

# Seed policy status in South Sudan

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Although farmers in South Sudan rely largely on agriculture for their livelihoods, they practice subsistence agriculture, which does not create the surpluses needed to feed a rapidly growing number of rural and urban consumers. Agricultural practices are broadly divided between mixed cultivation in the 'green belt', and livestock rearing and extensive cultivation in the Ironstone Plateau and semi-arid zones. Quality seed is a key factor in successful agricultural development. An effective seed delivery system should guarantee the availability of quality seed to farmers at the right time and place, and at affordable prices. The 21-year protracted violent conflict and recurrent floods and drought exacerbated seed shortages in South Sudan. The Ministry of Agriculture Forestry, Tourism, Animal Resources, Fisheries, Cooperatives and Rural Development (MAFTAFCRD) is committed to providing the lead support role and creating a favourable operating and economic environment for private sector investment in the national seed system. There are four types of seed system: formal, informal, relief, and community-based market-oriented. The formal seed system is less effective and operates mainly for imported seeds. Informal farmers' seed and seed aid provide the largest portion of seed, reaching the majority of farmers.

The community-based market-oriented (CoBaMa) system is a strategic approach to the development of an integrated seed sector by combining local isolated experiences and linking seed sector stakeholders to a more efficient and sustainable seed sector aimed at supporting food and seed security through domestic seed production for increased productivity. Under this system, three farmer seed production initiatives were transformed into sustainable market-driven local seed businesses to address new crops and varieties, quality, marketing and organisational aspects. Lessons learned were used to develop seed for a development project. Currently, the Alliance for a Green Revolution in Africa (AGRA) is supporting five crop breeding programmes (cassava, maize, rice, sorghum and cowpeas) and three seed companies (Century Seed, Green Belt Seed and Afrogenics). The breeding programmes have short-term plans to quickly evaluate introduced improved crop varieties for release and adoption by the local farming communities to improve seed availability. Maize, rice and cassava programmes have a total of nine selected varieties for release – four maize, four rice and one cassava. These three programmes also bulk basic seeds and supply to the seed companies and some individual farmers. Three seed companies have begun seed multiplication, selling and awareness creation on the use of quality seeds of improved crop varieties. Initiatives for the development of policies, rules and regulations favourable for private seed sector development, including improvement of physical infrastructure, have started.

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## Agricultural overview

Improvement of farmer livelihoods in South Sudan depends largely on agricultural activities, which account for about 80% of employment. More than 1.25 million farming families are involved in agricultural input and output value chain activities. Depending on their geographic location and agro-ecologies, South Sudanese farmers practise traditional subsistence agriculture in which crop production, wild food crop collection, rearing livestock and fishing are combined in undefined ratios (Bigirwa and DeVries, 2010). Subsistence farming is not effective or sufficiently efficient to supply the surpluses needed to feed large numbers of returnees and internally displaced persons (IDPs), who continuously add to a rapidly growing number of rural and urban consumers.

Agricultural practices in South Sudan could be broadly categorised into mixed cultivation in the ‘green belt’, where maize, cassava, upland rice, sorghum and legumes as well as tropical fruits are grown along the southern borders with Uganda and Democratic Republic of Congo (DRC); and the Ironstone Plateau and semi-arid zones in the central, eastern and northern regions that focus more on livestock rearing, including extensive cultivation of sorghum, groundnuts and sesame in addition to niche market crops.

Over 50% of the land in South Sudan has high potential for agriculture. In these high potential areas, climate and soils are suitable to grow a wide range of both field and horticultural crops. Most farmers practise shifting cultivation, with an average cultivated area of two feddans (0.84 ha) per household.

According to FAO (2011), the average yield of cereal production over the past ten years is less than 800 kg/ha. The major factor contributing to low yields is widespread use of seeds of local cultivars or landraces with poor genetic potential. Local varieties and landraces often have yield potential of less than 1 tonne (t) on a hectare of land. The farmers do not use quality seeds as they have limited access to improved varieties, there are inadequate supplies of seed, and prices are high.

## Seed systems

Transformation of the agricultural sector could be achieved through commercial distribution of improved seed and other essential inputs. Studies conducted by the International Food Policy Research Institute (IFPRI) on investment options for poverty alleviation in Eastern and Southern Africa indicate that the most significant impact on poverty and growth will come from investments in a range of agricultural sub-sectors, particularly crops for export to regional markets (James *et al.*, 2007).

Seed is a key factor in any agricultural production system. An effective seed system should guarantee availability of quality seed to farmers at the right time and place, and at affordable prices. Most farmers in South Sudan receive their seed supply through the informal seed system by saving from their own farms, or through gifts from relatives and neighbours, or by buying from local markets. At present, seed aid provides the largest portion of seed that reaches farmers. The formal seed system, which produces improved varieties, is not well organised.

The largest portion of the formal seed system in South Sudan currently depends on imported varieties. A formal seed system guided by a regulatory framework, which produces seed of modern varieties in an organised chain of institutions specialised in the conservation of genetic resources; plant breeding, seed production, seed quality control; and seed marketing and distribution, is being

initiated by MAFTAFCRD in collaboration with development partners such as AGRA, the Dutch Government and USAID.

Seed supply systems serve to make seed available to the users and guarantee sufficient quantities of good quality seed are available to farmers, at the right time and at an affordable price. Most of the farmers in South Sudan, similarly to elsewhere in sub-Saharan Africa, obtain their seeds through the informal system. Farmers save seed from their crops from year to year, receive seed from neighbours and relatives, or buy seed from local markets. A large proportion of farmers still depend on aid agencies for their seed.

### **Justification for urgent establishment of seed system**

Agriculture in South Sudan is zone-dependent. The principal food crops are cassava, sorghum, groundnuts, sesame, maize, sweet potatoes, cowpeas, beans, pigeon peas, tomatoes, onions, okra and pumpkins.

MAFTAFCRD has the primary responsibility of ensuring that adequate and timely supplies of high quality seed are available to farmers at competitive prices. MAFTAFCRD takes the lead in guaranteeing public service support for maintaining an efficient seed supply, generates farmer demand for improved seed, and creates an operating and economic environment favourable for private sector investment in the national seed system.

MAFTAFCRD and development partners collaborate to create a system that will focus on sustainable provision of the highest quality seed (genetic, physical, physiological, and phytosanitary quality components) consistent with potential economic returns, and with all applicable quality requirements to ensure seed reliability for farmers.

### **The current seed system of South Sudan**

#### **Availability**

Shortages of essential seeds and planting materials necessary to enable farmers to produce sufficient food for their families and a surplus for sale have been a constraint for many generations in South Sudan. The situation of seed shortages has been exacerbated by the 21-year violent conflict. In addition, recurrent floods and drought have impacted on the local seed supply.

The increased influx of returnees, refugees and internally displaced persons (IDPs) means that an increased demand for seed has worsened the seed shortages, creating a situation in which farmers may not be able to purchase available seeds in the local markets due to lack of buying power.

Because farmers recycle their harvested crop grain as seed, food shortages result in seed shortages, which may justify relief seed interventions. A small fraction of the total harvest is required to establish a new crop. For example, the seed requirement for sorghum is 5–10 kg per farm household, compared with an average annual household food requirement of 300 kg. Imported seed carries a risk of uncertain quality and may not be adapted to local conditions. Unless farmers know the quality and performance of imported seed, they are unlikely to use it until its performance has been proven locally.

As the seed production system in place is inadequate, the majority of improved seeds used in South Sudan are imported from Kenya, Uganda or Sudan. MAFTAFICRD, FAO and other partners have initiated the use of locally adapted crop varieties through a 'seed recollection programme', in which seeds are supplied to farmers and then repurchased from them. In 2009, 25 organisations (20 local and five international organisations) were subcontracted to recollect seeds through letters of agreement that specified the activities to be carried out, including type and quantity of seeds, recollection points and destination of the seeds. These organisations worked closely with local farmers' organisations and with an expert or extension agent from the ministry to identify good seed producers and growers, preferably those who previously had been provided with good quality seed by FAO. In addition, they organised seed quality testing. Recollection and bagging was carried out after the seed quality had been checked and certified by MAFTAFICRD officials. A total of 350 t of seeds was recollected and distributed in 2009. However, the genetic quality of the parent stock in this system is uncertain. The community-based seed production and supply initiative broadened the scope of seed and food security and created an opportunity for seed sector development. This resulted in a 42.7% reduction in seed imports in 2008, and a 54.7% reduction in 2009, and ensured availability of quality seeds of locally adapted crop varieties to the needy populations. Although 800 farmers were trained in seed production and produced 500 t of seeds in 2009, the training and management of the fields and farmers they worked with were weak and the results were not validated. The seed and input trade fair (ITF) approach adopted in some areas has encouraged seed growers to practise market-oriented seed production, with cash received during these fairs acting as an important incentive to farmers to continue as seed producers. This has been an appropriate strategy to reach those in need of seed aid.

### Accessing the seed

There is very limited understanding of how farmers traditionally manage seed in South Sudan. Seed is distributed through various channels, including government, NGOs, international commercial sector, relief agencies, farmers' own production and exchange with relatives or friends. For several years, relief seed markets have been at the centre of seed assistance schemes in Southern Sudan, for example in Western Equatoria. Without a commercial farming sector, development of a formal seed system is difficult. Apart from hybrids (primarily maize), the nascent seed industry generally markets only vegetable seeds and some cash crops such as sunflower. Very few seed companies are willing to multiply and maintain large inventories of certified seed for a market where there is uncertain demand. Thus most of the seed being marketed is 'conditioned' grain sold at 'seed' prices. As a result of several bad experiences in the local market, aid agencies now generally insist that the seed they purchase is tested for germination, but determination of varietal integrity is possible only through growing out the crop. Emergency seed interventions have been implemented in South Sudan for more than a decade. The much needed seeds that are provided to returnees, IDPs and vulnerable resident households by FAO's Emergency Rehabilitation and Coordination Unit (ERCU) is justified due to seed unavailability and poor quality of farmer-saved seed.

In order to supply seed to affected communities, aid agencies usually seek out commercial seed companies from either Kenya or Uganda, where established seed companies exist. Decisions on seed procurement are often made on the basis of what seed is available from these commercial suppliers. As the need for imported seed cannot be forecast until harvest, aid agencies have a short time frame in which to source and distribute seed before the start of the next planting season.

Farmers save their own seed, but often do not select seed from the plants with the best characteristics. In addition, traditional on-farm seed storage facilities consisting of grass thatch and mud construction often cause seed damage. It is common for crops to be stored over the kitchen fire as one way to decrease pest infestations, with a negative impact on seed viability. There are no data on storage and post-harvest losses, but anecdotal evidence suggests that such losses are considerable (Itto and Wongo, 2004). Development, testing and marketing of new varieties requires considerable investment. These costs can be prohibitive if the size of the market is small. Because South Sudan's seed market is so small at present, private seed companies have few incentives to develop new local varieties.

### Utilisation

In South Sudan, very few improved varieties for a wide variety of crops are intercropped. Cassava is widespread and is often intercropped with maize, groundnuts, sorghum and sesame, especially in semi-arid regions. As a result of the conflict, the public agricultural research system collapsed and has not yet become fully functional. However, new varieties are being imported and tested. Local varieties are also being improved. Most farmers are forced to use seed retained from their previous year's harvest, supplemented as needed by purchases from the market or from relatives or friends. The amount of imported certified seed used is negligible. As in previous years, the Government of South Sudan (GoSS), FAO and NGOs provided some seed and hand tools, principally to IDPs and returnees, and to farmers classified as vulnerable. However, the amounts of seed have been extremely small compared with the amount required by the farming community, and many farmers have complained of shortages. In 2010 and subsequent years, in areas where late rains prompted several replantings, the problem of seed shortages was further exacerbated.

Despite the fact that government and some development partners introduced many food crop varieties such as cassava mosaic disease (CMD)-resistant and cassava brown streak disease (CBSD)-tolerant cassava, improved maize (Longes) and rice (Nerica), some farmers continue to grow their traditional local varieties. According to the seed assessment conducted by AGRA, all crops grown in South Sudan, except maize, are of traditional, landrace varieties, late-maturing, low-yielding and generally unresponsive to improved crop management practices (Bigirwa and DeVries, 2010). Farmers practise methods common to the cultivation of low-yielding crops, with either broadcast seeding or the use of five or six seeds per hill, poor weed control, and near-zero use of either organic or inorganic fertilisers. Cassava fields planted with local varieties are heavily infected with mosaic disease and are very late maturing. However, a variety introduced from Uganda, TME 14, appears to be resistant to the disease. Rice fields planted with landrace varieties nearly as tall as maize take over 6 months to mature and show low (far less than 1 t/ha) yields. In contrast, Nerica rice (variety Nerica 4) appears to be considerably more productive than the landrace varieties. Sorghum varieties are invariably very low-yielding and late-maturing. Groundnut fields are heavily infected with both rosette disease and *Cercospora* leaf spot. Maize fields are planted with a mixture of local and improved varieties, resulting in cross-pollinations. Introduced hybrid maize 4M 19 displayed superior vigour.

### Community-based market-oriented seed production

This is a strategic approach for the development of an integrated seed sector – shifting from isolated local production towards a system approach linking seed sector stakeholders. The goal of this approach is a more efficient and sustainable seed sector to ensure food and seed security through domestic seed production. It is expected to increase productivity and create an enabling environment/business climate in South Sudan. To develop the seed sector, MAF-GoSS prioritised capacity building

and institutional development. The project focuses on linking farmers, extensionists and researchers to optimise available resources, experiment with new approaches involving government, NGOs and farmer groups, and work towards the development of a coherent seed strategy.

The project has two important components:

- a field-level component, in which seed sector stakeholders from government and NGOs work with farmer groups on variety selection and market-oriented seed production;
- a policy component, in which lessons learned from the field feed into a discussion at GoSS policy level to develop a strategy that supports integrated seed sector development in South Sudan.

Three farmer groups were identified and formed stakeholders' teams of business cluster groups at Lopit, Lopa County, Eastern Equatoria State, Magwi Payam, and Yei in Yei County. The business cluster groups were linked with researchers and extensionists during variety selection. The cluster at Lopit chose sorghum for participatory varietal selection (PVS); the Magwi group at Owinkyibul chose cassava and sesame; the Yei cluster tested maize and sorghum. The three farmer seed production initiatives were transformed into sustainable, market-driven local seed businesses addressing new crops and varieties, quality, marketing, and organisational aspects. Lessons learned were used in the development of roles, responsibilities and incentives for seed sector stakeholders. Seed stores were built for the three groups in the areas.

The team members were trained in crop and varietal selection, quality seed production, marketing and effective farmers' organisation. Action plans for PVS and seed production activities were developed. A SWOT analysis was conducted for establishment of effective market-oriented farmer seed producer groups, in terms of crops and varieties, quality aspects, identification of markets, organisational aspects (i.e., fieldwork) for the three farmers' organisations.

### Multiplication of basic seeds and variety development

Crop breeding programmes were initiated for various crops such as: cassava, maize, rice, sorghum and cowpeas, with support from AGRA. Evaluation and adaptation of introduced improved varieties for the selected crops started in 2012. Some varieties are in development for release, although the variety release committee is incomplete.

In the short-term maize breeding strategy, evaluations were conducted of maize varieties sourced from national and international agricultural research institutes in multi-locational trials and multiplication/maintenance of basic seeds. Four hybrid maize varieties (KH500-22A, KH500-43A, Longe 6H and Longe 10H) were selected for release.

Three maize parental lines (PML 1, PML 3 and PML 5) sourced from the National Crops Resources Research Institute (NaCRRI) are being bulked at Palotaka Basic Seed Centre (PBSC). Local maize germplasm was collected and will be tested for general field performance in the next growing season.



Figure 1. Maize hybrids recommended for release in 2012



Cassava variety NASE 14 is being bulked for distribution to cassava seed growers for multiplication and wider distribution to farmers. Cassava NASE series varieties with proven tolerance of CBSD are on PVS trials at seven locations.

Figure 2. IITA and NaCRRI cassava line bulking site at Yei Research Station



Seventy-three rice varieties (27 upland and 46 lowland) sourced from NaCRRI, International Rice Research Institute (IRRI) and Institut d'Economie Rurale of Mali were evaluated in field participatory trials in the green belt agro-ecology for two consecutive seasons. The four best performing varieties (NERICA 4, NERICA 1, NERICA 10, DKA-P27) were selected and recommended for release to farmers for adoption.

Figure 3. Participants observing seed production plots at Century Seed Company (left) and Yei Agricultural Research Centre (right)



Participants observing seed production plots at Century Seed Company and Yei Agricultural Research Center

Three private seed companies (Green Belt Seed, Century Seed and Afroganics) who work closely with MAFTAFCRD received grants from AGRA to improve their seed production activities. They aim to increase availability and accessibility of seed of improved varieties, increase farmers' awareness of the importance of using quality seeds, and train them in production of clean, quality seed of various crops (sorghum, maize, sesame, rice, cassava, beans and selected vegetables).

The companies mobilised seed outgrowers; organised training workshops for selected farmers and/or farmer groups; and sourced basic seeds from the national research centres or from research institutes in neighbouring countries such as Namulonge and Serere in Uganda, and IITA in Nigeria. They also liaised with the national and state ministries of agriculture, and local and international NGOs dealing with relief and agricultural development in the country. The seed companies organised selling points and were linked to agro-dealers trained by the International Fertilizer Development Center (IFDC). Activities included the introduction of fertiliser use. Demonstration plots were established at various levels (e.g., *boma* level) to ease distribution of improved seeds and to facilitate dissemination of technologies.

Figure 4. Green Belt Seed Company market outlet in Yei Town





The local seed companies have managed to produce and sell improved seeds to farmers, farmer groups, foreign seed companies and aid agencies. For example, Afrogenics produced 25 t of quality maize and sorghum seeds and sold 10 t of sorghum and 5 t of Longe 4 in 2012. It also supplied South Sudanese Red Cross and Aim Global Agribusiness Quality Seeds with cassava variety TME 14 cuttings, maize and sorghum seeds. The Green Belt Seed Company sold 2.8 t to FAO and local farmers. In 2013, Green Belt sold 3.75 t of sorghum and maize valued at US\$4,113. During the second season, it sold 11.75 t of beans, sorghum, maize and cowpeas valued at US\$19,037.

## Challenges

Some of the challenges facing the development of the seed sector and agriculture in general include:

- poor infrastructure, such as roads;
- difficulties in accessing foundation and/or breeder seeds;
- lack of farming machinery including dryers, threshers, graders and packaging machines;
- inadequate processing and storage facilities;
- unavailability and/or high cost of skilled labour;
- erratic rainfall;
- farmers' unwillingness to buy seeds and other inputs;
- high cost of transportation (of foundation seeds) from Uganda and Kenya;
- persistent resistance by some sections of farmers to accept improved seeds;
- high taxes on seeds, fertilisers and tools (22%) inhibiting growth of the private sector – seed companies have to pay multiple taxes that are often inconsistently applied.

Figure 5. Poor roads pose a challenge for providing seeds for improved food security, South Sudan, October 2012



## Introduction of harmonised seed standards, regulations and procedures

The Republic of South Sudan, through MAFTAFCRD, has adopted the harmonised seed standards, regulations and procedures for Eastern and Central Africa. Currently South Sudan is implementing a project funded by the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) for enhancing the adoption of harmonised East African seed standards, regulations and procedures (HESSREP), designed to develop and implement a national engagement plan for adoption of the project, and to enhance the capacity of value chain actors and share information on domestication and implementation of the project. South Sudan conducted a baseline survey and a series of awareness-creation meetings for different stakeholders: policy- and law-makers, crop breeders and research scientists, administrators and key agricultural informants, farmers' and producers' unions, institutions of higher learning, and business groups.

The baseline results indicate that more than 90% of those who participated were not aware of HESSREP and lacked knowledge of seed standards and procedures related to seed trade. A national task force was formed to facilitate domestication of the HESSREP process. An awareness training workshop on international treaties, a phytosanitary import and export regulatory system, export certification system, import inspections, and the draft Seed and Variety Act was conducted on 28–29 November 2013. The workshop was facilitated by the National Potato Council and the Kenya Plant Health Inspectorate Service (KEPHIS). Participants asked for more education and the formation of specialised committees to facilitate development of policies, bills/acts and regulations, including procedures required for development of new varieties, and for local and cross-border seed trade.

## Recommendations

The following recommendations are made for an enabling policy and regulatory framework in support of seed sector development.

- Formation and empowerment of specialised committees related to seed standards, regulations and procedures as required by Eastern and Central African countries.
- Advocacy and lobby for promotion of HESSREP in South Sudan.
- Empowerment and operationalisation of the border post to regulate cross-border trade.
- Support to develop seed regulations, laws, guidelines and protocols for quality seed production.
- Support for a specific consultancy for faster development of a vibrant seed system and formation of a separate seed administration within the structure of MAFTAFCRD.

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