet and finger millet), root crops (cassava, sweet potato, Irish potato, yams and cocoyam), oil crops (groundnuts, sesame, and sunflower), fiber crops (cotton and jute), plantation crops (coffee, tea, sugarcane) and horticultural crops (vegetables and fruits). The main vegetables grown in the country are tomatoes, eggplant onions, okra, cucurbits, cabbages and leafy vegetables while fruits include bananas, guava, citrus, mangoes, pineapples, lemons and oranges.

South Sudan aims at training farmers through exposure to some of the main causes of crop losses during pre-harvest, harvest and post-harvest stages, creating awareness through capacity building to prevent crop losses for a sustainable crop production and economic growth, adopting use of modern technologies of grain storage as opposed to the traditional structures now in use to secure food availability and security. Furthermore, South Sudan aims at securing quality seed and food security for people’s livelihoods and understands or appreciates assessment of post-harvest losses and grain quality analysis. Major periods of post-harvest losses are during harvesting, transportation, drying /threshing, winnowing/cleaning, poor separation of seeds from chaff and storage. Strategies to reduce crop losses include efficient technology, input management and timeliness of activities, correct timing of harvest (late harvest increases shattering of seeds), optimum time of harvest depending on the variety, harvesting at the correct moisture content (general, 21-27 percent), (cereals, 12-14 percent) and relative humidity and emphasizing the importance of good yield and quality to obtain good prices for seeds or grains. Factors affecting grain loss during storage are grain moisture level, relative humidity and temperature. Main causes of grain losses in general are insect, rats, micro-organisms, mice, birds, humans and livestock.



Consequences of grain losses include lack or less food for livelihoods, less or no seeds or planting materials for farmers and most nutritious part of the diet might have been removed.



Improved local wooden storage (Gugu)



Local storage structure

Challenges of crop or food losses in South Sudan are lack of coordination of activities between research, extension marketing and training and lack of trained personnel at all levels in post-harvest technology (research, warehouse management, quality control, extension). Other challenges are lack of information on post-harvest technologies that have been found effective elsewhere, lack of data on the extent of losses in different parts of the post-harvest system, lack of appropriate loss assessment methods, lack of warehouse and silo capacity, lack of an effective transport and distribution system of the grains and lack of quality standards and differences in pricing of the various grades in order to stimulate farmers to deliver good quality grain and to reduce losses.

Wood storage structures are common in Sudan. They can be rectangular, circular or with arch roof structures in either frame or crib construction. Grain unloading can be partially mechanized. Arch-roof structures may be either curved arch or with gambrel roof arch. Mechanized unloading can be included but it is not as convenient as with a circular storage. However, arch-roof structures may be used as machinery storage when not required for grain. Wooden storage structures are simple, easy to construct and less expensive, most of them are small, therefore, can be moved easily when empty. Disadvantages of wooden storage structures include requiring frequent repairs to keep them weatherproof, they are not fire proof, not as rodent proof as metallic structures and many cracks in wooden storage structures make it difficult to effectively control insects.

The way forward is improvement of the local storage system among various farming communities in South Sudan to prevent the huge losses experienced among these communities. Training farmers to realize the benefits of good storage of crops for better fetching of market prices and collaboration of the plant protection department with other outside institutions to improve the storage system under farmer conditions are further strategies to reduce post harvest losses in South Sudan.

Session 3: Seed Systems, Seed Policies, Market and Trade in Eastern Africa Subregion (Chairperson: Bernard Mtonga)

FAOSFE member countries presented country specific strategies for seed systems, seed policies, market and trade as presented below.

3.1 Burundi

Strategies for seed systems, seed policies, market and trade in Burundi

In Burundi, the mainstay of the Burundian economy is agriculture, accounting for 49 percent of GDP and supporting more than 90 percent of the labour force. Continued insecurity, overpopulation, and soil erosion have contributed to a significant reduction of the subsistence economy in recent

years. The main cash crop is coffee with other principal exports including tea, raw cotton, passion fruits and flowers. Staple crops are cassava, Irish and sweet potatoes, rice and bananas.

The main stakeholders of plant breeding and seed systems are research institutions (Agricultural Research Institution of Burundi – ISABU); private sector - farmer organizations, local institutions and NGOs; and the public sector - Ministry of Agriculture and Livestock (departments) and the National Seed Council (CNS). The Research Institution of Burundi produces new varieties (seed strains and breeder materials). Pre-basic seeds are distributed to private multipliers according CNS suggestions (based on reports from seed inspectors), which meet at the beginning of each growing season. The private seed multipliers are authorized by the CNS and produce basic seeds from the pre-basic seed provided by ISABU. They produce the basic seeds to be distributed to seed producers' associations (farmer organizations) recognized by the CNS for their skill and performance. Farmer organizations (Associations) produce seed when no commercial seeds are available to farmers (who produce for their consumption). These are the informal and traditional seed production and distribution systems. The public sector plays the main role of regulating and coaching through the provincial departments of the Ministry of Agriculture. This is achieved through associations of producers, private seed multipliers and availing of the field for seed multiplications.



Private Sector Seed Production in Burundi



Improved Seeds Developed by ISABU – Burundi

Burundi has Seed Law in force. An institutional framework is established. The National Control and Seed Certification (NCCB) will be promulgated as soon as possible. Challenges include



shortage of building capacities for farmer organizations on seed sector, lack of laboratories for seed certification and high cost of inputs. Opportunities are existence of institutional and legal frameworks, strengthened research institution, increased agriculture national budget (from two percent to seven percent), crop intensification programme for staple crops (maize, cassava, Irish potatoes, rice and bananas) local institutions and communities linkages, availability of land for seed multiplication, inputs subsidies implementation (ongoing 2011-2012), existence of irrigation infrastructures (dams for irrigation in west and north of Burundi) and a seed certification service – expected to be operational soon.

3.2 Kenya

Strategies for seed systems, seed policies, market and trade in Kenya

Agriculture is the backbone for the national economy. It contributes 24 percent to GDP and 60 percent to export earnings and 80 percent of the rural population depends on agriculture for their livelihoods. In Kenya, by end of 2008, there were 73 registered seed merchants. The national seed requirement is 28 000 – 35 000 tonnes of certified seeds. Seed is critical input for agricultural production. Good quality seed has potential for improving crop yields, productivity and food security. The advent of seed liberalization (local and foreign companies), research, breeding, seed multiplication and trade has improved the seed industry. International organization such as ISTA and OECD play an important role in the seed industry.

Kenya has a Seed Policy in place. National Seed Policy is an outline of intervention measures in seed industry for availing adequate high quality seed for the country's farming activities. Challenges include shortage of quality seeds for several crops, inadequate regulatory framework, inadequate suitable varieties for marginal areas and adulterated seed in the market.

3.3 Rwanda

Strategies for seed systems, seed policies, market and trade in Rwanda

Rwanda has a crop intensification program whose goal is to achieve food security and increase rural household income. Key elements of the program are land consolidation, access to input use (fertilizer and seeds), access to extension services and to stimulate reliable, private-sector input and output markets through fertilizer electronic auctions. Priority crops are Irish potato, rice, wheat, maize, cassava and beans. In Rwanda about 56 percent of the households have access to fertilizer and seeds. Fertilizer use increased to 27 kg/ha in 2011 from 6 kg/ha in 2006 and by 2017, the target is 45kg/ha. The country is building a fertilizer distribution network working with 436 Agro dealers, at least one per sector. Private fertilizer distributors had increased to 14 in 2011 from 9 in 2009. Crop production has had big impact on maize, Irish potatoes and cassava but moderate impact on wheat, rice and beans. Production of rice increased from 28 590 tonnes in 2010 to 48 544 tonnes in 2011. Described in Tables two and three are formal and informal seed systems while Table four provides formal and informal seed systems attributes.

Table 2: Formal Seed System

STAKEHOLDERS	TASKS
Ministry of Agriculture	<ul style="list-style-type: none"> - Policy design - Design rules and regulations governing the whole seed commodity chain - Provide funds and staff to ISAR and RADA to develop the seed value chain - Overall supervision
RAB Research	<ul style="list-style-type: none"> - Develop and maintain new varieties - Produce pre-basic seeds and disseminate them via RADA - Ensure variety maintenance - Ensure the national plant genetic resources management and conservation - Variety evaluation and release activities
RAB Extension	<ul style="list-style-type: none"> - Basic seed production and dissemination - Manage 18 basic seed production stations - Seed certification and inspection - Broker for CIP - Ensure the enforcement of law, rules and regulations - Policy implementation - Variety evaluation and release activities
Private	<ul style="list-style-type: none"> - Certified seed production - Seed marketing in rural settings
CCAFSR	<ul style="list-style-type: none"> - Coordination role and public relations - Lobbying and advocacy

Table 3: Informal Seed System

STAKEHOLDERS	TASKS
FARMERS	Seed production and dissemination Plant genetic resources management (conservation and use). Traditional plant breeding and selection.
MARKETS	Germplasm exchange through selling and buying (food purchasing)
RESEARCH	Participatory plant breeding leading to the enrichment of local germplasm (bean, soybean, sorghum, maize, cassava, wheat, etc).



Table 4: Formal Vs Informal Seed Systems Attributes

ATTRIBUTES	INFORMAL	FORMAL
SEED CATEGORY	No	Yes
TECHNICAL STANDARDS	No	Yes
QUALITY CONTROL	No	Yes
DISEASE CONTROL	No	Yes
MARKET ORIENTATION	No	Yes
PGR CONSERVATION	Yes	Yes
FLEXIBILITY	Yes	No
COMPARABILITY	No	Yes
ILLEGAL COMPETITION	Yes	No
TRADITIONAL VARIETIES	Yes	No
ENDANGERED SPECIES	Yes	No

The Seed Policy and Seed Law were developed in 2007. Ministerial instructions are available on seed production, seed certification and seed distribution.

3.4 South Sudan

Strategies for seed systems, seed policies, market and trade in South Sudan

South Sudan has newly set up government structures. It has high agricultural resource potential. The seed sector is in the process of rehabilitation. It has a prominent presence of relief and farmer saved seed. Key stakeholders are NGOs, projects, emerging government initiatives, and new classes of private sector. Tabulated in Table five is the current seed sector situation in South Sudan.

Table 5: The Current Seed Sector in South Sudan

System	Farmer based	Relief
Type of crops	Local food crops	Food and vegetables
Crops	Sorghum, maize, millet, sesame, G/nuts, cassava	Sorghum, maize, rice, bean, sesame, cowpea, groundnut, and vegetables
Varieties	Local	Limited known varieties
Reproduction	Both self and vegetative	Self pollinated and some hybrids
Value chain support	No support, Farmers seed	Limited known quality
Marketing	Farmers to farmers	Distribution

The farmer saved seed sector is relied on by the majority of the farmers, is efficient in distributing and varieties are poor yielding, but adaptable to the varied agro ecological zones. However, there is need for new interventions through introduction of better varieties to the system. The relief seed sector supply is in case of urgent need or problem, is freely distributed using the voucher system, but it has become part of the normal practices. The quality of seed is sometimes below

standard, affecting long term development of the seed sector. There is need to establish market oriented community seed production systems using the voucher system for transformation.

In South Sudan, two seed systems exist, namely Government Seed Program and NGO Seed Program. In the Government Program (led by the Ministry of Agriculture and Forestry Research), on farm trials with selected farmers groups are done, on-station trials in the research stations are conducted, observation trials on local varieties is done and the Ministry of Agriculture produces limited quantities of basic seed. There is need for establishment of basic seed centers and improvement of phytosanitary certification. Presented in Table six is the seed distribution and coverage by NGOs.

Table 6: Seed Distribution and Coverage by NGOs

Organization	Crops	Geographical Coverage	Stakeholders	Activity
Action Africa Help-International	Maize, sorghum, groundnut, rice, beans	Central and Western Equatorial	MAF, Research institute	Distribution of seed
Norwegian People's Aid (NPA)	Maize, sorghum, groundnut, rice, beans	CES, EES, UNS, JS	MP Partners/ CADs/ Research/FGs	Seed Multiplication/ distribution
Farm Sudan	Cassava	Central and Eastern Equatorial	MAF, FAO	Not yet active
ADRA – Sudan	Maize, sorghum, groundnut, cowpea, rice, beans	Eastern Equatorial and Jonglei	MAF, FAO, Polish aid, Juba University	Seed purchase and distribution
World vision	Maize, sorghum, groundnut, cowpea, sesame	Warrap	FAO, WFP, CBO	
BRAC	Maize, Sorghum, rice, vegetable	Central, Western, Lakes, Northern Behr Ghazel Eastern Equatoria, Jonglei Upper Nile	MAF, FAO, WFP, OXFAM	Seed provision to displaced people
FAO	Maize, Sorghum, Rice, Groundnut, Cowpea, cassava, Beans, Sesame and vegetable	All 10 States of South Sudan	MAF and others	Seed dissemination and mobilization of CBSP

The challenges include the need to transform relief dominated seed approach into pluralistic seed sector, building a service oriented public sector, creating a favorable environment for private sector, and rehabilitation and building up of community based seed sector. There is need for shifting the focus from relief to marketing, early generation seed, capacity development, promoting private sector at local and national level and developing appropriate policy framework, guiding the transformation process.



3.5 Uganda

Strategies for seed systems, seed policies, market and trade in Uganda

In Uganda, plant breeding is the responsibility of NARS which is composed of public, private, universities, etc., but coordinated by NARO, handling all types of crops producing breeder/foundation seeds and is dominated by public research. The formal seed sector is liberalized. Seed production is the responsibility of private sector. There are currently 23 registered seed companies with seed production of only 15 – 20 percent of demand. High quality seeds are produced but are highly priced. The informal seed sector is composed of farmer groups and farmer to farmer seed supply system. It accounts for 80 percent of seed supply. Poor quality (cheap) seed (Quality Declared Seed, Standard Seed) is produced. The informal seed sector is targeted for transformation into formal sector.

The Seed Policy is drafted and the Seed Strategy is in place. The Seeds Act of 2006 is in place and Seeds and Plant Regulations of 2011 is in place. The main challenges to seed industry in Uganda are shortage of breeder/foundation seed, lack of finance to seed companies, poor promotion and distribution, weak enforcement of regulations/standards and transformation of informal sector to formal sector.

Session 4: Harmonizing Seed Policies and Review of Institutional Capacity for Seed Production (Chairperson: Joyce MulilaMitti)

Mr. Seyfu Ketema, Executive Director of ASARECA made a presentation on Seed Policy Harmonization in East and Central Africa which was followed by discussions. He explained that the work started in 2002. It involves harmonization of variety evaluation, release and registration, seed certification, phytosanitation, plant variety protection, revision of pest lists, and simplified import /export documentation procedures. He added that a variety release committee should comprise breeders (who present their data), seed companies, extension system, farmers associations, seed certification institute representatives to ensure acceptability of the released seeds.

During discussions it was noted that SADC started its seed harmonization in the early 2000 and protocols have been developed to that effect. In 2010 a seed security project in four countries was initiated to start the process of harmonization as a pilot project. Prior, SACCAR network existed, but was not very active and work stopped after donor support ended. The key support structure is SADC Seed Centre.

Another support structure is CADESA which replaced SACCAR. Good progress in variety release harmonization and also in seed certification has been achieved. The biggest gap is in plant quarantine and phytosanitary services where there is no progress because the national structures are poorly equipped. Another gap is in variety release of vegetative planting materials. The message in terms of harmonization is for the Eastern Africa subregion to learn from SADC and COMESA. The choice of four countries for the pilot project was based on donor's influence. More resources were required to include more countries. In the four countries, efforts to build community based seed production and market linkages were made. The system is the informal sector but with market linkage. Quality Declared Seeds (QDS) were produced using decentralized laboratory equipment. Licensing of extension workers to inspect QDS plots is essential. FAO could play a role in higher level harmonization.

Session 5: Implementation of GPA-PGRFA Strategies/Policies (Chairperson: Bateno Kabeto)

The Global Plan of Action and the International Treaty on Plant Genetic Resources for Food and Agriculture (GPA-PGRFA) provides, in Article five, for the conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture. Article six deals with the sustainable use of these resources and specifically provides that “Contracting parties shall develop and maintain appropriate policy and legal measures that promote the sustainable use of plant genetic resources for food and agriculture”. The sustainable use of plant genetic resources for food and agriculture may include such measures as reviewing and, as appropriate, adjusting breeding strategies and regulations concerning variety release and seed distribution.”

With the adoption of the International Treaty on PGRFA as a binding instrument by the FAO Conference in 2001, the GPA acquired a renewed dimension as an element that contributes to the objectives of the Treaty. Article 14 of the Treaty recognizes that “the rolling Global Plan of Action for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Agriculture is important to this Treaty,” and “Contracting parties should promote its effective implementation, including through national actions and, as appropriate, international cooperation to provide a coherent framework, inter alia, for capacity building, technology transfer and exchange of information”.

Below are the presentations from member countries on implementation of GPA-PGRFA strategies/policies.

5.1 Burundi

Implementation of GPA-PGRFA Strategies/Policies in Burundi

Burundi signed the GPA-PGRFA Treaty in 2002 but is not being implemented in the country. The germplasm conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture are being done at regional level through ASARECA.

5.2 Ethiopia

Implementation of GPA-PGRFA Strategies/Policies in Ethiopia

The GPA-PGRFA Treaty was signed and is being implemented with regard to conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture such as recognizing farmers’ rights and accession as well as breeders rights proclamation. This is being done at institutional level within the country.

5.3 Kenya

Implementation of GPA-PGRFA Strategies/Policies in Kenya

Kenya is a signatory to the Treaty. The implementation started in 2003 by Kenya Agriculture Research Institute (KARI). In July 2009 the GPA-PGRFA Document was submitted to FAO. There is a steering committee of 10 members. KARI, by delegation coordinates the national Gene Bank and is the national focal point for national plan of action of GPA-PGRFA activities in the country.



5.4 Rwanda

Implementation of GPA-PGRFA Strategies/Policies in Rwanda

Rwanda signed the Treaty and the implementation is being done by the research institute. Has a Gene Bank of seed and conducts research on priority crops. After research the seeds are distributed to registered farmers (as seed growers) for seed multiplication. Other farmers access seeds from such seed growers. Rwanda has a developed seed policy and enhances private sector engagement in production, distribution and marketing of seed. The Government is responsible for seed control.

5.5 Somalia

Implementation of GPA-PGRFA Strategies/Policies in Somalia

Currently, no work is being done on conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture in reference and adherence to the GPA-PGRFA, in Somalia.

5.6 South Sudan

Implementation of GPA-PGRFA Strategies/Policies in South Sudan

South Sudan has not signed the Treaty and there is no work being done on conservation, exploration, collection, characterization, evaluation and documentation of plant genetic resources for food and agriculture in reference and adherence to the GPA-PGRFA. However, necessary steps and efforts are being made through the Multi-Donor Trust Fund to initiate germplasm collection and control.

5.7 Uganda

Implementation of GPA-PGRFA Strategies/Policies in Uganda

Uganda signed the GPA-PGRFA Treaty in 2003 and later domesticated it into a Draft Policy which is ready to be presented to the Parliament. Support is required to actualize the Treaty. There is an established Gene Bank and a Curator is heading a team overseeing GPA-PGRFA activities in the country.

Session 6: Pesticide Risk Reduction, Early Pest/Disease Detection/Warning System and Phytosanitary Regulatory Frameworks, Rotterdam Convention and IPPC (Chairperson: Abdurahman Abdulahi)

Detailed below are the presentations and discussions on implementation of pesticide risk reduction, early pest/disease detection/warning system and phytosanitary regulatory frameworks (Rotterdam Convention and IPPC) of each member country that attended the Workshop.

6.1 Burundi

Implementation of Pesticide Risk Reduction, Early Pest/Disease Detection/Warning System and Phytosanitary Regulatory Frameworks (Rotterdam Convention and IPPC) in Burundi.

In Burundi, follow up actions on implementation of Rotterdam Convention (RC) are being undertaken. Rotterdam Convention deals with marketing of industrial chemicals and pesticides to which Burundi has already responded. The list of pesticides whose use is banned in Burundi contains 19 products and seven compounds of Trebutyl - Tin. Burundi participates in various

meetings organized by the IPPC. The IPPC has initiated a project through the FAO (National phytosanitary capacity building). This project was already launched and there is need to review the budget and its disbursement for its implementation. The subsidiary bodies of the IPPC (IAPC: Inter- African Phytosanitary Council) collaborate on activities through meetings focused on the implementation of phytosanitary standards.

Burundi has a promotion, detection system and early warning system against diseases and pests. For epidemiological surveillance, pheromone traps for pests are used for 4 species of pests:

- 1) *Prostephanus truncatus* (The larger grain borer)
- 2) *Acreas acerata*
- 3) *Hypottio celerion* (Sphinx of sweet potato) and *Spodoptera* (Armyworm)

Constraints and challenges include lack of tools and equipment (traps and related equipment are insufficient to be spread to all areas of the affected rural communities) and lack of communication network system. The early warning system is not effective and the system needs to be set up.

6.2 Ethiopia

Implementation of Pesticide Risk Reduction, Early Pest/Disease Detection/Warning System and Phytosanitary Regulatory Frameworks (Rotterdam Convention and IPPC) in Ethiopia.

Although pesticides play an important role in agriculture and public health sector in Ethiopia, various pesticide use associated problems exist in the country. More over only very limited information is available about the exact health and environmental effects of pesticides on the Ethiopian population and the environment.

In order to overcome these issues and strengthen the pesticide registration and post registration scheme in the country, a four year joint collaboration project (Pesticide Risk Reduction Programme –Ethiopia) was signed in 2010 by Ministry of Agriculture since February 2010 to realize the following objectives:-

- To develop a legal framework for the registration and post registration of pesticides (regulation, directives and guidelines).
- To develop a proper pesticide registration system for Ethiopia and capacity building on dossier evaluation.
- To develop a well functioning post registration system (including development of reference laboratory with analytical capacities for quality control, monitoring, procurement guideline, inspection, storage of pesticides, capacity building and training).
- To develop a formal consultation platform that will support with advice on (post) registration issues.
- To execute an impact assessment of the new (post) registration system.
- Based on the Cotton IPM FFS FAO Project that was implemented;
- As the result of the IPM Farmer Field School pilot scheme that was implemented in Southern Nations and Nationalities Peoples (SNNP) region during the year 2006 and 2007, 781 farmers and 32 Government facilitators gained a better understanding of an eco-friendly way of cotton production.
- Cotton IPM-FFS resulted in getting higher yields at less costs with no or minimized risks to humans and to their environment linked to uses and handling of pesticides.



- Due to the successful performance of this intervention, an organic cotton scheme was started by European investor in the region recruiting IPM-FFS graduate farmers, but soon this scheme discontinued as the result of the global financial crises that occurred in 2007 and 2008.
- The IPM use in cotton production was discontinued due to funding and closing of the project

The early pest detection/warning system in Ethiopia is applied mainly for Desert Locust and armyworms management. For Armyworm, over 170 pheromone traps are deployed at different sites in the country and community based monitoring was conducted as a pilot scheme. For Desert Locust, regular Locust survey is conducted in the country for early detection and timely action. Desert Locust bulletin is published on monthly basis and sent to FAO Emergency Center for Locust Operations and distributed to international and local stakeholders. Fragmentation of pest management was noted within the subregion and the countries because the work on pest control was not being done jointly. There is need for FAOSFE to connect the regions on communications in collaboration with DLCO-EA with regard to radio communication, monthly situation and forecast publications.

In Ethiopia, use of bio-pesticides is regulated. Bio-pesticide on-farm trials are being conducted in rose flower farms to investigate the efficacy of biological control agents (predatory mites) against Red spider mite (*Tetranychus urticae*) under Ethiopian condition and to gain grower's acceptance of IPM. Results of bio-pesticide on farm trial showed:-

- 1) Reduction of the population of Red spider mite (*Tetranychus urticae*)
- 2) Decrease in pesticide use
- 3) Improvement in crop harvest quality
- 4) Increase in stem number

Ethiopia is signatory to the Rotterdam Convention. Till now, except four pesticides, the country consented to "not to import" all pesticides listed under annex III of the RC.

6.3 Kenya

Implementation of Pesticide Risk Reduction, Early Pest/Disease Detection/Warning System and Phytosanitary Regulatory Frameworks (Rotterdam Convention and IPPC) in Kenya.

Kenya has over four million hectares of food crops, 526 000 hectares of industrial/cash crops, and 560 000 hectares of horticulture crops. Agriculture is a major contributor to the economy (26 percent directly and 27 percent indirectly to the GDP), contributing 45 percent of the total government revenue and employs 70 percent of the total labour force.

Threats to Kenyan agriculture include migratory pests (armyworms, quelea birds, locusts) and many other pests and diseases. Early detection and diagnosis of pests and diseases of plants is done to limit their spread and impact, whether they arrive naturally or are introduced deliberately. There is commitment by the Government through the MOA among others to limit their spread and impact. On average, pests and diseases cause up to 30 percent food crop loss (field and storage). Early detection and warning Systems exist in Kenya for the Red-billed Quelea bird (*Quelea quelea*). The Red-billed Quelea can devastate wheat, rice, millet and sorghum crops. Losses of up to 100 percent have been reported. The birds migrate long distances in search of food. Colony survey is done in April/May and October/November.

The information generated includes behavior of the breeding colony, availability of food, expected population and the likelihood of the birds invading cropped areas. Regional forecast reports are received on whether the *Quelea* season has begun or not, on rainfall amount to prompt the first migrations and outbreaks, and where they could breed or the end of their breeding season. Historical reviews are done on previous patterns of breeding, outbreaks and periods as well as indication of likelihood of *Quelea* outbreak. Field reports from staff and stakeholders give crop situation and presence of *Quelea* birds. Rainfall enhances growth of grass (natural food), promotes growth of small grain cereals (alternative food) and increases water availability for the birds.

The African Armyworm (*Spodoptera exempta*) is a serious, notifiable and sporadic outbreak pest. It attacks all crops of gramminae family and large outbreaks cause food insecurity. Kenya has a national forecasting system for armyworm. Over 500 pheromone traps are operated by extension agents who send trap data to the Plant Protection Services of MOA where the data is used for synthesis of forecasts.

Community Based Armyworm Forecasting (CBAF) is also done. Communities themselves take records of rainfall and moth catches, use data to issue alerts within the community and the Government is currently up scaling the approach. Historical reviews of previous patterns of outbreaks and periods as well as indication of likelihood of outbreak are done periodically. Rainfall encourages the growth of grass and this can encourage armyworm outbreaks. Wind direction will determine the subsequent outbreak areas of armyworm.

Kenya can be invaded by three types of locusts, namely; the Desert Locust (*Schistocerca gregaria*), the Red Locust (*Nomadacris septemfasciata*) and the Tree Locusts (*Anacridium melanorhodon*). The Desert Locust invaded Kenya in 2007/2008 after over 40 years. The Desert Locust information service is available on the FAO website showing periodical situational updates based on the following scale:

Red	For intensive surveys and institution of control measures since there is significant threat to crops
Brown	For threat to crops hence survey and control is required
Yellow	For increased vigilance and control, if required and
Green	For no threat to crops but maintaining regular surveys.

The information also shows the likely direction of movement of swarms. For Red Locust, forecasting information is obtained from IRLCO-CSA Reports showing outbreak areas, and likely subsequent outbreak regions depending on vegetation, precipitation, and wind direction. Tree Locust forecast information is generated through the Ministry's Extension Service.

Other measures on pests and diseases include extension services, epidemiological surveys, scouting, advice and reporting, laws and regulations. The Kenya Plant Health Inspectorate Services (KEPHIS) is the Agency with mandate to protect Kenya's agriculture from introduction and spread of pests and diseases that could impact upon the environment, economy and human health. The country has a Plant Protection Act (Cap 324). All travelers are required to declare plants/plant products or other regulated articles carried as part of their baggage (This includes hand carried products and checked in baggage). Actions that follow the detection of a pest or disease are awareness creation, research, enactment and enforcement of legislation/regulation,



training, management or control, declaration in the Kenya Gazette of pests, weeds and diseases as quarantine, alien, invasive and noxious organisms e.g.: *Parthenium hysterophorus* and *Prosopis juliflora* 'Mathenge' as examples of invasive alien species. Asian fruit fly (*Bactrocera invadens*) is a quarantine pest in Kenya.

Up-scaling early pest/disease detection and warning systems in Kenya is done through improved awareness creation and vigilance, increased trap network for armyworm forecasting, up-scaling community based armyworm forecasting, strengthening research e.g. use of biological control agents (nucleopolyhydrosi, virus - NPV), strengthening regulation enforcement and enactment of new ones, extension service staff capacity building and provision of modern tools, equipment and facilities.

6.4 Rwanda

Implementation of Pesticide Risk Reduction, Early Pest/Disease Detection/Warning System and Phytosanitary Regulatory Frameworks (Rotterdam Convention and IPPC) in Rwanda.

In Rwanda the early detection of pest and warning system is based on an IPM project in maize, cassava, banana and horticultural crops. The objective is to contribute to the improvement of agricultural productivity and environment protection by setting up a system of integrated management to fight against the main crop diseases and pests in the country.

There are four main components, namely;

- 1) Utilisation of healthy planting material
- 2) Adoption of good cropping practices appropriated for control of pests and diseases
- 3) Taking into account the data relative to development cycles of pests and diseases to define control measures
- 4) Suitable management of resistant varieties.

The detection is based at field level in order to have a rapid impact at farmers who are trained through FFSs (Farmer Field Schools). The IPPC is being implemented in Rwanda. The country has ratified the IPPC and has developed the Plant Health Law. The Rwanda National Plant Protection Organization was put in place.

The Government is committed to increasing the quality of agricultural products for trade by putting the inspection and certification unit in place as well as preventing the introduction and spread of exotic pests in accordance with international standards. Pest lists have been developed for priority crops and a Pest Information Management System (pest information database) exists. The Banana bacterial wilt surveillance program of Fruit fly and cassava diseases (CMV and CBSV), exist in the country. Follow up of other migratory pests (e.g. African armyworm - *spodoptera exempta*, and Variegated grasshopper - *Zonocerus variegates*), is also being done.

Rwanda ratified the Rotterdam Convention in 2005 and Agrochemicals Law is already developed. The Organic Law, establishing procedures for protecting, conserving and promoting the environment in Rwanda was also developed in 2005. The list of prohibited chemicals is published for private and public sectors and is being renewed regularly. Rwanda Environment Management Authority (REMA) and Rwanda Bureau of Standards work together with Ministry of Agriculture to reinforce prohibited chemicals.

6.5 South Sudan

Implementation of Pesticide Risk Reduction, Early Pest/Disease Detection/Warning System and Phytosanitary Regulatory Frameworks (Rotterdam Convention and IPPC) in South Sudan.

The Republic of South Sudan is a new nation and is yet to study gradually and keenly, issues related to the implementation of Rotterdam Convention (RC) and International Plant Protection Convention (IPPC) globally before it declares its position to participate actively in the conventions. South Sudan was partially part of such international conventions since the independent of Sudan in 1956. Sudan remained one nation until the 9th of July, 2011 when South Sudan became an independent state.

Before independence, participation in such issues of chemicals or pesticides, or inclusion into Regional or International Conventions on Plant Protection treaties were tackled by the Sudan Government on behalf of the South Sudan. Critically speaking South Sudan for the last two and a half decades assumed a safer environment as regards exposure and the use of chemicals and pesticides. The country has been locked at war with Sudan since early sixties and no plant protection activities that required the application of chemicals or pesticides in a massive scale never existed in the country.

The way forward for South Sudan is to continue maintaining such a safer environment for the benefit of all citizens and livestock by studying and exercising tougher regulations on the importation of chemicals and pesticides into the country. The country is now engaged wholly to draw out its own policies that can regulate entry of chemicals and pesticides and only after careful studies. As a new partner member in UN and the AU, South Sudan remains committed and open to cooperate with all other bodies on the issues of chemicals and pesticides related to plant protection and safety of the environment as long as it deems necessary and safer. The country will share and harmonize with the regional or international bodies in making every effort to find solutions to the current chemicals and pesticides impasse so that it does not become a dumping ground for discredited chemicals and hazardous substances.

6.6 Uganda

Implementation of Pesticide Risk Reduction, Early Pest/Disease Detection/Warning System and Phytosanitary Regulatory Frameworks (Rotterdam Convention and IPPC) in Uganda.

In Uganda, follow up actions on the Rotterdam Convention include collaboration on studies on effect of Furadan, effects on pesticides (cotton fruits and vegetables) and participation in national consultative meetings for banning of Endosulfan chemicals – a phased banning to allow for alternatives. IPPC implementation activities involved attending the General Assembly by IAPC in April 2010, participating in harmonization standards (seeds) with COMESA and ASARECA, being a member of International Standards setting body, participating in a Workshop on invasive weeds organized by FAO/EAC and participating in a Workshop and multiple analysis for PRA decision making in the Republic of South Africa.

Implementation challenges regarding the RC and IPPC in Uganda are low funding, poor communication and lack of synergy between stakeholders. Considerations in promoting early pest/disease detection and warning system in Uganda are climate change, upsurge of pests/diseases, palatability of crop varieties and susceptible varieties. Strategies for pest detection and early warning systems are seasonal surveillance, conducting mobile plant clinics, undertaking field scouting and reporting and obtaining reports from other stakeholders. Challenges of implementing pesticide risk reduction, early pest/disease detection/warning system and phytosanitary regulatory frameworks (Rotterdam Convention and IPPC) in Uganda include lack of funding, poor communication, low knowledge base of field staff, slow response and low logistical support for staff.



4. RECOMMENDATIONS AND ACTION PLANS FOR THE SUBREGION ON POLICIES, STRATEGIES AND FRAMEWORKS

Detailed below are the recommendations/action plans on seed systems, policies and input strategies; on best practices in post harvest handling scaling-up; on promoting early pest/disease detection and warning systems; and on implementing Rotterdam Convention and International Plant Protection Convention (IPPC). These recommendations/action plans are to be implemented by FAOSFE and all concerned stakeholders in the member countries of the Subregion with technical leadership role provided by FAOSFE. Summarized below are the agreed recommendations/action plans for the Subregion.

1. Recommendations On Seed Systems, Policies And Input Strategies

A: Recommendations/Action plans for the Formal Seed System in the Subregion:

1. Promoting research for development of suitable varieties (Breeder and Pre-basic seeds)
2. Supporting seed multiplication (Basic and certified)
3. Promoting seed certification
4. Advocating seed marketing and distribution
5. Supporting farmers through extension with regard to use of quality seeds

B: Recommendations/Action plans for the Informal Seed System in the Subregion:

1. Supporting Emergency seed production cases such as in Somalia and South Sudan
2. Promoting basic seed standards in seed variety development and germination
3. Encouraging graduation of informal to formal seed systems

C: Recommendations/Action plans for the Input Strategies for the Subregion:

1. Ensuring quality assurance of inputs
2. Promoting involvement of private sector in distribution,
3. Supporting subsidies, where appropriate
4. Ensuring that input supply is demand driven and based on need assessments

D: Recommendations/Action plans regarding Seed Development Policies in the Subregion:

1. Coordinating harmonization of seed development policies at subregional level
2. Supporting and recognizing efforts of ASARECA, SADC, COMESA and EAC in the subregion.

2. Recommendations Of Best Practices in Post Harvest Handling Scaling Up

A: Recommendations for Cereals

1. Promoting processing and value addition
2. Emphasizing drying and safe storage infrastructure - (e.g. avoiding Aflatoxin contamination)
3. Encouraging flour production, packaging/branding
4. Promoting value chain linkages approaches

B: Recommendations for Root and Tuber crops

1. Encouraging drying (reducing moisture content to acceptable storage levels)
2. Emphasizing market value approach

3. Promoting processing for value addition
4. Supporting proper fermentation processes to avoid any food contamination
5. Promoting value chain linkages approaches

C: **Recommendations for Oil Crops and legumes**

1. Promoting primary processing
2. Promoting proper and safe drying to avoid contamination
3. Promoting value chain linkages approaches (local/subregional)
4. Promoting primary processing (sorting/cleaning/winnowing, etc.)

D: **Recommendations for Best Practices Scaling-up**

1. Encouraging community based weather forecasting
2. Supporting training in post harvest management technology
3. Emphasizing information management (pricing, commodity movements, transport, etc.)
4. Promoting regional market linkages
5. Promoting infrastructure development
6. Facilitating harmonization of standards
7. Promoting multi-market values (consumption, human, livestock and industrial)

3. Recommendations of Promoting Early Pest/Disease Detection and Warning Systems

1. FAOSFE's handling of pests and disease issues should include detection and early warning systems of invasive species
2. Member countries should report existing and any new pests to FAOSFE and FAOSFE should immediately notify countries, and provide complete information on the nature of pest and disease and propose strategies for containment
3. FAOSFE should encourage and promote regional cooperation in pest surveillance reporting
4. FAOSFE should encourage and support community based pest forecasting
5. FAOSFE should support promotion of safe use of pesticides/products in pest control and pesticide lifecycle management
6. FAOSFE should consider to support training of Plant Protection Specialists for the Subregion

4. Recommendations On Rotterdam Convention (RC) and International Plant Protection Convention (IPPC)

1. FAO Subregional office to ensure that non signatory countries are advised to ratify the conventions
2. Member countries to coordinate the harmonization among stakeholders within their countries
3. FAO Subregional office to take the lead to in harmonizing activities of the two conventions within the subregion
4. FAO Subregional office to fast track capacity development for non signatory and signatory countries to enable the quick and proper implementation of the two conventions (RC and IPPC)
5. Member countries should develop mechanisms to track implementation through regular reports
6. Both FAOSFE and member countries should promote IPM to reduce the risks of pesticides



5. CLOSING REMARKS

Closing remarks were given by Ms. Joyce MulilaMitti - Crop Production and Protection Officer for FAO Sub-Regional Office for Southern Africa, also representing FAO Africa Regional Office (RAF). Closing the Workshop, on behalf of the SRC and RAF team leader for Strategic Objective A (SO-A), Ms. Joyce MulilaMitti expressed thanks for the active participation during the Workshop. She noted that it was gratifying to see the active contributions and the commitment shown over the two days of the Workshop. She noticed that at the beginning of the Workshop, it was observed that the agenda was too ambitious, however because of participants' commitment, it was possible to complete ahead of schedule. She added that FAOSFE will produce the Workshop Report of Proceedings, which will be shared with the participants to ensure that what FAOSFE will determine as their role is agreeable to the participants.

Ms. Joyce MulilaMitti emphasized that the outputs of this Workshop were very important for the planning process not only at SFE but for RAF as a whole. While SFE was not present at the RAF SO-A planning meeting, the planning process for the subregion is going to have more value added as it is the only subregion that will benefit from input of the member countries as this process did not happen elsewhere. Ms. MulilaMitti also took note that the outcomes of this Workshop in terms of defining priorities for crop production and protection work were very similar to those identified at the SO-A RAF meeting.

Furthermore, she reiterated that as Mr. Castro Camarada pointed out in his opening address, the Workshop was not convened as an end in itself, but as a means to an end. Hence apart from the outputs contributing to input for the documentation of subregional approaches, best practices and strategies for the various key aspects for crop production and protection, the outputs will contribute to the planning process and the implementation of SFE programmes for the next biennium (2012-2013). She was also reliably informed that SFE would like to have regular annual review and planning meetings with representatives of member states in the subregion to improve the quality and relevance of FAO programming in the subregion.

With these remarks, she officially closed the Workshop and wished all participants safe and pleasant trips back to their various destinations. On behalf of FAOSFE, Mr. Bernard Mtonga, (Int'l Consultant - Plant Production and Protection) and the main Workshop Facilitator, also thanked participants for their resourceful input and active participation in the Workshop which contributed to its success and wished everyone safe travels back to their countries.

6. ANNEXES

Annex 1: Agenda of the Fourth SFE Multidisciplinary Team Meeting

DAY ONE: Thursday, 4 August 2011: Official Opening, Major Crops, Input Strategies, Seed Systems, Policy and Post Harvest Management

Time	Session/topic	Presenter
08:30 - 08:45	Registration of Participants	Mr. Bernard Mtonga
08.45 – 08.50	Welcome Remarks	Mr. Bernard Mtonga
08:55 - 09:15	Official Opening	Mr. Castro Camarada
Major Crops, Input Strategies, Seed Systems, Policy and Post Harvest Management		
09.15 – 10.00	Introductions, objectives of the workshop and setting the workshop agenda	Mr. Bernard Mtonga
10:00 – 10:30	Coffee/Tea Break	
10.30 – 12.30	Consultative identification and discussion of commodities (crops) and crop production constraints in the SFE countries	Mr. Mohammed Salih
12:30 - 14:00	Lunch	
14.00 – 15.30	Presentations and discussions on strategies for inputs, post-harvest technology/handling and best practices (Burundi, Ethiopia, Kenya, Rwanda, South Sudan, Uganda)	Ms. Joyce MulilaMitti
15:30 - 15:45	Coffee/Tea Break	
15:45 - 17:30	Presentations and discussions on seed systems, Seed Policy, Market and Trade in SFE	Mr. Bernard Mtonga



DAY TWO: Friday, 5 August 2011: PGRFA Strategies, Pesticide Risk Reduction, IPM, Phytosanitary Regulatory Frameworks and Action Plans

Time	Session/topic	Presenter
08:30 - 09:30	Presentations and Group Discussions on Harmonizing Seed policies, reviewing institutional capacity for seed production of public and private sectors in the SFE countries	Ms. Joyce Mulila Mitti
09.30 – 10.30	Presentations and Discussions on SFE country action plans on PGRFA strategies/policies that reinforce linkages in the implementation of Global Action Plan on PGRFA	Mr. Bateno Kabeto
10:30 – 10:45	Coffee/Tea Break	
10.45 – 11.45	Presentations on and Discussions on following Pesticide Risk Reduction IPM and the use of Bio-pesticides (and Rotterdam Convention), and consultatively discuss IPM and Phytosanitary Regulatory Frameworks	Mr. A. Abdulahi
11.45 – 13.15	Group Work and Presentations on Developing Action Plans for the Subregion and follow up of agreed Policies, Strategies and Frameworks	Mr. Bernard Mtonga
13:15 – 13:30	Closing Remarks by the FAOSFS Crop Production and Protection Officer/RAF Representative	Ms. Joyce Mulila Mitti
12:30 - 14:00	Lunch	

Annex 2: List of Workshop Participants and Facilitators

1. Ms. Godeberthe Ndhokubwayo, Advisor of Ministry of Agriculture and Livestock – Burundi
2. Mr. Zenon Nsanankiye, Advisor of Cabinet of Ministry of Agriculture and Livestock – Burundi
3. Mr. Okasaai Opolot, Crop Resources Officer – Uganda
4. Mr. Komayombi Bulegeya, Commissioner - Crop Protection – Uganda
5. Mr. Atem Garang Malual, Executive Director for Training, South Sudan
6. Mr. Sampson Akoyi Binyason, Research Professor -MAF/RISIS – South Sudan
7. Mr. Joseph Ngetich, D/Director of Agriculture – Kenya
8. Mr. Abner Ingosi, Head - Food Security, Ministry of Agriculture, Kenya
9. Mr. Mohammed Salih, Programme Manager/Facilitator, FAO Somalia
10. Ms. Joyce MulilaMitti, Plant Production and Protection Officer/Facilitator, FAOSFS – Zimbabwe
11. Mr. Jan Helsen, Emergency Officer - Agriculture, FAO, REOA – Kenya
12. Mr. Abdurahman Abdurahi, Chief Research Officer/Facilitator – DLCOEA – Ethiopia
13. Mr. Seyfu Ketema, Executive Director, ASARECA – Uganda
14. Mr. Norbert Sendege, Crop Production Director General, Rwanda
15. Ms. Beatrice Uwumukiza, In Charge of Inspection and Certification Services - Director General, Rwanda
16. Mr. Bateno Kabeto, National Expert (Crop)/Facilitator, FAO Ethiopia
17. Mr. Fantahun Assefa, Field Program Support and Monitoring Officer – FAOSFE, Ethiopia
18. Mr. Mihiret Kassa, Food Safety and Quality Officer – FAOSFE, Ethiopia
19. Mr. Bernard Mtonga, Int'l Consultant (Plant Production and Protection)/Facilitator, FAOSFE - Ethiopia
20. Mr. Tadesse Amera, Coordinator, Ethiopia
21. Mr. Assefa Ayele, Agronomist, Ethiopia
22. Mr. Daniel Mekonnen, Crop Breeder, Ethiopia
23. Mr. Alemayehu W/Amanuel, PRRP – Ethiopia. Coordinator, Ethiopia



Annex 3: Group Photograph



Organizing Team/FAOSFE

Overall planning/coordination - Bernard Mtonga

1. Emebet Tilahun, Secretary
2. Rihana Mohammed, Secretary
3. Sophia Aberra, Programme Assistant
4. Misrak Hailu, Secretary
5. Genet Tesfaye, IT Support Officer {CIOF}
6. Ameha Shegu, IT Support







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