



# FEED THE FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



## Contextual Analysis of South Sudan's Seed Sector and Pathways for Building Seed Sector Resilience



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**Cover page photo credit:** A farmer proudly showing her locally produced vegetable seeds. By Gerrit-Jan van Uffelen, Wageningen Center for Development Innovation. 2022.

#### **DISCLAIMER**

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**Feed the Future Consortium Partners** in the Feed the Future Global Supporting Seed Systems for Development activity:



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## List of Abbreviations and Acronyms

A3-SEED	Accelerating Agriculture and Agribusiness in South Sudan for Enhanced Economic Development Project
AGRA	Alliance for a Green Revolution in Africa
ARD	Agricultural Research Directorate
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
BHA	Bureau for Humanitarian Assistance
CBSP	Community-based Seed Production
CGIAR	Consortium of International Agricultural Research Centers
CIAT	International Centre for Tropical Agriculture
CIMMYT	International Maize and Wheat Improvement Centre
COMESA	Common Market for Eastern and Southern Africa
CRS	Catholic Relief Services
CSB	Community Seed Bank
CTC	Crop Training Center
CBSP	Community-based Seed Production
ECAPAPA	Eastern and Central Africa Program for Agricultural Policy Analysis
ELRP	Emergency Livelihood Response Program
EWSKF	East West Seed Knowledge Foundation
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field Schools
FGD	Focus Group Discussion
FNS	Food and Nutrition Security
GoSS	Government of South Sudan
GRFC	Global Report on Food Crises
HLPE	High Level Panel of Experts on Food Security and Nutrition
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFDC	International Fertilizer Development Center
IDP	Internally Displaced People
IITA	International Institute of Tropical Agriculture



IPC	Integrated Food Security Phase Classification
ISSD	Integrated Seed Sector Development
ISTA	International Seed Testing Association
LSB	Local Seed Business
MAFS	Ministry of Agriculture and Food Security
NARS	National Agricultural Research Systems
NGO	Non-Governmental Organization
NUFFIC	The Dutch Organization for Internationalisation in Education
RFS	Bureau for Resilience and Food Security
QDS	Quality Declared Seed
REPRO	Food and Nutrition Security Resilience Programme (FNS-REPRO) of FAO
S34D	Feed the Future Global Supporting Seed Systems for Development Activity
SAFER	Sustainable Agriculture for Economic Resiliency Program in South Sudan
SAMS	Smallholder Agriculture Market Support
SQB	Seed Quality Control Board
SSD4SS	Seed Sector Development for South Sudan
SSRA	Seed Systems Resilience Assessment
SSSA	Seed Systems Security Assessment
STASS	Seed Traders Association of South Sudan
MT	Metric Ton (1,000 kilograms)
UNEP	United Nations Environment Program
UNISDR	United Nations Office of Disaster Risk Reduction
USAID	United States Agency for International Development
WCDI	Wageningen Centre for Development Innovation
WUR	Wageningen University and Research

# Concepts and Definitions

Working definitions for the main concepts used in this document.

## Food System

According to Van Berkum (2018)<sup>3</sup>: *Food systems comprise all the processes associated with food production and food utilization: growing, harvesting, packing, processing, transporting, marketing, consuming, and disposing of food remains (including fish). All these activities require inputs and result in products and/or services, income, and access to food, as well as environmental impacts. A food system operates in and is influenced by social, political, cultural, technological, economic, and natural environments* (Global Panel, 2016; HLPE, 2017).

## Fragile State

According to the United States Agency for International Development (USAID)<sup>4</sup>, this refers to countries where the legitimacy of the Government is in question, and the state itself is either unable or unwilling to adequately assure the provision of security and basic services to a significant portion of its population.

## Integrated Seed Sector Development (ISSD)

Seed system actors may include farming households and their communities, public and private bodies, development partners and non-governmental organizations (NGOs). Actors may have different interests, priorities, and capacities, resulting in different focuses on areas and interests, resulting in a variety of seed systems. No single intervention, be it public-, private-, community-, or NGO-based, can provide sufficient support to the seed sector for achieving the goal of seed security at community, regional and national levels. Individual farming households use distinct seed systems for different crops. ISSD<sup>5</sup> recognizes the unique role played by each of these different seed systems within the overall sector and its specific context, and the need to approach them in a pluralistic manner. These diverse seed systems are clustered into informal, intermediary, and formal seed systems.

## Protracted Crisis

Harmer and Macrae (2004) define protracted crises as *‘those environments in which a significant proportion of the population is acutely vulnerable to death, disease, and disruption of their livelihoods over a prolonged period of time’*.

## Resilience

The United Nations Office of Disaster Risk Reduction (UNISDR) definition of resilience: *‘The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to, and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.’*

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<sup>3</sup> <https://library.wur.nl/WebQuery/wurpubs/fulltext/451505>

<sup>4</sup> [https://www.ilo.org/wcmsp5/groups/public/---ed\\_emp/documents/terminology/wcms\\_504528.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_emp/documents/terminology/wcms_504528.pdf)

<sup>5</sup> <https://issdafrica.org/guiding-principles/>

In relation to the Rome Based Agencies' focus on agriculture, food security and nutrition, resilience is essentially about the inherent capacities (abilities) of individuals, groups, communities, and institutions to withstand, cope, recover, adapt, and transform in the face of shocks.

## **Seed Systems**

Seed systems are sets of activities by different actors that are involved in plant genetic resource management, plant breeding and variety development, seed production, multiplication, dissemination, service provisioning, policy, and regulation development, resulting in access, timely availability, and use of quality seed of different crops and varieties in demand by farmers.

## **Seed System Types and Models**

Formal seed systems: the main models being: 1) Government seed companies and/or programs; 2) commercial seed companies (local to multinational), and; 3) closed value chains<sup>6</sup>. Intermediary seed systems: the main models being: 1) community seed banks (CSBs); 2) community-based seed production (CBSP); 3) local seed businesses (LSBs), and; 4) seed relief. Informal seed systems: the main models being: 1) farm-saved seed; 2) social seed networks, and 3) local (grain) markets. For a detailed description of the main models within these main seed systems, see annex 1.

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<sup>6</sup> This seed system usually has a short value chain, in which seed (including planting materials) and input packages are directly provided to commercial growers. The system includes crops such as cotton, tea, coffee, tobacco, and sugarcane.

# 1 Introduction

## 1.1 Background to the Study

### **Collaborative Effort by S34D and FNS-REPRO**

This case study is a collaborative effort by the Feed the Future Global Supporting Seed Systems for Development (S34D) Activity and the FAO Food and Nutrition Security Resilience Program (FNS-REPRO, or REPRO). This country case provides a better understanding of the current status of South Sudan's seed sector, documents the challenges it faces, and presents recommendations and pathways to develop a more resilient and vibrant seed sector.

The aim of this case study is to provide guidance to humanitarian and development agencies to contribute to resilience building among farmers by proposing ways in which seed systems can provide farmers in fragile states with access to quality seed of appropriate varieties in a timely and affordable manner. It will contribute to resilient seed systems by proposing models for the (re-)establishment of new, more robust seed systems that are able to adapt and transform to withstand the various shocks and stresses that impact food and seed systems in fragile states.

### **S34D Activity on Fragile States**

This activity explores and develops models for the emergence of enhanced and resilient seed systems in fragile contexts, based on lessons that emerge from historical, recent, and on-going initiatives through selected country studies, including South Sudan. The models of interest to S34D encompass aspects of formal, informal, and intermediary (including emergency seed model) seed systems and explore how these can work to support and strengthen each other.

The S34D activity is funded by the Feed the Future Initiative through the Bureau for Resilience and Food Security (RFS) and by USAID through the Bureau for Humanitarian Assistance (BHA).

### **FNS Resilience Program REPRO<sup>7</sup> and ISSD-Africa**

In South Sudan REPRO aims to contribute to the development of context-sensitive seed systems resilience, aiming to reduce the number of people in Integrated Food Security Phase Classification - phase 3 (IPC-3) (food crisis) through integrated seed sector development and to reduce the number of people in IPC-4 (food emergency) through an effective seed insecurity response. The Dutch-funded FAO-implemented REPRO program works with the Wageningen Centre for Development Innovation (WCDI) of Wageningen University and Research (WUR) to provide guidance to Government, humanitarian, and development actors, and the private seed sector, to build more resilient seed systems that improve food systems performance aimed at improved food and nutrition outcomes for South Sudan's peoples.

In implementing its learning and capacity-building agenda, WCDI works in close partnership with the Integrated Seed Sector Development Africa program (ISSD-Africa), in particular on research themes 'seed sector development in fragile states'<sup>8</sup> and 'effective seed insecurity response'<sup>9</sup>. REPRO is funded by the Inclusive Green Growth Department of the Dutch Ministry of Development Co-operation.

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<sup>7</sup> <https://www.fao.org/emergencies/resources/documents/resources-detail/vn/c/1235761/>

<sup>8</sup> <https://issdafrica.org/seed-sector-development-in-fragile-states/>

<sup>9</sup> <https://issdafrica.org/effective-seed-insecurity-response/>

## 1.2 Approach

### **Fragile States and Protracted Food Crises**

This contextual understanding of seed systems takes into account that South Sudan is a fragile state<sup>10</sup> experiencing a protracted food crisis with a significant proportion of its population acutely vulnerable to disruption of their livelihoods, poor food and nutrition outcomes, disease, and death over a prolonged period of time.

### **Method**

The main methods of this study include a review of documentation (on state fragility, food and cropping systems, seed systems and seed interventions), key informant interviews, surveys through semi-structured survey questionnaires, multi-stakeholder workshops in Juba, Torit (Eastern Equatoria State) and Wau (Western Bahr el Gezahl State), and field visits.

The main seed sector stakeholders and actors consulted included Government, FAO and UN agencies, development partners, NGOs, private seed sector and community representatives, and farming households (see Annex 2 for a detailed list). This represents over 76 key informants from 30 different organizations and various departments of the South Sudan Government.

The case study was carried out by a team of experts representing the University of Juba, South Sudan, and WCDI, the Netherlands, with guidance from the S34D team at Catholic Relief Services (CRS).

## 1.3 Organization of the Report

### **Taking an Integrated Seed Sector Development Perspective**

Seed system actors include farming households and their communities, public and private bodies, development partners and NGOs. Actors may have different interests, priorities, and capacities, resulting in different focuses on areas and interests and a variety of seed systems used by individual farming households. Therefore public-, private-, community-, and NGO- based actors contribute to the seed sector for achieving the goal of seed security at community, regional and national levels.

Each seed system plays a unique role within the overall sector and its specific context, hence the need to approach them in a pluralistic manner. This report therefore adopts an integrated seed sector development perspective in the fragile states context, presenting findings and recommendations according to the main seed system types and models therein.

### **Structure of the Report**

Chapter 1 elaborates the background, purpose, and methodology of the case study. Chapter 2 elaborates the broader economic and political contexts of South Sudan in terms of its unique agro—ecology, food and nutrition security status, protracted food crisis, conflict and insecurity, and impacts of climate change and the COVID-19 pandemic. Chapter 3 provides an overview of food and cropping systems, livelihood systems and major crops grown by the farmers. Chapter 4 provides the overview of current seed sector development efforts by public, private and development partners in South Sudan. Chapter 5 provides stakeholders' perspectives on key strengths, challenges and emerging lessons in South Sudan seed sector development. Finally, chapter 6 concludes by presenting ten proposed pathways for building resilience in the South Sudan seed sector.

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<sup>10</sup> <https://www.fao.org/emergencies/resources/documents/resources-detail/vn/c/1235761/>

## 2 South Sudan Case Study Context

### 2.1 General Context

South Sudan is endowed with abundant natural resources with high potential in agriculture, fisheries, livestock, and forestry. Although the agricultural sector's development represents the major source of growth in the country's economy, it is well below its potential. Crop and livestock productions are the central livelihood strategies in South Sudan.

South Sudan is a fragile state<sup>11</sup> experiencing a protracted food crisis characterized by its longevity (for at least three decades by now); weak governance and public administration (in the face of overwhelming needs); breakdown of local institutions; and insecurity and conflict.

Poor food and nutrition outcomes are the most common manifestation of protracted crises<sup>12</sup>; South Sudan is no exception, with a high percentage of its people experiencing food crises or worse. The deterioration of food systems, and the seed systems underpinning them, can be a contributing factor to conflict, which can in turn trigger a protracted crisis.

Food insecurity in South Sudan is generally caused by a combination of factors including prolonged conflict, frequent displacement due to inter- and intra-ethnic conflicts, late and uneven distribution of rainfall, inadequate agricultural inputs, uncontrolled crop pests, insufficient agricultural extension services, and inadequate policies and programs.

### 2.2 Ecology and Agriculture

The diverse ecology of South Sudan provides a growing season ranging from 280 to 300 days per annum in southwestern cropping areas, known as the Greenbelt, and from 130 to 150 days per annum in northern states. A bi-modal rainfall pattern extends over most of the Greater Equatoria Region (Western, Central and parts of Eastern Equatoria), while the rest of the country has a uni-modal rainfall regime. Agricultural performance varies markedly depending on latitude and longitude, with the possibility of two or three harvests per annum from the same plots in the Greater Equatoria Region and a single harvest in the uni-modal rainfall areas further north.

Agriculture is almost entirely dependent on rainfall and hence the variability of precipitation in terms of amount and distribution is usually the major factor in determining crop production. Generally, rainfall increases in a northeast to southwest direction culminating in the Greenbelt along the border with the Central African Republic, the Democratic Republic of the Congo, and Uganda. However, there are usually considerable variations in rainfall from year to year and from location to location within the same year. In low-lying areas, flooding and water-logging are common occurrences, while prolonged dry periods are frequent in south-eastern areas and along the border with Sudan (FAO, 2021a).

### 2.3 South Sudan's Food Crisis

#### **South Sudan's Protracted Crisis**

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<sup>11</sup> <https://fragilestatesindex.org/country-data/>

<sup>12</sup> <http://www.fao.org/3/i1683e/i1683e03.pdf>

South Sudan suffers from a protracted crisis. This is a situation characterized by its longevity or duration, weak governance or public administration (in the face of overwhelming constraints), breakdown of local institutions, and conflict. The deterioration in the sustainability of livelihood systems can be a contributing factor to conflict, which may in turn trigger a protracted crisis (FAO, 2010).

Food and nutrition insecurity is the most common manifestation of protracted crises; unsustainable livelihood systems and poor food security contribute to malnutrition and increased mortality rates.

**Food Security and Nutrition Challenges**

According to the Global Report on Food Crises (GRFC) in 2022 the number of South Sudanese in food crisis or worse (IPC Phase 3 and above) increased from 6.5 million in May–July 2020 to 7.2 million by April–July 2021, with 108,000 projected to be in catastrophe (IPC Phase 5) in Pibor, Jonglei, Northern Bahl el Ghazal, and Warrap Counties (Figure 1). This 2021 estimate is the highest number for South Sudan in the GRFC’s existence, driven by the protracted conflict, economic crisis, high food prices, socioeconomic impacts of COVID-19, and unprecedented flooding. The key nutritional challenges are related to the following: food security; access to health services; and access to healthy diets, household environments and caring and feeding practices (FAO, 2022).

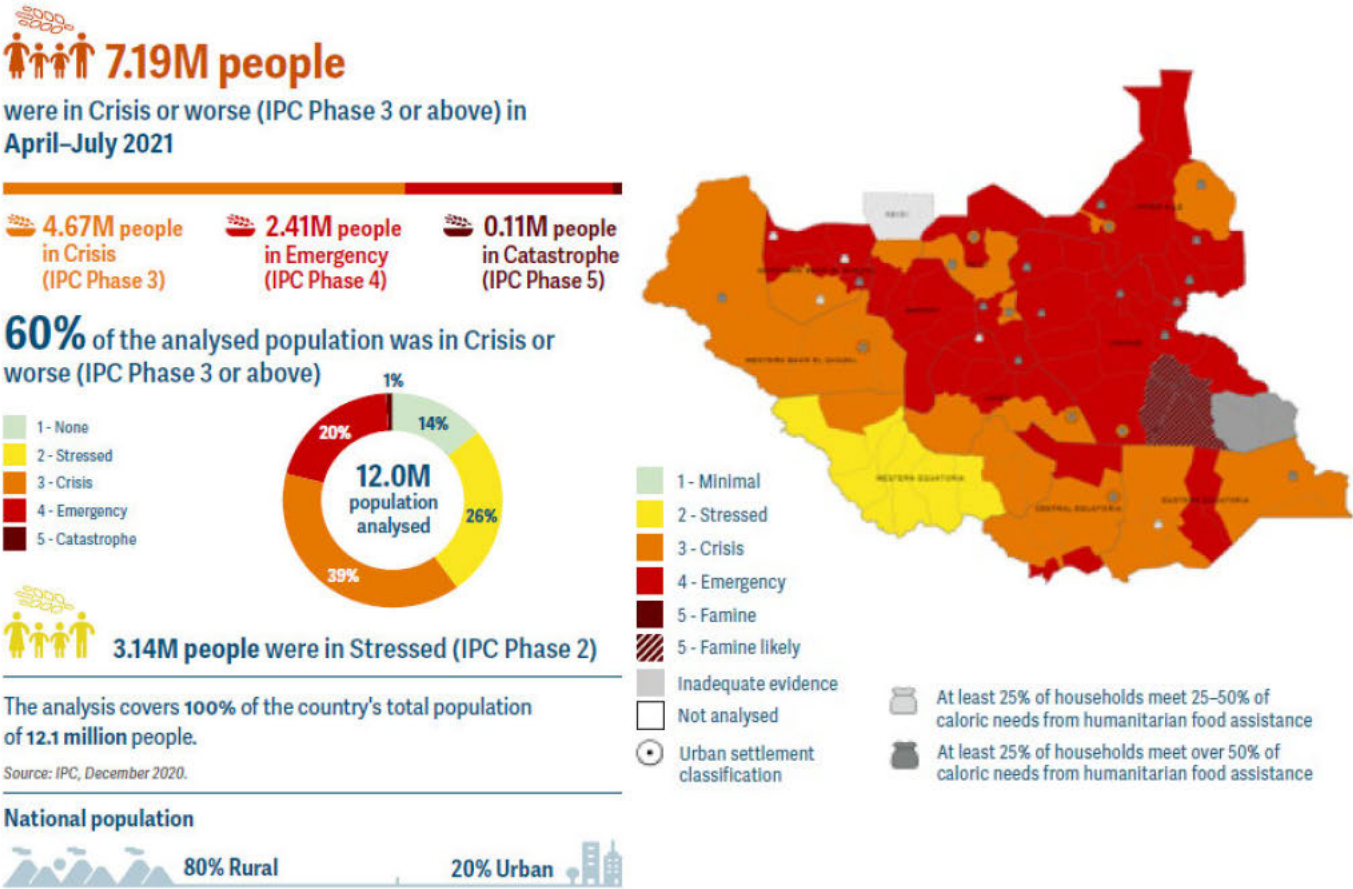


Figure 1. South Sudan Acute Food Insecurity Overview. Source: FAO, 2022.

## 3 Food Cropping Systems

### 3.1 Agricultural Practices

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 in South Sudan can be broadly categorized into mixed cultivation in the Greenbelt, where maize, cassava, upland rice, sorghum and legumes as well as tropical fruits are grown along the southern borders with Uganda and the Democratic Republic of Congo; 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. Agricultural practices in general follow the agro-climatic zones (see Figure 2).

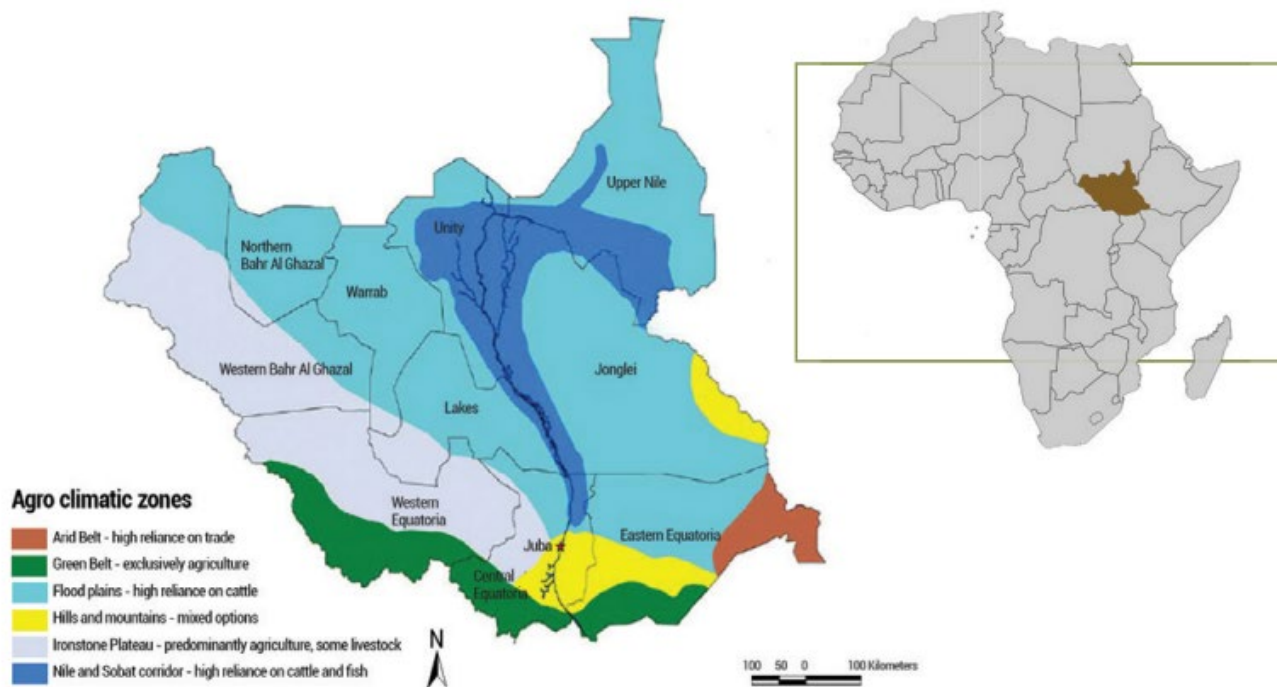


Figure 2. Agroclimatic Zones Of South Sudan. Source: developed by FAO South Sudan (N.B. at this date the final boundary between Sudan and South Sudan had not yet been determined). FAO, 2021a.

### 3.2 Major Livelihood Zones

South Sudan is made up of 12 major livelihood zones, marking distinctively different geographic areas in which most households have a relatively similar pattern of production determined by factors such as agro-ecology, markets, and trade opportunities (Figure 3). Socio-economic groups within a single livelihood zone tend to have similarities in their asset base, as well as relatively similar consumption patterns and coping strategies in response to shocks. A detailed characterization of major livelihood



zones is provided in Annex 3. An additional resource of interest may be the South Sudan *Land Cover Atlas*<sup>13</sup>.

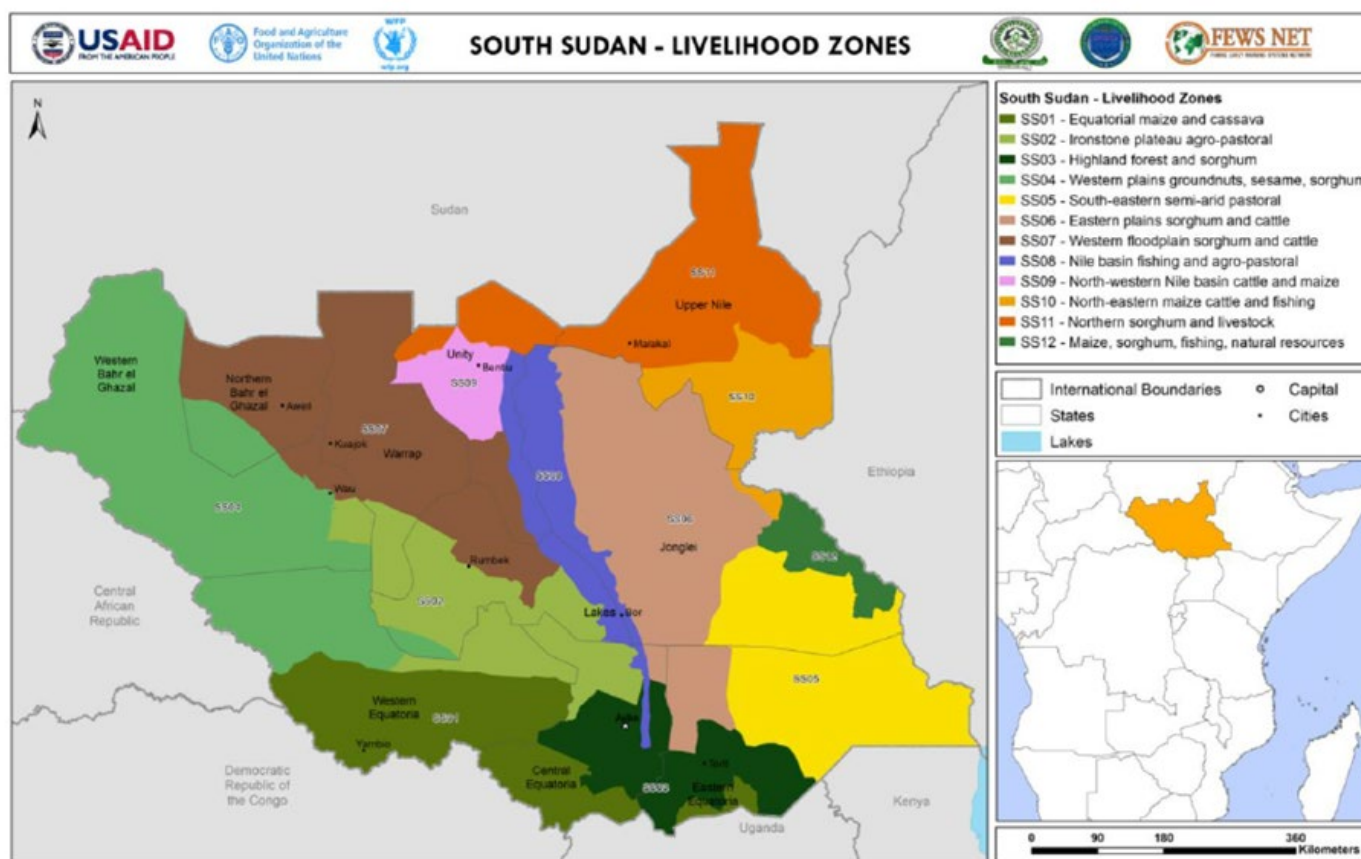


Figure 3. South Sudan’s Livelihood Zones. Source: FEWSNET, 2018

### 3.3 Crop Production

Crop production is mainly conducted by smallholder farmers on small plots of land cultivated by hand. The family size is five to seven persons that belong to larger family aggregations. Despite an abundant availability of land throughout the country, the extent of the cultivated area is limited mainly by (a) the size of the household labor force and/or the ability of the households to provide in-kind payment (essentially food/local beer) for the mobilization of traditional working groups (*nafeer*); (b) the limited availability of efficient tools and power for land clearing and ploughing and (c) the reduced security of access to land (FAO, 2021c).

According to the FAO 2021c Special Report, 2020 net cereal production (after the standardized deduction of post-harvest losses and seed use) in the traditional smallholder sector was estimated at about 874,400 MT, 7% above both the 2019 output and the 2015–2019 annual average, but still well below the pre-conflict levels. The increase in cereal production compared to the previous year was driven by an increase in the harvested area and by good yields due to favorable rains in most cropping

<sup>13</sup> <https://www.fao.org/publications/card/en/c/cc6e5ce5-bbde-4608-b2ac-1d5a6f5042cd/>

areas. The average gross cereal yield in 2020 from the traditional smallholder sector was estimated, as in 2019, at 1.1 MT/hectare<sup>14</sup>.

With a projected population of about 12.2 million in mid-2021, the overall cereal deficit in the January–December 2021 marketing year is estimated at about 465,600 MT, about 4% below the deficit estimated for 2020. This deficit, still above the past five-year average, contributed to record-high levels of food insecurity throughout the country, especially where conflict and flooding affected crops and livestock.

### 3.4 Main Crops

Sorghum is the main cereal crop cultivated in both the smallholder and mechanized sector, comprising about 70% of the area sown to cereals. The preferred sorghum varieties are found among many local landraces with lengths to maturity fitting agro-ecological niches ranging from short-season (<90 days) to very long-season (>220 days) types. There are also several improved, short-cycle varieties of sorghum from Sudan that have become well-established in both large-scale mechanized farms and traditional smallholder farming areas, with cross-border access to Sudan.

At the national level, the area planted with maize is estimated to be 20% of the total cereal area. Maize is the most popular cereal in the Greenbelt, where Longe varieties (especially open pollinated variety Longe 5) from Uganda are grown in series in two crops per year on the same land. It is also the main cereal crop in southern and central parts of Unity State, along the Sobat River in Upper Nile State and in eastern counties of Jonglei State near the Ethiopian border, where mixed Longe varieties, local landraces and Ethiopian releases are noted. Elsewhere, maize is only cultivated in very limited areas close to homesteads, where it is consumed green with the first early sorghums in August-September.

Other cereals, namely bulrush millet, finger millet and rice, are estimated to account for the remaining 10% of the cereal area. In Northern and Western Bahr el Ghazal, Warrap and Lakes states, sorghum is inter-cropped with bulrush millet, while finger millet and upland rice are mainly found in Greater Equatoria Region.

In recent years, the cultivation of rice in Western Equatoria State has been expanding, with rice planted as a sole crop or intercropped with maize, groundnuts, and cassava (FAO, 2020c).

#### **Non-Cereal Crops**

Groundnut is another major crop grown in the country. Groundnut, with a short growing season and the possibility of use as both staple and cash crops, are an important safety net crop for farming households in the northern states where cassava does not grow. Groundnut also provides income as a cash crop in southern cropping areas where the longer rainy season allows for two harvests per year. However, cassava is the major safety net and the preferred staple crop in the Greenbelt and the southern areas of the Ironstone Plateau.

In parts of Central and Western Equatoria, yam, coffee, mango, and papaya are commonly grown. Okra, cowpea, green gram, pumpkin, and tobacco are also widely grown around homesteads. Vegetables such as onions or tomatoes are not commonly grown in rural areas but are increasingly cultivated near cities to supply urban markets (AfDB, 2013).

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<sup>14</sup> This is a slight increase over the period 2000-2010 with an average yield of cereal production being less than 0.8 MT/ha (FAO, 2011).

## 4 Current Efforts in Seed Sector Development

In this chapter, we have synthesized the status of the South Sudan seed sector by analyzing the seed systems, key seed actors and their seed programs, and compiling data on seed production and seed imports. The findings presented in this chapter are informed by a multi-stakeholder workshop held in Juba, key informant interviews and a review of relevant study reports.

### 4.1 Seed Systems

An analysis of South Sudan seed systems was carried out in a multi-stakeholder workshop in Juba by analyzing the key domains (those directly involved in seed production or seed import), key supporting organizations, major crops, types of varieties, seed quality, and seed dissemination mechanisms (Table 1). This analysis characterized the three cluster of seed systems that co-exist; that is, the informal seed system (farm-saved seed, social seed networks, and local grain markets), intermediary seed system (community-based seed production schemes and seed relief), and the formal seed system (the public seed system and private seed companies). The important features of the major seed systems of South Sudan are further described below.

#### **Informal Seed System**

Most farmers in South Sudan acquire their seed for crop production through the informal seed system by saving seed from their own farms (farm-saved seed), through gifts or bartering from relatives and neighbors (social seed networks), and by buying from local markets (local grain markets). Women farmers have the most dominant role in household seed saving and seed supply in the social seed network (Ngalamu et al., 2021). Multi-stakeholder workshop participants in Juba estimated that the informal seed system contributed almost 80% of the overall seed used by the farmers.

#### **Intermediary Seed System**

The intermediary seed system plays an important role, as resources from the international community have been funding emergency seed provisioning, targeting chronically food-insecure farmers, internally displaced persons, and returnees.

Emergency seed aid has been provided for a long time to large numbers of food-insecure farmers, internally displaced people, and returnees. However, delays in direct seed delivery are common, delaying planting, thus affecting crop yields and contributing to reduced/lost harvests. At the same time the relevance of emergency seed aid in the context of the protracted crisis in South Sudan has long been questioned.

The majority of seed relief agencies procure seed of staple crops from Uganda and vegetable seed from Uganda, Kenya, Netherlands and Sudan. More recently there is the beginning of a shift towards working with more progressive farmers to produce seed of popular local varieties (landraces) and few improved varieties provided by the NGOs programs. These community-based seed production (CBSP) programs encourage farmers to work together in local seed production by forming co-operatives and engaging in seed marketing together. Multi-stakeholder workshop participants in Juba estimated that 15% of the seed planted by farmers is supplied through the intermediary seed system (mainly through seed relief).

#### **Formal Seed System**

The formal seed system, which produces certified seed of improved varieties, is still not well organized and remains heavily dependent on the few improved varieties available in South Sudan. These improved

varieties are Longe-5 (maize), Sesso 3 (sorghum), SECOW 2WT (cowpea), and Serenut 4 (groundnut). Lack of foundation seed is another critical challenge. The Agricultural Research Directorate of the Ministry of Agriculture and Food Security (MAFS) is involved in foundation seed production, though the volume produced does not meet the demand. There is a drive to increase seed production in South Sudan, helped by FAO's commitment to purchase increasing volumes of high-quality seed produced in South Sudan itself.

Without a commercial farming sector, the development of a formal seed system is difficult. However, in this regard there are encouraging developments in parts of South Sudan that experience relative stability such as in parts of the Equatorial Greenbelt (for example Yambio and Magwi Counties) and the rice-producing areas in the north. There is a growing space for commercial seed companies, but they are to a large degree dependent on humanitarian seed programs to secure their seed market (making it, in effect, seed relief). At the same time, seed companies lack vision about how to develop a diversified seed market that will reduce the vulnerability created by seed relief.

There is a long way to go to develop a formal seed system that is guided by a seed policy and seed regulatory framework which produces seed of improved varieties in an organized chain of institutions specialized in conservation of genetic resources, plant breeding, seed production, seed quality control, and seed marketing/distribution. There is no institutional gene bank in South Sudan. There have been initiatives and efforts related to establishing a gene bank in the past; for example, the Ministry of Agriculture, Forestry, Tourism, Animal Resources, Fisheries, Cooperatives and Rural Development in 2014, in collaboration with development partners such as the Alliance for a Green Revolution in Africa (AGRA), the Dutch Government and USAID; but the 2013/16 conflict that affected large parts of South Sudan have eroded these achievements. Multi-stakeholder workshop participants in Juba estimated that 5% of seed is supplied through the formal seed system (mostly through the seed production in the private seed companies).

Table 1. Characterization of South Sudan Seed Sector

Seed System Types	Informal Seed System		Intermediary Seed System		Formal Seed System	
	Farm-Saved Seed and Social Seed Network	Local Grain Market	Community-Based Seed Production	Seed Relief	Public/Government Seed Programs	Private Seed Companies
Domain (Seed Producers or Seed Importers)	Female and male farmers, farmer groups, refugees, returnees, IDPs, host of refugees	Grain traders, local farmers	Seed multiplication farmers groups, farmers' associations/co-operatives	UN agencies and I/NGO programs	MAFS, Agricultural Research Directorate, University of Juba, Yei Crop Training Center	Seed companies associated with the Seed Traders' Association of South Sudan
Key Supporting Organizations	None	None	FAO, AVSI, World Concern, World Vision, CARITAS Luxembourg	FAO, AVSI, WHH, Save the Children, CordAid, Care, BASENET, World Vision, Plan International, ICRC, Oxfam, Christian Aid and Global Aim	FAO, World Vision, WFP, IFDC	FAO, IFDC, WFP

Major Crops	Sorghum, maize, groundnut, sesame, beans, millet (bullrush, pearl, and finger), sweet potatoes	Maize, groundnut, beans, sorghum, cassava	Cassava, groundnut, maize, sorghum, sesames	Sorghum, groundnut, cowpea, maize, sesame, cowpea  <b>Fruits and vegetables (imported seed):</b> tomatoes, onion, eggplant, green pepper, pumpkin, cucumber, okra, etc.	Maize, sorghum, rice, pearl millet, beans, cowpea, groundnuts	Maize, sorghum, cowpea, beans, groundnut, sesame  Imported vegetable seed
Types of Varieties	Local (landraces), recycled improved	Unknown	Improved, local (landraces)	Improved, hybrid (vegetables)	Improved	Improved, hybrid (vegetables)
Seed Quality	Local seed, trusted seed	Unknown	Partial inspection	Certified, unknown, truthfully labelled (vegetables)	Certified	Certified, truthfully labelled (vegetables)
Seed Dissemination	Local exchange	Sell in local market	Seed fairs, seed sold to seed relief agencies	Mainly free seed distribution to farmers, or other mechanisms (vouchers, cash for seed)	Agro-dealers, and Government extension	Majority of seed sales to the seed relief agencies and NGOs program, remaining seed sold through agro-dealer networks
Estimated Seed Supply (%)	80%		15%		5%	

## 4.2 Key Seed Actors and Seed Programs

### 4.2.1 Ministry of Agriculture and Food Security (MAFS)

MAFS has initiated the development of a National Seed Policy based on the review of the 2011 draft seed policy. Similarly, MAFS has also started the development of new Seed Law. FAO, European Union and Japan International Cooperation Agency (JICA) are the development partners who are supporting the MAFS with this. MAFS recognizes the regional efforts by the Common Market for Eastern and Southern Africa (COMESA) on seed standards and the harmonized seed policy and regulations for the East Africa region. At the same time the seed initiative of the Eastern and Central Africa Program for Agricultural Policy Analysis (ECAPAPA) has been undertaken to address the challenge of harmonizing seed policies and regulations in the region.

Crop breeding activities are mostly limited to adaptability trials by the Agricultural Research Directorate (ARD), but with some limited partnership with University of Juba, FAO and a few NGOs such as World Vision. These research activities are mainly focused on maize, sorghum, rice, pearl millet, beans, groundnuts and sesame. Between 2011 and 2018, 31 new varieties have been released; however, many of these new varieties have remained on the shelf of research (FAO, 2019). The Directorate of Crop Production and Extension Services chairs the Variety Release Committee. The committee meets only if there is a request from the breeders. FAO and other development partners are piloting the State and County level Seed Quality Control Board in coordination with MAFS, creating a precursor for a decentralized seed quality assurance system which needs further development support and recognition by the new seed regulatory framework.

#### 4.2.2 Food and Agriculture Organization of the United Nations (FAO)

As a specialized UN agency, the FAO plays a strong role in seed security and seed sector development in South Sudan. The FAO is the main pipeline supplier of seed and other agricultural inputs. The Emergency Livelihood Response Program (ELRP) and the Food and Nutrition Security Resilience Programme of the FAO (REPRO) are the two flagship programs of the FAO. Introduced in 2014, the ELRP program focuses on responding to humanitarian needs in South Sudan, targeting severely food-insecure households through direct seed delivery, voucher systems or (more recently) cash transfers. The REPRO programs target farmers in areas with a relatively high number of households that experience food crisis or worse (IPC-3 or higher) by taking an integrated seed sector development approach.

In summary, FAO seed programs focus on five thematic areas:

- emergency response
- seed production and supply
- collaborative research with MAFS, the Consortium of International Agricultural Research Centers (CGIAR), National Agricultural Research Systems (NARS) and academia
- policy and regulatory framework
- partnership and collaboration.

Emergency response: The main approach used in the emergency seed response of FAO programs in South Sudan is the procurement and direct distribution of emergency seed kits (assorted crop/vegetable seeds and tools). 65% of the volume of seed is procured from international sources, and 35% is locally purchased seed (see section 4.3 for seed production data). In 2020, FAO modified its ELRP implementation modality from vouchers for seed (through seed fairs) to include cash for seed, delivering up to USD 2,085,000 to 67,880 households in 26 counties during the main and second planting seasons.

Seed production and supply: FAO programs support capacity strengthening and infrastructure development, and seed quality assurance services to the CBSPs. Good practices include foundation seed production in partnership with the PRO Seed company, establishment of seed quality control board at County level, and capacity building of MAFS extension staff.

Collaborative research: FAO programs are partnering with MAFS, University of Juba, Catholic University on adaptive and on-farm trials. There is also collaboration with CGIAR institutions (i.e., the International Institute of Tropical Agriculture (IITA), the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the International Maize and Wheat Improvement Centre (CIMMYT), the International Potato Institute (CIP), and Africa Rice), by which each CGIAR center provides 15 advanced lines for their mandated crops for on-farm trials in South Sudan.

The policy and regulatory framework: includes support to MAFS in the development of the new seed policy and seed regulatory framework.

Partnerships and collaborations: these include capacity-building support to FAO program implementing partners (such as local NGOs, community-based organizations, the Yei Crop Training Center (CTC) and the University of Juba); creating linkages between CBSP and private seed companies; and improved collaboration with various development partners.

In addition to the above, FAO conducts rapid seed security resilience assessments each year to determine seed supply, access, availability, purity, and demand dynamics.

### **4.2.3 World Food Program of the United Nations (WFP)**

WFP in South Sudan focuses on three specific activities that support seed sector development. First, a seed systems assessment activity in the Northern Bahr el Gezähl State and Western Bahr el Gezähl State, in collaboration with the Agricultural Research Directorate (MAFS) and the PRO Seed company. Second, supporting a primary focus on seed in Agriculture Producer Groups. This involves 1,533 smallholder farmers (60% female) organized into 67 producer groups, with four ox-ploughs and two donkey ploughs per group supporting seed production (mainly sorghum and ground nuts). Thirdly, the construction of a seed bank in Aweil North of Northern Bahr el Gezähl State. The seed bank will provide services as a one-stop center for buying and selling locally produced seeds, and support the conservation of local varieties.

### **4.2.4 International and Local Development Organizations**

#### **Alliance for a Green Revolution in Africa (AGRA)**

AGRA has been a key actor in promoting seed production and supply, opening its office in 2011 to support emerging private seed companies as well as crop breeding activities. AGRA's program 'Seed Sector Development for South Sudan (SSD4SS)' came to an end by 2019 with the Dutch Government embarking on a new set of programs promoting private sector involvement, in particular through FAO's FNS-REPRO program and the Accelerating Agriculture and Agribusiness in South Sudan for Enhanced Economic Development (A3-SEED) project of the International Fertilizer Development Center (IFDC).

#### **Association of Volunteers in International Service (AVSI)**

AVSI has established 13 seed multiplication groups in Torit and Ikwoto Counties of eastern Equatoria state. The crops under seed production include sorghum, maize, groundnuts, potato, and millet. Varieties are both local and improved. AVSI programs also include seed importing and conducting adaptation trials of imported varieties. AVSI's main support to the CBSP groups is training on quality seed production, awareness creation on improved varieties, and a seed germination testing service prior to distribution.

#### **International Fertilizer Development Center (IFDC)**

The Accelerating Agriculture and Agribusiness in South Sudan for Enhanced Economic Development Project (A3-SEED) is a five-year (2021-2025) project led by IFDC and funded by the Embassy of the Kingdom of the Netherlands in Juba. A3-SEED objectives are to ensure the availability of quality seed to the last mile, through agri-entrepreneurship and support to existing private seed companies to improve quality seed, input marketing, distribution, and production practices. Key seed-related activities include investment in commercial seed production through capacity building of private seed companies on pre- and post-harvest management, seed quality assurance, good agriculture practices, and promotion of quality seed uptake through small packs, radio jingles and field demos. The seed extension services are being done through village-based agents. It is further supporting seed processing, packaging and seed marketing through agro-dealers shops. A3-SEED is focusing its seed activities on Rumbek, Bor, Juba, Yambio, and Torit Counties, involving maize, sorghum, beans, groundnut, cowpea and rice.

#### **World Concern**

World Concern is another partner of the REPRO program. It works with 1,900 farmers in seed production through eight cooperatives in Jur River County of Western Bahr el Gezähl State in several localities (Bar-urud, Dhikou, Kangi, Majai, Majak Alel, Maluil, and Marial Ajith). World Concern supports farmers in producing quality seed of sorghum, maize, groundnut, sesame, cowpea, and green pea. This includes capacity building for farmers in the following: quality seed production; post-harvest seed handling; seed quality control; seeds marketing; nutrition training (identification and promotion of nutrition-dense crops, and cooking sessions); radio talk shows (in English and Arabic, covering topics such as seed production, seeds marketing and crop diversification); and farmer co-operative

development. Seed quality control includes joint supervision and monitoring by the newly formed State Seed Quality Control Board of MAFS.

#### **4.2.5 Research and Knowledge Institutes**

##### **University of Juba**

The Department of Agricultural Sciences of University Juba has been involved in breeding and adaptability trials in partnership with the Agricultural Research Directorate of MAFS and a project, 'Building Back Better', funded through a Seed Systems Working Group. The Department is involved in bulking of breeder seed, new variety maintenance and evaluation. The University of Juba is also partnering with WCDI in conducting seed systems resilience assessments and capacity-building training courses in South Sudan.

##### **Consultative Group for International Agricultural Research (CGIAR)**

CGIAR contributions to South Sudan's seed sector development are not as strong compared to other East African countries. However, there are some past/on-going initiatives where CGIAR institutions are partnering on crop improvement and seed-related projects.

For example, IITA is engaged in both cowpea and maize improvement programs; ICRISAT is supporting the Agriculture Research Directorate in a sorghum improvement program; CIMMYT is more active in hybrid maize promotion programs; and the International Center for Agricultural Research in the Dry Areas (ICARDA) is involved in a crop salinity study.

The Alliance of Bioversity International and the International Centre for Tropical Agriculture (ABC) are involved in Dutch Government-funded NUFFIC<sup>15</sup> projects working together with WCDI. Together they are building the capacity of the University of Juba to deliver a training course on climate change, seed systems and community seed banks. They also support (in alignment with FAO's REPRO program) several pilots, in particular in community seed banks, local seed business development, and participatory crop improvement.

##### **Wageningen Centre for Development Innovation (WCDI)**

WCDI is facilitating the learning and capacity-building agenda component of the FAO REPRO program. In doing so WCDI works with and strengthens the capacity of University of Juba and other key stakeholders in building seed systems resilience through training, knowledge sharing, exposure visits, action research, and facilitating multi-stakeholder dialogues. An important activity is the initiation of the South Sudan Seed Hub as an independent body to facilitate exchange, to document good practice, and to develop policy briefs as an outcome of multi stakeholder dialogues. WCDI is further coordinating the NUFFIC-funded capacity-building training courses on the seed and horticulture sector. As an integral part of the NUFFIC program a range of innovation pilots are being implemented such as community seed banks (focusing on conservation of landraces at risk of loss), local seed business development, and participatory crop improvement.

##### **East West Seed Knowledge Foundation (EWSKF)**

EWSKF works in partnership with Wageningen Plant Research on training in-country teams to deliver practical courses on income generation and on making horticulture work for healthier diets. EWSKF has entered into an agreement with the University of Juba to establish practical training grounds at selected universities (John Garang in Bor, Bahr el Gezabl) and the Yei CTC.

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<sup>15</sup> NUFFIC is the Dutch Organization for Internationalisation in Education



#### 4.2.6 Private Seed Companies

Currently 12 seed companies are involved in seed production and seed marketing in South Sudan: PRO Seed, Seed Grow, Afrogenics, Magwi Seed Company, Green Horizon Seed, Smart Seed, Gumbo Glow Seed, Tefco Seed, Smart Farmer, Nalweyo Seed Company, Nile Basin Seeds, and Aryan Seed.

The seed companies' production and sales areas are mostly concentrated in Magwi, Torit, Juba, Yei, Terekeka, Bor South, Maridi, Yambio, Nzara and Jur River. Most of the seed companies are active partners and seed suppliers to the FAO, WFP, and various programs of the I/NGOs. Seed companies source foundation seed from the ARD. PRO Seed is only the private seed company involved in foundation seed class-2 (FS-2) production (by first importing foundation seed from Uganda for maize, sorghum and cowpea crops). Essentially, the several seed companies mentioned that they have capacities in good technical quality seed production. Seed production is mostly done through outgrower schemes by contracting progressive farmers and participating in NGO-supported CBSPs. Seed quality control is done through their own trained staff (internal seed quality control).

### 4.3 Seed Production and Seed Imports

#### Use of Improved Varieties

A total of 22 food crops with over 68 improved varieties are currently used by farmers in South Sudan (Table 2). Most of the improved varieties distributed to the farmers by the seed relief programs are either imported from abroad or locally produced in South Sudan.

Table 2. List of Improved Varieties Used in South Sudan.

SN	Crop	Variety
1.	Maize	NADR1, ZM521, Palotaka 1H, Palotaka 2H, Primec, MH14, Greengold, Maxim, <b>Longe-5</b> , Longe 10 (Hybrid), Mukama
2.	Sorghum	Macia, Sesso 2, <b>Sesso 3</b> , Serena, Kari-Mtama 1, <b>Wad Ahmed</b>
3.	Rice	NERICA 1, NERICA 4, NERICA 10, DAK P27, NERICA L-1, <b>Namche 5</b>
4.	Cowpea	AGRAC-116, AGRAC-216, AGRAC-316, <b>SECOW 2WT</b>
5.	Beans	JUBE 1, JUBE 2, JUBE 3, Roso Coco, Nabe-4, <b>Nabe-17</b> , K132, K20
6.	Groundnut	YEPA 1, YEPA 2, YEPA 3, Serenut 2, <b>Serenut 4</b> , <b>Red Beauty</b>
7.	Sesame	<b>Sesame 2</b>
8.	Soybean	Namsoya 2
9.	Sweet potato	<b>Orange flesh</b>
	<b>Vegetables and others</b>	
10.	Eggplant	Black Beauty
11.	Tomatoes	Money Maker, Roma
12.	Cabbage	Copenhagen, Drumhead
13.	Onion	Red Creole
14.	Carrot	Nantes
15.	Amaranth	White Emla
16.	Collards	Georgia
17.	Okra	Pusa Sawani, Spineless
18.	Watermelon	Crimson Sweet, Sugar Baby
19.	Green pepper	California Wonder
20.	Jute mellow	Kudra (Egyptian Baladi), Kudra (Junbeea), Kudra (Saaedi)
21.	Eurca sativa	Girgir
22.	Portulca	Regila

Note: the varieties in bold indicate those most widely used in local seed production or seed importation.

## **Seed Procurement by the FAO**

The FAO is the main actor in seed procurement. It procures seed internationally as well as locally in South Sudan. In 2021 it procured a total of 9,325 metric tons (MT) of field crop seed (sorghum, maize, rice, cowpea, groundnut, sesame; 62% volume of seed from Uganda and the remainder procured locally in South Sudan) and 76.7 MT of vegetable seed (99% volume of seed from Uganda, Kenya, Netherlands and Sudan). This also included local procurement of foundation seed class-2 (FS-2) of cowpea (SECOW 2WT) and sorghum (Sesso 3) from South Sudan. Similarly in 2022, the FAO procured a total of 5,903 MT of seed of staple crops (69% volume of seed from Uganda and the remainder locally) and a total of 15.3 MT of vegetable seed internationally (Uganda, Kenya, Netherlands, Sudan). In terms of seed procurement, FAO confirms that procured seed of different varieties are aligned with an approved list provided by the MAFS. Seed samples are analyzed by an independent third party (the FAO contracted Baltic/Intertek), and the quality tested by a laboratory accredited to the International Seed Testing Association (ISTA). Duplicate samples are shared with FAO/MAFS for in-house seed quality analysis at MAFS laboratory to determine clearance for distribution in anticipation of ISTA-accredited seed testing results.

## **Seed Production by Private Seed Companies**

Seed companies are producing quality seed of improved varieties of maize, sorghum, groundnuts, cowpea and common beans. Over the last decade or so private seed companies have progressively increased production (from about 65 MT in 2011 to 1,760 MT in 2018), with 90% of production fields under out-grower schemes. A total of 63% of the seeds produced locally went to humanitarian organizations, about 23% was channeled through agro-input dealers, and around 9% remained as carryover (unsold) into the next season (FAO, 2019).

In this study, seed companies reported a total of 2580 MT of quality seed production in 2021. A total of 25% of this seed was sold to the NGO programs; 1% through agro-dealers; and 0.5% directly to farmers. The remaining 73% seed was sold as grain. Seed companies mentioned that they had produced this seed in the anticipation of the previous year's seed market figures. The in-country seed tendering procedures disadvantaged local private seed companies because their seed prices were found to be more expensive compared to seed imported from neighboring countries. The local private seed companies stated that this difference in price was because seed production in South Sudan is more expensive than in neighboring countries (mainly due to high dependence on manual labor which is expensive in South Sudan); however, they were convinced that the locally produced seed was of higher quality and better suited to the agro-ecological conditions.

In 2021 Green Horizon Seed Company produced hybrid maize seed (65 MT of Longe 10H). In the same year, PRO Seed imported 309.5 kg of maize (Longe 5), sorghum (Sesso 3) and cowpea (SECOW 5WD) foundation seed from the National Crops Resources Research Institute of Uganda. They multiplied this foundation seed to produce foundation seed class-2 (FS-2) for sale to the FAO and other seed companies in South Sudan.

## **Seed Production by NGO Program**

In 2021, World Concern-supported farmer cooperatives produced a total of 760 MT of seed (groundnut 567.2 MT, sorghum 118.3 MT, peanut 55.4 MT, sesame 11.7 MT, cowpea 3.6 MT, sesame 11.7 MT, green pea 2.1 MT, beans 0.9 MT, and maize 0.2 MT). These farmer cooperatives involved 1,900 farmers in Jur River County of Western Bahr el Gezabl State in several localities (Bar-urud, Dhikou, Kangi, Majai, Majak Alel, Maluil, and Marial Ajith). In the 2022 main season a total of eight farmer cooperatives supported by World Concern produced a total of 824 MT of quality seed of beans, groundnut, bambara nut, sesame, sorghum and maize crops in Western Bahr el Ghazal and Northern Bahr el Ghazal. Seed was disseminated through seed fairs.

## 5 Stakeholder Perspectives on Seed Sector Development

This chapter presents the key findings on multi-stakeholders' perspectives in the development of the South Sudan seed sector. To capture the in-depth insights of key stakeholders, we have organized the study according to the three different administrative levels of South Sudan, reflecting the scope of their respective seed sector development and analyzing the complexities in their seed sectors at various levels. These three levels are: national level (South Sudan); state level (Eastern Equatoria State, which was well known for its robust seed sector in the past, with operational private seed companies and NGO programs); and County and Payam level (selecting Torit County in Eastern Equatoria State, as Torit County represents the context of urban dynamics as well as conflict-prone rural areas where a number of seed programs are under operation).

At each level, the study focused on the same sets of guiding questions on key strengths, challenges and opportunities in the seed sector, including the formal, intermediary and informal seed systems. We have summarized the stakeholder perspectives on *strengths and challenges* in this chapter. The stakeholder perspectives on *opportunities for development* are merged in chapter 6 of this report. At the end, we have provided *emerging good practices and lessons learned* from the multi-stakeholders' dialogue.

### 5.1 Stakeholder Perspectives at National Level

#### 5.1.1 Government and Public Institutions

A one-day workshop was organized in Juba in which officials and seed experts from the Ministry of Agriculture and Food Security (MAFS), the Directorate of Agricultural Research, the Ministry of Standards, and the University of Juba participated. They visioned that South Sudan's seed sector is critically important to improving food and nutrition security (FNS) for the South Sudanese peoples. They highlighted that a functional seed sector enhances agricultural production and improved food security; they also mentioned that a functional seed sector builds food systems resilience and that a strong seed sector contributes to accelerated crop improvement and increasing the nutritional value of crops. Table 3 provides the key strengths and challenges of South Sudan seed sector development as a summary of the Juba workshop.

Table 3. Government and Public Institutions' Perspectives on Key Strengths and Challenges of the South Sudan Seed Sector

<b>Key Strengths</b>
<ul style="list-style-type: none"> <li>• The strong will and interest in developing the seed sector by the international community, and some good seed companies.</li> </ul>
<ul style="list-style-type: none"> <li>• The availability of a good number of South Sudanese seed experts and plant breeders.</li> </ul>
<ul style="list-style-type: none"> <li>• A review of the draft seed policy (2011) has been initiated by the MAFS with technical support from FAO.</li> </ul>
<ul style="list-style-type: none"> <li>• Seed relief programs are well resourced; if designed properly, seed relief agencies can contribute significantly to the development of a resilient seed sector in South Sudan.</li> </ul>
<ul style="list-style-type: none"> <li>• A positive trend in local seed sourcing by seed relief programs.</li> </ul>
<ul style="list-style-type: none"> <li>• The availability of local crop diversity adaptive to local climatic conditions in farmers' fields.</li> </ul>

<ul style="list-style-type: none"> <li>• Community based seed production programs are increasing in number.</li> <li>• The informal seed system is providing the bulk of seed needed by the farmers.</li> </ul>
<b>Key Challenges</b>
<ul style="list-style-type: none"> <li>• The lack of a national seed policy or seed regulatory framework; this is hampering the development of the seed sector.</li> <li>• The government's inadequate funding for the Agricultural Research Directorate and the University of Juba is hampering local crop breeding and variety research programs.</li> <li>• There are very few improved varieties available for commercial seed production.</li> <li>• The lack of functional seed laboratories, and very few technical staff to provide services on seed quality assurance.</li> <li>• Very limited volume of foundation seed available within the country.</li> <li>• Lack of a national gene bank for conservation of genetic resources.</li> <li>• Lack of coordination amongst key stakeholders, and poor consultation and collaboration with national seed experts.</li> <li>• Seed relief is distributed late, and often lacks good quality seed, with poor germination rates compared with locally produced seed.</li> <li>• The seed market is dominated by NGOs.</li> </ul>

### 5.1.2 Private Seed Companies

A one-day workshop was organized in Juba that brought together members (private seed companies) of the Seed Traders Association of South Sudan (STASS). Additional information was gathered through a survey questionnaire sent to selected private seed companies. Members of the STASS see the private seed companies as critically important for improving food and nutrition security for South Sudan's people. They mention that private seed companies can provide a reliable source of high-quality seed to increase household food production and consumption, develop value chains creating employment opportunities, and scale up seed production to increase agricultural production. Private seed companies also see the need to produce quality seed of varieties in demand by farmers and making the seed business demand-driven. Table 4 provides a summary of private seed companies' views on the key strengths and challenges of South Sudan seed sector development.

Table 4. Private Seed Companies' Perspectives on Key Strengths and Challenges of the South Sudan Seed Sector

<b>Key Strengths</b>
<ul style="list-style-type: none"> <li>• Increasing opportunities as humanitarian organizations are increasingly investing money in private seed sector development.</li> <li>• Technical expertise required for quality seed production can be accessed through scientists and professional crop breeders within South Sudan.</li> <li>• Demand for high quality seed is increasing and markets are developing.</li> <li>• Farmers are getting more experienced and interested in becoming outgrowers.</li> </ul>
<b>Key Challenges</b>
<ul style="list-style-type: none"> <li>• Lack of clear Government policies and inadequate research in support of seed sector development.</li> <li>• Political instability and prevailing insecurity in large parts of the country.</li> <li>• Poor roads and infrastructure, resulting in high transportation cost and poor market accessibility/development.</li> <li>• Serious competition by imported seeds that are at lower cost (but often of lower quality compared to locally produced seeds).</li> <li>• Free seed distribution by the humanitarian sector undermines market-based approaches to seed production and marketing.</li> </ul>

### 5.1.3 UN Agencies, Humanitarian and Development Organizations

Program managers and seed experts of UN agencies and various I/NGOs intervening in South Sudan’s seed sector were consulted in workshops or by conducting individual interviews. These organizations included FAO, WFP, AVCI, IFDC, Mercy Corps, World Vision, World Concern, Global Aim, CordAid, CARITAS Luxembourg and others. Table 5 provides the UN agencies’ and humanitarian and development organizations’ perspectives on South Sudan seed sector development.

Table 5. UN Agencies’ and Humanitarian and Development Organizations’ Perspectives on the Key Strengths and Challenges of South Sudan Seed Sector Development.

<b>Key Strengths</b>
<ul style="list-style-type: none"> <li>The availability of development programs supporting various areas of seed sector development. For example, supporting the Government on new seed policy development; strengthening the seed quality assurance system; capacity building of community-based seed production schemes; local private seed company development; promotion of good agriculture practices and seed marketing through agro-input dealer networks or seed fairs; voucher system.</li> </ul>
<ul style="list-style-type: none"> <li>Seed relief programs provide the second largest portion of seed (after the informal seed system), reaching the majority of farmers. Seed relief includes not only food security crops but also fruit and vegetable crops for increased healthier diets and nutrition.</li> </ul>
<ul style="list-style-type: none"> <li>The positive trend of purchasing locally produced seed as part of seed relief programs.</li> </ul>
<ul style="list-style-type: none"> <li>The initiation of partnership with CGIAR centers to access the best-bet lines and testing in South Sudan in partnership with crop breeders of MAFS and the University of Juba.</li> </ul>
<ul style="list-style-type: none"> <li>The initiation of local foundation seed production in partnership with seed companies.</li> </ul>
<b>Key Challenges</b>
<ul style="list-style-type: none"> <li>The lack of a seed policy and regulatory framework, thus hindering the development of the seed sector. The absence of a well-organized institution that is responsible for seed sector coordination.</li> </ul>
<ul style="list-style-type: none"> <li>The formal seed system is less effective and seed relief is mainly dependent on imported seed, with less than 12 companies operating at low level and concentrating mainly in the Equatoria region.</li> </ul>
<ul style="list-style-type: none"> <li>There is limited crop breeding research to develop new improved materials that are adapted to diverse agro-ecologies. About 33 new varieties have been released but most remain on the shelf of research.</li> </ul>
<ul style="list-style-type: none"> <li>The limited seed distribution network within the private sector. Most agro-input dealers are based in Juba and very few (1-3) are in major towns such as Yambio and Torit.</li> </ul>
<ul style="list-style-type: none"> <li>The low level of production of “quality seed” (&lt;3000 MT per annum) and limited crop and varietal portfolios with private seed companies.</li> </ul>
<ul style="list-style-type: none"> <li>Poor infrastructure limiting seed distribution. Limited technical knowledge on post-harvest handling. Scattered seed production fields are a major challenge in seed multiplication, making field inspection expensive and time-consuming.</li> </ul>
<ul style="list-style-type: none"> <li>Limited or even lack of access to financing. Limiting opportunities for capitalizing seed companies to establish processing and packaging facilities.</li> </ul>
<ul style="list-style-type: none"> <li>Untargeted free distribution of seed as inputs. There is still ongoing free distribution of seeds in various areas in the country. Most seeds are imported from outside despite some farmers having the potential to produce quality seed locally.</li> </ul>

## 5.2 Stakeholder Perspectives at Eastern Equatoria State Level

The information in this section is based on a state level multi-stakeholder workshop in Torit, with the attendance of participants representing the Government, private seed companies, leading UN agencies, and NGOs implementing community-based programs including seed interventions. The important vision agreed by workshop participants was that financially well-resourced seed relief could play a key role in seed sector transformation. The key strengths and challenges as a summary of the State level workshop is in Table 6.

Table 6. Eastern Equatoria Multi-Stakeholders' Perspectives on Key Strengths and Challenges in Seed Sector Development.

<b>Key Strengths</b>
<ul style="list-style-type: none"> <li>Seed relief programs are well resourced; if designed properly, seed relief agencies could contribute significantly to the development of a resilient seed sector in eastern Equatoria and South Sudan.</li> </ul>
<ul style="list-style-type: none"> <li>Private seed companies have a strong interest in producing quality seeds in Eastern Equatoria, especially Magwi because of its fertile soils and proximity to Juba.</li> </ul>
<ul style="list-style-type: none"> <li>Community-based seed production programs are increasing in their numbers due to the support from FAO and NGOs.</li> </ul>
<ul style="list-style-type: none"> <li>Farmers in their localities are starting to benefit from the multiplication of locally preferred improved varieties.</li> </ul>
<ul style="list-style-type: none"> <li>There is a positive trend of uptake of quality seed production practices by farmers involved in seed programs.</li> </ul>
<ul style="list-style-type: none"> <li>There is uptake of modern technologies such as ox-ploughing and using improved tools.</li> </ul>
<ul style="list-style-type: none"> <li>In the absence of a strong formal seed system, the informal seed system is playing a dominant role in seed supply to the majority of farmers. This seed system is also contributing to social cohesion due to seed sharing and exchange practices between local farmers (men and women), refugees, IDPs, and hosts of refugees.</li> </ul>
<b>Key Challenges</b>
<ul style="list-style-type: none"> <li>The formal seed system is weak, with low quantities of quality seed produced. Due to insecurity in large parts of Eastern Equatoria, development prospects for formal seed system are further limited.</li> </ul>
<ul style="list-style-type: none"> <li>Agriculture Research Centers are not operational.</li> </ul>
<ul style="list-style-type: none"> <li>The private seed companies that exist are weak and depend on 'humanitarian seed relief' for access to the foundation seed, finance and seed marketing.</li> </ul>
<ul style="list-style-type: none"> <li>Though CBSPs numbers are increasing, they lack timely access to starter or foundation seed; have limited choice on improved varieties for seed production; have very limited seed quality control services; and have very limited seed processing facilities and lack of seed marketing skills. Due to the lack of storage facilities, CBSP members often store seeds near their fields (resulting in deterioration of seed quality), which is often a far distance from roads and any market infrastructure.</li> </ul>
<ul style="list-style-type: none"> <li>Substantial seed relief is provided through FAO and NGOs; however a clear seed relief policy does not exist.</li> </ul>
<ul style="list-style-type: none"> <li>Seed relief is typically given late. Seed relief provided to farmers is planted once and consumed, with no seeds maintained. Seeds provided through seed relief are not trusted by farmers (as compared to their 'community seeds').</li> </ul>

### 5.3 Stakeholder Perspectives at County and Payam Level

This section's findings are based on the REPRO South Sudan study on seed systems resilience assessment in Torit County (Ngalamu et al. 2021) and supplementary information collected during the present study. The seed sector stakeholders including farmers and their communities visioned that despite the co-existence of different seed systems, the informal seed system is the dominant source of seed of major food security crops in Torit. Local farmers, IDPs, returnees, refugees, host of refugees, and grain traders operating in the local market are key seed sector stakeholders. Among them female farmers, local grain markets and the AVSI program play the most important role in the access and supply of seed in Torit County. The key strengths and challenges of seed sector development in Torit County level are presented in Table 7.

Table 7. Torit County Stakeholder Perspectives on Key Strengths And Challenges in Seed Sector Development.

<b>Key Strengths</b>
<ul style="list-style-type: none"> <li>• Farmers and their communities use multiple seed systems to source their seed needs. Farm-saved seed, the social seed network and local grain markets are the major sources of seed to the farmers, accounting for over 68% of the seed supply. Seed relief programs provide another 17% of seed supply. The private seed companies provide 8% of seed supply and only 2% seed is supplied through the public research and extension system.</li> </ul>
<ul style="list-style-type: none"> <li>• Female farmers were found to play a dominant role in the seed access and supply system in social seed network. Out of the 752 farmers involved in the social seed network, 71% were female.</li> </ul>
<ul style="list-style-type: none"> <li>• Farmers perceived that local varieties are often more drought and pest resilient (compared to the varieties distributed through seed relief).</li> </ul>
<ul style="list-style-type: none"> <li>• Refugees, IDPs and returnees have an important role in the access and exchange of seeds and actively share seed with local farmers in Torit County. Most seed received by refugees (100 %), IDPs (91 %) and returnees (92 %) are on a free basis.</li> </ul>
<ul style="list-style-type: none"> <li>• Torit market and Omoliha market are the two local grain markets which have the highest number of direct connections with farmers and their communities in Torit County. The Torit and Omoliha markets are both sources of seeds and recipients of seeds because farmers actively trade the grain and use it as seed for their crop production.</li> </ul>
<b>Key Challenges</b>
<ul style="list-style-type: none"> <li>• Increased spells of droughts, flood, delayed rain, and disease-pest incidences impact crop production and the livelihoods of farmer communities.</li> </ul>
<ul style="list-style-type: none"> <li>• The loss of local varieties of crops, limited choice of improved varieties, lack of recognition and promotion of local varieties seed production in formal seed production programs.</li> </ul>
<ul style="list-style-type: none"> <li>• The lack of quality seed availability of several farmer-preferred and climate-resilient crops.</li> </ul>
<ul style="list-style-type: none"> <li>• The lack of recognition of women farmers' roles in crop diversity maintenance and local seed supply in Government, NGO and private seed sector programs.</li> </ul>
<ul style="list-style-type: none"> <li>• CBSP groups use certified seed as starter seed (if they are involved in seed production of improved varieties seed). The quality is not superior; post-harvesting and storability is an issue due to the volume produced and processed.</li> </ul>
<ul style="list-style-type: none"> <li>• Field seed inspections and seed certifications are not regularly followed in seed production programs.</li> </ul>
<ul style="list-style-type: none"> <li>• Seed processing under CBSP is expensive and cumbersome, while seed relief agencies face ill-timed delivery of seeds to partners and beneficiaries.</li> </ul>
<ul style="list-style-type: none"> <li>• The limited training to the CBSP groups on quality seed production and seed storage practices.</li> </ul>
<ul style="list-style-type: none"> <li>• The very limited field demonstration trials on good agricultural practices; the lack of machineries for post-harvest processing; the lack of knowledge to operate and maintain machines; some processing chemicals are absent; the poor or non-existent seed storage systems; and the lack of knowledge on safety measures on operation of machinery and use of chemicals.</li> </ul>

Sources: Ngalamu et. al 2021; additional information gathered during this study

## 5.4 Emerging Lessons to Promote Seed Sector Development

### Seed Relief and Transformation of the Seed Sector

Multi-stakeholders' dialogues in Juba and Eastern Equatoria state have both highlighted that seed relief programs in South Sudan are well-resourced at present, and if designed well can play a critical and catalytic role in transforming both the intermediary as well as the overall seed sector in South Sudan. Seed policy and governance are foundational for seed relief to contribute to the transformation of South Sudan's seed sector. This requires proper attention to the role of seed relief and this being

reflected in South Sudan's seed policy and seed regulatory framework, in particular specifying that the role of seed relief (receiving substantial financial support) must become instrumental in seed sector transformation.

### **Create Positive Synergies Between Humanitarian and Development Seed Programming**

The collaboration between FAO's implemented Sustainable Agriculture for Economic Resiliency (SAFER) and WFP's Smallholder Agriculture Market Support (SAMS) in Yambio provides a good example of a coordinated approach to co-location promoted through South Sudan's Partnership for Recovery and Resilience (PfRR). FAO's SAFER program developed some positive synergies between humanitarian and development/ resilience programming, for example by encouraging SAFER-supported enterprise groups to supply seed fairs, some of which were ELRP-funded, and linking surplus-producing enterprise groups with WFP's SAMS project.

Resilience building is enhanced in situations where an NGO is implementing both emergency and resilience programs. In practice, however, humanitarian and development seed programming are usually implemented by different partners. For example, in Torit, AVSI is implementing a cross-border resilience program (funded by the EU) in which seed is an important component, while FAO has contracted a separate partner for implementing its ELRP. In practice this means that implementing partners do not co-ordinate well at aligning project activities to create positive synergies.

### **NGOs in Seed Sector Development**

The absence of a seed regulatory framework and relevant fora to operationalize such a framework means that, in practice, NGO's seed work is well-intentioned (as one may expect) but not well coordinated across NGOs, or aligned to contribute to strategic objectives such as development of the local or national seed sector. There is a need for an overall vision for seed sector development and governance thereof, including the development of sets of principles in the approaches guiding local seed actors. This should include training and resource packages to guarantee minimum standards in seed provisioning.

### **Link and Coordinate with Knowledgeable Seed System Actors**

For those agencies that work at scale work or in 'isolation' in remote areas, and not necessarily having the right expertise and skills in seed programming, it makes sense to link and co-ordinate with knowledgeable seed actors.

For example, the WFP in South Sudan is recently becoming more involved in seed systems work, in particular the distribution of seed and planting materials and in setting up demonstration plots. The WFP works with the FAO in adopting a voucher scheme with input dealers (including seeds) and with private sector partners in seed multiplication by linking WFP-supported farmers and groups/cooperatives with seed companies. Regarding its technical seed work the WFP links-in and co-ordinates with the Ministry of Agriculture, FAO, the EU and JICA, IFDC and the Seed Traders Association of South Sudan (STASS).

### **Engage Research Organizations**

Though international and regional research organizations do not have a permanent presence nor offices in South Sudan, they can make available important knowledge on technical issues and approaches. To make use of these in support of South Sudan's seed sector, development engagement should be sought by the FAO, UN agencies, NGOs, and the Government of South Sudan. NGOs in particular can play an important role here because of their flexibility and their understanding of local contexts within which they have worked for a long time.

For example, World Vision is one of the few INGOs with a dedicated program on seed development. World Vision partners with Government, research institutions and farming communities, and relevant stakeholders operating in the region (CGIAR, especially with ICRISAT, CIMMYT and ICARDA). World Vision is also working with ICRISAT and the MAFS to develop a seed system for sorghum using a farmer-driven adaptive trials approach. Sorghum adaptive trials of 49 local and international



varieties, prepared by ICRISAT Kenya, have been planted at three sites in Rajaf, Warrap and Upper Nile areas. World Vision is also working with the Government of South Sudan in conducting trials of biofortified varieties of orange sweet potato and millet.

### **Apply Evidence-Based Programming for Building Resilient Seed Systems**

Effective and efficient emergency seed provisioning, as well as building more resilient seed systems start with an understanding on how local seed systems function and therefore should be based on proper assessments and analysis. Stakeholders expressed their view that the informal seed system has been remarkably resilient over space and time in the face of South Sudan's protracted crises and recurrent conflicts. It is therefore important to take local context into account when building seed systems resilience (this fits well with the commitment towards the Grand Bargain's commitment on localization<sup>16</sup>) and to link practice with policy.

For example, FAO's REPRO program aims to take an evidence-based adaptive programming approach to building seed systems resilience, grounded on local realities. REPRO therefore has a field level component (working with seed sector stakeholders in, for example, undertaking seed systems resilience assessment and pathway development, and local seed multiplication) and a policy component (discussing field level practice with GoSS, FAO and other actors to support building a more resilient seed sector in South Sudan).

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<sup>16</sup> <https://glocalisation.ifrc.org/>

## 6 Conclusions and Recommendations: Pathways for Building Resilience in South Sudan Seed Sector

Lessons learned from past and ongoing seed sector interventions, and the visions and perspectives expressed during the interviews and multi-stakeholder dialogues in Juba, Torit (Eastern Equatoria) and Wau (Western Bahr el Ghazal) underscored that seed relief programs in South Sudan are relatively well-resourced, and if designed well can play an instrumental and catalytic role in building the resilience of the overall seed sector in South Sudan. There is an urgent need to transform the predominant humanitarian seed provisioning approach, which has been prevailing for decades in South Sudan, into building a robust and resilient seed sector, including a vibrant local seed business. There is also an urgent need to ensure that seed systems development is relevant to the current context of smallholder farmers across South Sudan, and at the same time envisions a seed sector fitting a more stable and peaceful South Sudan in, hopefully, the near future.

To realize this ambition a total of ten pathways were synthesized. These pathways provide a road map and concrete actions required for the transformation of South Sudan's seed sector to better serve the needs of smallholder farmers across South Sudan. A full description of the pathways (presenting the challenges, ambitions, strategic actions and key stakeholders involved) can be found in Annex 4.

### **Pathway 1: Development of a National Seed Policy and Seed Regulatory Framework**

The ambition is to develop a national seed policy and seed regulatory framework, based on current realities across South Sudan and harmonized with international agreements.

Key Strategic Actions:

- Through a multi-stakeholder dialogue process, verify (and where necessary improve) the 2011 Seed Policy document for official endorsement.
- Develop a seed law, regulations, and guidelines to implement the seed policy.
- Develop guidelines and principled approaches on key issues to inform seed sector interventions (in anticipation of seed policy and law).
- Establish appropriate regulatory bodies: a National Seed Council, a National Seed Authority, a National Seed Variety Release Committee, and a Seed Quality Control Board.

Stakeholders:

- MAFS and its development partners, Ministry of Trade, Ministry of Investment, Chamber of Commerce, FAO, development and humanitarian agencies, the private seed sector, and farmer organizations.

### **Pathway 2: Strengthening Seed Sector Coordination, Digital Inclusion and Partnerships**

The ambition is to improve coordination across the three main seed systems, from local to regional and national level, through a functional South Sudan Seed Hub<sup>17</sup>, and to facilitate easy access to seed related information through a South Sudan Seed Portal.

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<sup>17</sup> <https://cgspace.cgiar.org/handle/10568/111026>

Key Strategic Actions:

- Establish a South Sudan Seed Hub, operating at central and state levels, facilitating coordination and knowledge sharing, and fostering seed partnerships.
- Develop the South Sudan Seed Portal as a digital platform/or gateway to share seed related policies, seed regulatory provisions and requirements, and information on on-going seed programs, seed companies etc.
- Promote regional partnerships with surrounding countries (Kenya, Uganda, Ethiopia, and Sudan in particular) for dialogue and exchange, exposure to good practice, and development/ strengthening of cross-border seed work.

Stakeholders:

- South Sudan Government, development and humanitarian organizations, FAO, University of Juba, CGIAR centers and regional and international universities, and other stakeholders.

### **Pathway 3: Supporting the Transition from Seed Relief to Seed Sector Development**

The ambition is to transition from seed importation / free seed distribution approaches, to long-term investment in the development of a robust and resilient seed sector in South Sudan.

Key Strategic Actions:

- Develop appropriate policy guidelines that limit seed importation and encourage local seed production.
- Seed relief programs to invest in the development of professional local capacity along the seed value chain.
- Seed relief programs must support the strengthening of farmer-saved seed systems, especially building the capacity of women in production and management of quality seed.
- Seed relief program support to the Government in the development of the seed policy and seed regulatory framework.

Stakeholders:

- MAFS/ Agriculture Research Directorate (ARD), academia, development partners and humanitarian actors, private sector (seed companies and local seed businesses), FAO and UN agencies.

### **Pathway 4: Strengthening Farmer-Based Seed Systems**

The ambition is to support the strengthening of farmer-based seed systems, including the systems of farmer-saved seed, community-based seed production and local seed business, also considering nutrition-dense crops and vegetables, and fodder and forage crops.

Key Strategic Actions:

- Broaden local seed producers' crop/variety portfolios with locally preferred and climate-resilient crops and varieties, potentially through community seed banks.
- Support well-performing local seed producers in the process of becoming local seed businesses/companies.
- Facilitate participatory plant breeding/variety selection to support farmers' access to locally preferred crop diversity.

Stakeholders:

- South Sudan Government, development and humanitarian agencies, development partners, private seed sector, farmer seed production groups and farmer communities.

### **Pathway 5: Supporting the Development of the Private Seed Sector**

The ambition is for professional seed producers to produce and market high quantities of high-quality seed of well-adapted and farmer-demanded varieties; for seed companies to produce their own foundation seed and embark on their own crop breeding programs; and for STASS to play a central role in policy advocacy and facilitation of strategic linkages.

Key Strategic Actions:

- Improve the procedures for seed certification by STASS-MAFS.
- Government to create a more enabling environment for seed business
- Design processes for transition of seed relief to supporting seed business

Stakeholders:

- STASS, private seed companies, MAFS and its development partners, development and humanitarian agencies, and financial institutions.

### **Pathway 6: Establishment of a Decentralized Seed Quality Assurance System**

The ambition is to develop a simple, cost-effective, decentralized seed quality assurance system providing authority to local/County agriculture departments on seed quality control and seed certification, and to include the possibility of accreditation of private seed companies.

Key Strategic Actions:

- Develop a policy and regulatory framework that supports decentralized seed quality control.
- Establish one reference seed laboratory at country level in accordance with the International Seed Testing Association (ISTA) standards.
- Establish one small-scale seed testing laboratory (mini seed lab) per county, or cluster of seed producing counties.

Stakeholders:

- MAFS, ARD, STASS, private seed companies, I/NGOs, and international development partners.

### **Pathway 7: Establishment of a National Gene Bank Linked to Community Seed Banks**

The ambition is for the establishment of a basic but functional national gene bank in South Sudan for conservation and promoting the use of important food and fodder-forage crop diversity, including linkages with community seed banks that conserve and produce seed of those genetic resources in areas where its loss is highly significant.

Key Strategic Actions:

- Set up a national/central gene bank under the authority of the Directorate of Agricultural Research (ARD), and build ARD capacity to manage the gene bank.
- Document important landraces with germplasm collected and stored at the national gene bank.
- Develop a policy on national gene banks that link with and give support to decentralized community biodiversity seed banks at local level.

Stakeholders:

- MAFS and its development partners, ARD, National Universities, Agricultural Institutes, development and humanitarian agencies, the private seed sector, and farmer groups.

### **Pathway 8: Strengthening Crop Breeding and Access to New Varieties**

The ambition is to establish functional partnerships with CGIAR and regional NARS for wider access to germplasm for adaptability testing and subsequent release/registration for local seed production, and to further support local crop breeding efforts including participatory plant breeding and participatory variety selection.

Key Strategic Actions:

- Facilitate partnerships with CGIAR centers and regional NARS, particularly with countries bordering South Sudan, for wider access to germplasm for adaptability testing in-country, and subsequent release and registration for local seed production.
- Build the capacity of ARD, the University of Juba and Yei CTC in participatory plant breeding and participatory variety selection.
- Support private seed companies with an interest in establishing their own crop breeding program.

Stakeholders:

- MAFS, ARD, University of Juba, STASS, private seed companies, I/NGOs, and FAO/IT-PGRFA.

### **Pathway 9: Establishing Public-Private Partnerships in Foundation Seed Production**

The ambition is for the MAFS and domestic seed companies to play a key role in ensuring foundation seed production and supply through a well-coordinated system, with a clear task division between the public (in particular MAFS/ARD) and the private sector (in particular STASS).

Key Strategic Actions:

- The MAFS to take up a main role in foundation seed production and its supply, with further development of ARD capacities to produce foundation seed at zonal and sub-zonal agro-ecological levels.
- STASS and I/NGOs should play a key role in shaping the guidelines, public-private business model and supporting capacity building of seed companies for foundation seed production.
- Government to facilitate the partnership with sub-regional NARS and private seed companies of neighboring countries for access to breeder seed.

Stakeholders

- MAFS, ARD, STASS, private seed companies, I/NGOs, and University of Juba.

### **Pathway 10: Capacity Building of Key Government Departments and Public Institutes**

The ambition is to have professional capacity on seed sector development available at key Government departments and public institutes, based on institutional and individual needs.

Key Strategic Actions:

- Agricultural Research Directorate: grant the Directorate of Agriculture a semi-autonomous status for promoting research in support of seed sector development and seed systems resilience.
- University of Juba: train academic staff in seed systems development and transformation.

- Yei CTC: update/develop practical training in the field of seed production, storage and marketing, including seed testing and field inspection.

Stakeholders

- MAFS, ARD, University of Juba, Yei CTC, development and humanitarian agencies, international universities and training centers.

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# Annexes

## Annex 1. Description of the Three Main Seed Systems and the Main Models Therein

### **Formal Seed Systems**

#### **Government Seed Companies and/or Programs**

There are various (mostly public) operators in the seed value chain in this system, through which seed is certified and varieties are improved. In most developing countries, Governments invest their resources in the production and dissemination of crops that are important for food and nutritional security through this system; these include cereals (maize, rice, wheat, and several others), legumes and vegetables.

#### **Commercial Seed Companies (Local to Multinational)**

In this seed system, commercial companies are either directly engaged in seed production through contract farming and outgrower schemes, or in importing seed of high value food and cash crops, which are subsequently marketed through their own networks and/or agro-input dealers. Hybrid maize, hybrid rice, exotic vegetables and perennial fruit trees are the main crops for which this system is operational.

#### **Closed Value Chain**

This seed system usually has a short value chain, in which seed (including planting materials) and input packages are directly provided to commercial growers. The system includes crops such as cotton, tea, coffee, tobacco, and sugarcane.

### **Intermediary Seed Systems**

#### **Community Seed Bank (CSB)**

Community level seed-saving initiatives have been around since the end of the 1980s, established with the support of international and national non-Governmental organizations. Community seed banks have been designed and implemented to conserve, restore, revitalize, support adaptation to climate change and strengthen the farmer's seed system. Efforts have taken various forms and names: community gene bank, seed hut, seed reserve, seed library, seed-savers group, association, or network. Depending on the objectives set by its members, it might focus on conservation of agriculture biodiversity, including reviving lost crop and varieties, while others might give priority to both conservation and access and availability of diverse types of seed suitable to various agroecological domains, primarily for local farmers. In addition to these main functions, promoting seed and food sovereignty is another core element of some community seed banks.

#### **Community-Based Seed Production (CBSP)**

Farmers source seed of locally important food and cash crops through this system. Non-Governmental organizations (NGOs) are actively involved in supporting communities with the aim of enhancing food security and reducing poverty. This system includes both local and improved varieties and may involve some aspect of seed quality assurance procedures, such as using certified seed or even foundation seed as source seed; maintaining good pre-harvest and post-harvest management practices; rouging 'off-

types' in the field; and storing the different varieties of seed separately. In the country where a quality declared seed (QDS) system is functional, CBSPs benefit from the QDS system.

### **Local Seed Businesses (LSBs)**

Farmers multiply and sell quality seed of improved varieties to other farmers in this seed system. Farmers' capacities are strengthened through organizing as seed-producing cooperatives or groups or becoming professional seed producers. Often these groups are legally registered with the district agriculture office. LSBs may include seed quality assurance procedures, such as quality declared seed (QDS) and a formal certification process. This system includes major food crops, as well as vegetables and perennial fruit trees, and mostly uses local or nationally released/registered improved varieties.

### **Seed Relief**

In the event of an emergency and in many protracted crisis situations due to human conflicts or natural disasters, seed is freely distributed to farmers as a form of relief in order to support their recovery. Varieties and seed quality standards are usually unknown, which is a concern in terms of the long-term sustainability of the seed sector. However, in recent years local seed sourcing and use of voucher-based seed distribution have been started as good practice within seed relief programs.

## **Informal Seed Systems**

### **Farm-Saved Seed**

The most prominent source of seed for most farmers in developing countries, and for many in the developed world, is farmer-saved seed. Farmers obtain seed through both informal and formal channels. Varieties can be both local and improved. The crops are largely for subsistence and food security, but in many cases may also be used for income-generating purposes. The role of women farmers in farmer-saved seed is very important.

### **Social Seed Network**

This system integrates both informal and formal flows of crop varieties in the farming communities. Farmers save the seed for next season and regularly share, exchange, or barter or sell the seed to their neighbors and communities. Social relationships, cohesion, trust, and reciprocity are the key factors that influence the development of a seed network and determine to what extent these networks are resilient to shocks and stressors. Through this system, farmers as a community maintain a portfolio of crop diversity that is required for their daily livelihoods.

### **Local (Grain) Markets**

Farmers regularly purchase potential seed from the local grain market to fulfil their seed need for their crop production. It includes the majority of open pollinated crops. Pulses, beans, and oil seed crops are the crops often sourced from the local market. Major actors in the local grain market include small, medium, and large traders, and local farmers themselves. This system includes both local, improved, and mixed varieties. The quality of potential seed in the local grain market is often unknown.

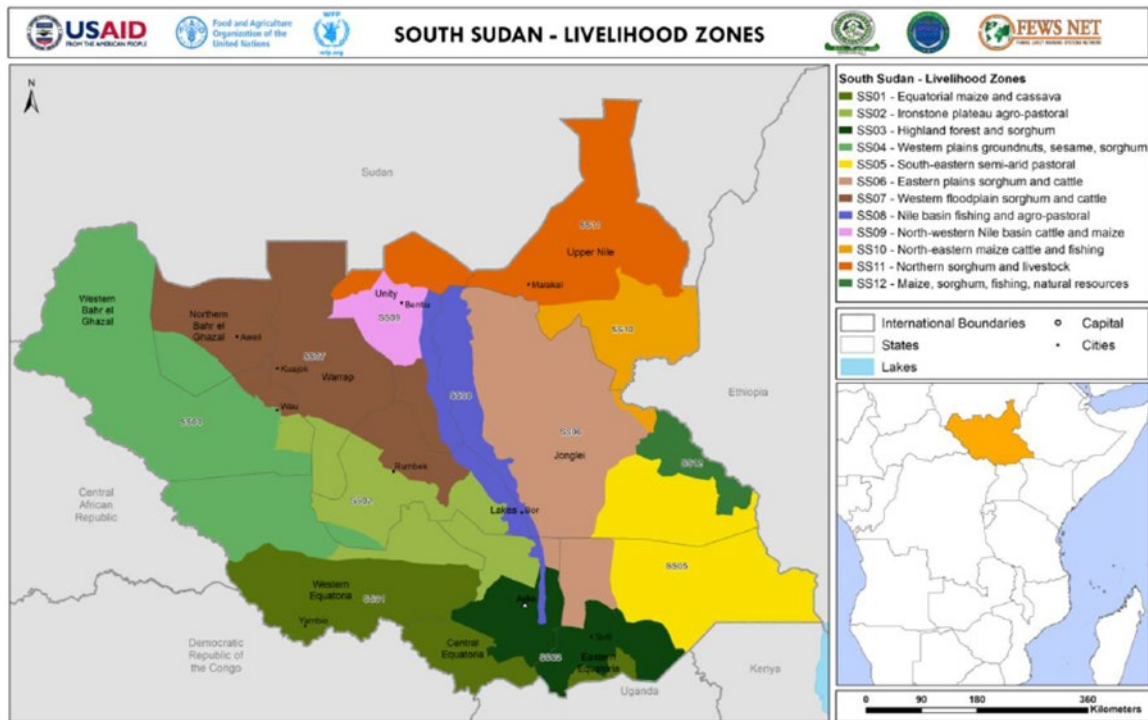
Annex 2. List of Organizations and Respondents Consulted in the Case Study

Date	Location	Name	Organization
21/03/2022	Juba	[REDACTED]	Ministry of Agriculture and Food Security
	Juba	[REDACTED]	University of Juba
		[REDACTED]	EWS KT
06/04/2022	Juba	[REDACTED]	USAID
		[REDACTED]	MAFS, SSNBS and CS
23/03/2022	Juba	[REDACTED]	IFDC
23/03/2022	Juba	[REDACTED]	WFP/FSL
27/03/2022	Juba	[REDACTED]	FAO
28/03/2022	Juba	[REDACTED]	South Sudan Seed Traders Association
28/03/2022	Juba	[REDACTED]	PRO Seed Company
29/03/2022	Wau	[REDACTED]	World Concern and PCO
29/03/2022	Juba	[REDACTED]	MAFS and SSNBS
30/03/2022	Wau	[REDACTED]	FAO
	Wau	[REDACTED]	ARG
	Wau	[REDACTED]	University of Bahr el Ghazal
	Wau	[REDACTED]	Catholic University
	Jur River	[REDACTED]	Cooperative Societies
31/03/2022	Marial Ajiith	[REDACTED]	Women Group
	Juba	[REDACTED]	South Sudan Agricultural Producers Union
04/04/2022	Torit	[REDACTED]	FAO
04/04/2022	Torit	[REDACTED]	AVSI and Caritas Lux
	Torit	[REDACTED]	Global Aim
	Torit	[REDACTED]	First Director General
	Torit	[REDACTED]	CordAid
	Juba	[REDACTED]	UNICEF
	Juba	[REDACTED]	World Concern
	Juba	[REDACTED]	Mercy Corps
	Juba	[REDACTED]	Save the Children
	Juba	[REDACTED]	World Vision
	Juba	[REDACTED]	Agriconsulting Europe S. A
	Juba	[REDACTED]	FAO
	Juba	[REDACTED]	Delegation of the EU
	Juba	[REDACTED]	FAO
	Juba	[REDACTED]	Rift Valley Consultancy
	Juba	[REDACTED]	AVSI
	Juba	[REDACTED]	RAS
	Torit	[REDACTED]	ARG

Eastern Equatoria Seed Sector Resilience Workshop and Individual Interviews

Date	Location	Name	Organization/Institution
05/04/2022	Torit	[REDACTED]	Cordaid
			FAO Field Office
			Global Aim South Sudan (GASS)
			Global Aim South Sudan (GASS)
			FAO
			Caritas Luxembourg
			GASS
			Afroganics
			FAO
			AVSI
			FAO
			State Ministry of Agriculture, Forestry, Cooperatives and Environment (SMAFCE)
			Torit Municipal Council
			Felixstone Company Ltd
Torit County			
SMAFCE			

## Annex 3. The Major Livelihood Zones of South Sudan



Source: <https://reliefweb.int/report/south-sudan/livelihoods-zone-map-and-descriptions-republic-south-sudan-updated-august-2018>

The major agro-ecologies on which the REPRO South Sudan project focuses are:

- i. *Equatorial maize and cassava zone (SS01)*: this zone is characterized by equatorial rainforest, concentrated particularly on the Uganda, Democratic Republic of Congo and Central African Republic borders. This is the only part of South Sudan with typical bimodal rainfall pattern and two reliable seasons. Precipitation is about 1 100 mm to 1 500 mm per annum in both rainy seasons. First rains normally commence around March with a break in late June and restart a second time in July through November. **Major crops include maize, beans, sorghum, groundnut, cassava, and sweet potato.** The identified project catchment area for this zone is **Yambio and Torit**, although Torit catchment extends to zone SS03 as well.
- ii. *Ironstone plateau agro-pastoral livelihood zone (SS02)*: this zone cuts across the former Central Equatoria State (CES), Western Equatoria State (WES) Lakes, and Warrap and Western Bahr El Ghazal (WBEG) State. Predominantly cultivated crops are **sorghum, groundnut, and sesame**. Other crops are maize, cowpea, green gram (Lakes), cassava and sweet potato. More than 80% of the households in this zone keep livestock. This zone will be represented by the **Wau** catchment area in WBEG.
- iii. *Highland forest and sorghum zone (SS03)*: this zone cuts across CES and Eastern Equatoria State (EES) but is located along the mountain ranges of the Greater Equatorial region and the border with Ethiopia and Uganda. Its topography is characterized by highlands and foothills with a mixture of forest, bush shrubs and grasslands. The zone has a unimodal rainfall pattern with average precipitation of about 1 100 mm to 1 300 mm per annum. There are two distinct seasons; a rainy season from April to November and a short dry season from December to March. **The main crops are sorghum and maize**, with the latter growing mainly in the eastern parts of the zone. Other crops cultivated in this zone include millet, sesame,

cowpeas/green grams, sweet potatoes, cassava, and groundnut.  
This zone is represented partly by the **Torit** in EES and **Akobo** in Jonglei catchment areas.

- iv. *Western plains groundnut, sesame, and sorghum (SS04)*: this zone is mainly located in WBEG and some parts of WES and Northern Bahr El Ghazal (NBEG) state. It is characterized by highlands, foothills, and parts of the Ironstone Plateau. Vegetation in the area is a mixture of forest and grasslands with mahogany and bamboo trees. The zone has a unimodal rainfall pattern, with average precipitation of about 900 mm to 1 100 mm. There are two main seasons; the rainy season, which starts in April to October, and the dry season from November to March. Soils are mainly relatively fertile sandy clays. The main crops cultivated include **sorghum, cassava, groundnut, sesame**, cowpeas, sweet potatoes, and assorted vegetables. This zone is represented by the **Wau** catchment area, with River Jur and Wau Counties being potential areas for project implementation.
- v. *Eastern plains sorghum and cattle zone (SS06)*: this livelihood zone is in eastern flood plains in the former Jonglei state. It can be described as a zone of short unimodal rainfall with annual precipitation ranging from 600 mm to 900 mm. The rainy season is normally between June and mid-October, and dry season from Mid-October to May, respectively. The major crops grown include **sorghum and groundnut** and some maize in addition to **cowpeas** and groundnuts. The catchment area for this zone is **Bor**, with Bor, Twic East and Bor South Counties being potential areas for project implementation.
- vi. *Western flood plain sorghum and cattle zone (SS07)*: this is a predominantly agro-pastoral zone covering the former Warrap state, parts of Lakes and Northern Bahr El Ghazal (NBEG) states. It has a very short rainy season that often starts in June and ends in September, with annual precipitation being between 500 mm to 700 mm. The most commonly grown crops are **sorghum, groundnut**, and millet. **Cowpeas**, green grams, and sesame are also grown on a limited scale. The catchment area for this zone is **Aweil**, with Aweil East, Aweil South and Aweil West Counties being potential project implementation areas.
- vii. *Northern sorghum, sesame, and livestock (SS011)*: this livelihood zone is located mainly in the former Upper Nile state and has a very short rainy season of about 2.5 to 3 months starting from July with annual precipitation of about 300mm. It is an agro-pastoralist zone where farmers **grow sorghum and sesame** in large acreages (Renk Mechanized Agriculture) ranging from 100 to 1 000 feddans<sup>18</sup>. Other crops grown by farmers are **maize, groundnuts, and cowpeas**. The catchment area for this zone is **Renk**, with Renk and Melut Counties being potential project areas.

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18 A feddan = 4200 m<sup>2</sup>, approximately one acre

## Annex 4. Detailed Pathways for Building Resilience in the South Sudan Seed Sector

Based on lessons learned from past and ongoing seed sector intervention and the visions and perspectives expressed during the interviews and multi-stakeholder dialogues in Juba, Torit (Eastern Equatoria) and Wau (Western Bahr el Ghazal) a total of ten pathways were synthesized. These pathways provide a road map required for the transformation of South Sudan's seed sector to become more robust, resilient and better serve the needs of smallholder farmers across South Sudan.

This annex provides a full description of the pathways presenting the challenges, ambitions, strategic actions and key stakeholders involved.

### **Pathway 1: Development of a National Seed Policy and Seed Regulatory Framework**

#### **Challenges**

- 2011 Seed Policy not enacted, resulting in lack of strategic directions for South Sudan seed sector stakeholders towards the development of a resilient seed sector.

#### **Ambitions**

- Develop a national seed policy and seed regulatory framework, based on current realities across South Sudan and harmonized with international agreements.

#### **Key Strategic Actions**

- Through a multi-stakeholder dialogue process verify (and where necessary improve) the 2011 Seed Policy document for official endorsement, considering:
  - ✓ Coverage of interests of the public sector, private sector, civil society, development and humanitarian agencies, and farmers.
  - ✓ Coverage of interests at national, state and County level.
  - ✓ Attention to formal, intermediary and informal seed systems.
  - ✓ Consideration of key operations and services in the seed value chain.
  - ✓ Assessment of current capacities and capacity-building needs of seed producers, service providers and regulators.
  - ✓ Whenever possible and appropriate, decentralized approaches at state and County level.
  - ✓ Elaboration of different scenarios, including one in which South Sudan becomes more peaceful and stable.
  - ✓ Specific attention for transforming humanitarian seed relief in ways that strengthen the development of a robust local private sector.
- Develop a seed law, regulations, and guidelines to implement the seed policy.
- Establish the appropriate bodies to implement the seed regulatory framework, including a National Seed Council, a National Seed Authority, a National Seed Variety Release Committee and a Seed Quality Control Board.
- In the absence of enacted seed policy/law and establishment/functioning of regulatory bodies, develop guidelines and principled approaches to guide seed sector interventions.

#### **Stakeholders**

MAFS and its development partners, Ministry of Trade, Ministry of Investment, Chamber of Commerce, FAO, development and humanitarian agencies, the private seed sector, and farmer organizations.

### **Pathway 2: Strengthening Seed Sector Coordination, Digital Inclusion and Partnerships**

#### **Challenges**

- Lack of a mechanism facilitating coordination and knowledge-sharing among seed sector stakeholders, resulting in a lack of alignment of seed sector interventions and difficulties in scaling good practices.

#### **Ambitions**

- Improve coordination across the three main seed systems, from local to regional and national level, through a functional South Sudan Seed Hub.
- Facilitate easy access to seed-related information through a South Sudan Seed Portal.

#### **Key Strategic Actions**

- Establish a South Sudan Seed Hub operating at central and state levels facilitating coordination and knowledge sharing, and fostering seed partnerships.
- Develop the South Sudan Seed Portal as a digital platform/or gateway to share seed related policies, seed regulatory provisions and requirements, and information on on-going seed programs, seed companies etc.
- Promote regional partnerships with surrounding countries (Kenya, Uganda, Ethiopia, and Sudan in particular) for dialogue and exchange, exposure to good practice, and development/ strengthening of cross-border seed work.
- Develop/strengthen partnerships with CGIAR centers and NARS in Eastern Africa for introduction, testing and release of new and adapted varieties.
- Establish long-term partnerships between South Sudan and foreign universities and research centers.

#### **Stakeholders**

South Sudan Government, development and humanitarian organizations, FAO, University of Juba, CGIAR centers, regional and international universities, and other stakeholders.

### **Pathway 3: Supporting the Transition From Seed Relief to Seed Sector Development**

#### **Challenges**

- If not carefully managed and properly designed, seed relief may do farmers more harm than good, and potentially undermine the development of a resilient seed sector in South Sudan.

#### **Ambitions**

- Transition from seed importation / free seed distribution approaches, to long-term investment in the development of a robust and resilient seed sector with a vibrant local seed industry in South Sudan.

#### **Key Strategic Actions**

- Specify the role of seed relief programming in becoming instrumental and catalytic to seed sector transformation.
- Develop appropriate policy guidelines that limit seed importation and encourage local seed production.
- FAO, NGOs, and Government to purchase locally produced seeds, either QDS or certified seed, thereby enhancing/strengthening the local seed industry.
- Seed relief programs to invest in the development of professional local capacity along the seed value chain.
- Seed relief programs to support the strengthening of farmer-saved seed systems, especially building the capacity of women in production and management of quality seed.
- Seed relief program support to the Government in the development of the seed policy and seed regulatory framework.

#### **Stakeholders**

MAFS/ Agriculture Research Directorate (ARD), academia, development partners and humanitarian actors, private sector (seed companies and local seed businesses), FAO and UN agencies.

### **Pathway 4: Strengthening Farmer-Based Seed Systems**

#### **Challenges**



- The opportunities of informal and intermediary seed systems in providing farmers access to quality seed of locally preferred varieties are largely unexplored.

#### **Ambitions**

- Support the strengthening of farmer-based seed systems, including the systems of farmer-saved seed, community-based seed production and local seed business, also considering nutrition-dense crops and vegetables, and fodder and forage crops.

#### **Key Strategic Actions**

- Develop the professional capacity of local seed producers in the area of seed production and marketing, organizational development, and building strategic linkages with seed service providers.
- Broaden local seed producers' crop/variety portfolios with locally preferred and climate-resilient crops and varieties, potentially through community seed banks.
- Assure access to proper seed storage facilities which meet standards with sufficient capacity and processing/value addition facilities.
- Support well-performing local seed producers in the process of becoming local seed businesses/companies.
- Advocate for a policy that supports local seed production and marketing of farmers' varieties.
- Develop and implement targeted seed training programs for female farmers and ensure their involvement in seed-related programming at County level.
- Strengthen the capacities of nodal seed farmers in becoming a reliable (sustainable) source of quality seed.
- Support farmers by buying their locally-produced quality seed for further dissemination (I/NGOs).
- Strengthen the capacity of local traders in local grain markets and link them to local producers of quality seed.
- Facilitate participatory plant breeding/variety selection to support farmers' access to locally preferred crop diversity.

#### **Stakeholders**

South Sudan Government, development and humanitarian agencies, development partners, private seed sector, farmer seed production groups and farmer communities.

### **Pathway 5: Supporting the Development of the Private Seed Sector**

#### **Challenges**

- The private seed sector in South Sudan is still in a nascent stage. Next to the constraints of political instability, prevailing insecurity and poor roads and market infrastructure in large parts of the country, the sector is constrained by serious competition of imported seeds at lower costs, and often freely distributed.

#### **Ambitions**

- Professional seed producers producing and marketing high quantities of high-quality seed of well-adapted and farmer-demanded varieties.
- Seed companies producing their own foundation seed and embarking on their own crop breeding programs.
- STASS to play a central role in policy advocacy and facilitation of strategic linkages.

#### **Key Strategic Actions**

- Improve the procedures for seed certification by STASS-MAFS
- Take a diversity of measures to reduce the high cost of in-country and local seed production
- Facilitate access to finance for seed companies
- Establish seed processing facilities to reduce cost of locally produced seed and add value
- Government to create a more enabling environment for seed business
- Support investment in seed storage facilities
- Design processes for transition of seed relief to support of seed business

#### **Stakeholders**

STASS, private seed companies, MAFS and its development partners, development and humanitarian agencies, and financial institutions.

## **Pathway 6: Establishment of a Decentralized Seed Quality Assurance System**

### **Challenges**

- There is a non-functional seed quality assurance system; this fails to protect farmers from sub-standard and counterfeit seed.

### **Ambitions**

- Develop a simple, cost-effective, decentralized seed quality assurance system providing authority to local/County agriculture departments on seed quality control and seed certification, and include possibility of accreditation of private seed companies.

### **Key Strategic Actions**

- Develop a policy and regulatory framework that supports decentralized seed quality control.
- Establish one reference seed laboratory at country level in accordance with the International Seed Testing Association (ISTA) standards.
- Establish one small-scale seed testing laboratory (mini seed lab) per County, or cluster of seed producing Counties.
- Provide authority to the County agriculture office for seed quality control and seed certification in their respective areas.
- Support the private seed sector to develop their own internal quality control system, in line with seed regulations, and provide accreditation of such systems by Government.
- Promote a risk-based approach in prioritizing seed laboratory testing and field inspection, based on the risks and complaints made by the seed users.

### **Stakeholders**

MAFS, ARD, STASS, private seed companies, I/NGOs, and international development partners.

## **Pathway 7: Establishment of a National Gene Bank Linked to Community Seed Banks**

### **Challenges**

- Conflicts, displacement and climate change have caused a dramatic loss of genetic resources of local food crops, fodder and forage crops. A mechanism for collection, conservation and promoting the use of these important genetic resources is missing.

### **Ambitions**

- Establishment of a basic but functional national gene bank in South Sudan for conservation and promoting use of important food and fodder-forage crops diversity, including linkages with community seed banks that conserve and produce seed of those genetic resources in areas where its loss is highly significant.

### **Key Strategic Actions**

- Set up a national/central gene bank under the authority of the Agricultural Research Directorate (ARD), and build ARD capacity to manage the gene bank.
- Institutionalize germplasm collection and storage in the national gene bank.
- Document important landraces with germplasm collected and stored at the national gene bank.
- Develop a policy on national gene banks that link with and give support to decentralized community biodiversity seed banks at local level.
- Build the capacity of the national gene bank for multi-lateral germplasm exchange through the implementation of the International Plant Treaty, carrying out pre-breeding work and germplasm testing at farmers' fields.

## **Stakeholders**

MAFS and its development partners, ARD, National Universities, Agricultural Institutes, development and humanitarian agencies, the private seed sector, and farmer groups.

## **Pathway 8: Strengthening Crop Breeding and Access to New Varieties**

### **Challenges**

- Local crop breeding programs face lack of resources and breeder capacity, and are hampered in access to new varieties and advance breeding lines. This has resulted in very few new/well adapted varieties being available to the farmers to choose from to meet their demand.

### **Ambitions**

- Establish functional partnerships with CGIAR and regional NARS for wider access to germplasm for adaptability testing and subsequent release/registration for local seed production.
- Further support for local crop breeding efforts including participatory plant breeding and participatory variety selection.

### **Key Strategic Actions**

- Facilitate partnerships with CGIAR centers and regional NARS, particularly with countries bordering South Sudan, for wider access to germplasm for adaptability testing in-country, and subsequent release and registration for local seed production.
- Strengthen the implementation of the International Treaty on Plant Genetic Resources for Food and Agriculture Support (IT-PGRFA) of which South Sudan is a contracting party, facilitating access to germplasm from the international gene pool through its multilateral system.
- Build the capacity of ARD, the University of Juba and Yei CTC in participatory plant breeding and participatory variety selection.
- Support private seed companies with an interest in establishing their own crop breeding program.

### **Stakeholders**

MAFS, ARD, University of Juba, STASS, private seed companies, I/NGOs, and FAO/IT-PGRFA.

## **Pathway 9: Establishing Public-Private Partnerships in Foundation Seed Production**

### **Challenges**

- South Sudan seed sector development is constrained by lack of foundation seed of demanded varieties, which is in most cases imported from Uganda by the STASS and humanitarian organizations, often facing challenges in quality, pricing, and timing.

### **Ambitions**

- The MAFS and domestic seed companies to play a key role in ensuring foundation seed production and supply through a well-coordinated system, with a clear task division between the public (in particular MAFS/ARD) and the private sector (in particular STASS).

### **Key Strategic Actions**

- The MAFS to take up a main role in foundation seed production and its supply, with further development of ARD capacities to produce foundation seed at zonal and sub-zonal agro-ecological levels.
- Government should allow the private seed companies to produce their own foundation seed to reduce access risks.
- STASS and I/NGOs should play a key role in shaping the guidelines, public-private business model and supporting capacity building of seed companies for foundation seed production.
- Government to facilitate the partnership with sub-regional NARS and private seed companies of neighboring countries for access to breeder seed.

### **Stakeholders**

MAFS, ARD, STASS, private seed companies, I/NGOs, and University of Juba.

## **Pathway 10: Capacity Building of Key Government Departments and Public Institutes**

## **Challenges**

- Insufficient human capacity within South Sudan's Agricultural Research Directorate, the University of Juba and Yei CTC for supporting the required transition of the seed sector.

## **Ambitions**

- To have professional capacity on seed sector development available at key Government departments and public institutes, based on institutional and individual needs.

## **Key Strategic Actions**

### ***Agricultural Research Directorate***

- Grant the Directorate of Agriculture a semi-autonomous status for promoting research in support of seed sector development and seed systems resilience.
- Government and international community to invest in the development of human resources and research infrastructure.
- Strengthen the link between ARD and CGIAR centers.
- Government to commit a multi-year reasonable budget to the directorate.
- Establish agro-ecology specific zonal stations to address local seed challenges.
- Incorporate local seed business into the national seed framework.
- Establish a functional National Seed Authority in South Sudan.
- Government to implement the International Treaty for facilitating access to and exchange of plant genetic materials.

### ***University of Juba***

- Train academic staff in seed systems development and transformation.
- Transform the relevant Department at the University of Juba from purely knowledge-based to competence-based, to build both knowledge and the skills required for seed systems transformation.
- Enhance the research capability of the agricultural staff at the University of Juba through access to studies, training, and exposure visits, and by actively involving staff in seed programming.
- Review and update the existing curriculum of Agricultural Sciences at the University of Juba.
- Consider upgrading the current Department of Agricultural Science into a School of Agricultural Science, and within that establish an Agricultural Research Institute to tackle seed and seed related issues (having its own mandate to develop and release crop varieties).
- Develop a policy that attracts and encourages exchange of both students and academic staff with partners universities both regionally as well as internationally.

### ***Yei Crop Training Centre***

- Update/develop practical training in the field of seed production, storage and marketing, including seed testing and field inspection.
- Encourage exchange visits to strengthen capacities in teaching and training; review the training curriculum; upgrade existing courses to Diploma level; and invest in ICT, in particular good quality internet.
- Strengthen links with other centers in the region and internationally.
- Ensure the financial sustainability of Yei CTC by ensuring an annual budget from the Government, and the development of a Yei CTC business component to charge (standard) fees for services rendered.

## **Stakeholders**

MAFS, ARD, University of Juba, Yei CTC, development and humanitarian agencies, international universities and training centers.