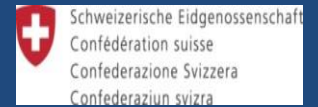


# SEED SECURITY ASSESSMENT REPORT



*Northern Bahr  
el Ghazal State,  
South Sudan*

**April, 2014**



## ACKNOWLEDGEMENT

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### The Assessment Team

The seed security assessment was conducted by a team lead by Joseph Okidi from FAO Sub-regional Emergency Office for Eastern and Central Africa (REOA) with participation of staff from FAO South Sudan, State Ministry of Agriculture and Forestry (SMoAF) and Non-Governmental Organizations (NGOs)

Name	Position	Organization
1) Okidi Joseph	Seed Security Specialist	FAO REOA
2) Phillip Mareng Bol	Senior Inspector for Agric.	SMoAF, CAD, Aweil East
3) Deng Deng Bol Mabior	Senior Inspector for Agric.	SMoAF, CAD, Aweil South
4) Alfred Auer Sebit Dut	Senior Inspector for Agric.	SMoAF, CAD, Aweil Centre
5) Charles Stephen Ajok Mou	Senior Inspector for Agric.	SMoAF
6) Archangelo Deng Athiang	FS&L field officer,	Samaritans Purse-I
7) Peter Akol Wol	Extension Officer	CAD, Aweil West
8) Deng Yei Deng	Extension officer	SMoAF
9) Kirr Awen Mayen	Agriculture field Officer	FAO
10) Lita Jackson	Project Officer	FAO

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## ACRONYM

ANLA	Annual Needs and Livelihood Assessment Mission
CAD	County Agriculture Department
CFSAM	Crop and Food Security Assessment Mission
FAO	Food and Agriculture Organization of the United Nations
FCS	Food Consumption Score
FDG	Focus Group Discussion
GAM	Global Acute Malnutrition
KII	Key Informant Interview
KUCDA	Kueng Community Development Agency
NBELG	Northern Bahr el Ghazal
NBHS	National Baseline Households Survey
NBS	National Bureau of Statistics
NGO	Non-Governmental Organization
OCHA	United Nations, Office for Coordination of Humanitarian Affairs
REOA	FAO Sub-regional Emergency Office for East and Central Africa
RRC	Relief and Rehabilitation Commission
SAM	Severe Acute Malnutrition
SMoAF	State Ministry of Agriculture and Forestry (SMoAF)
SP-I	Samaritan Purse International
SSA	Seed Security Assessment
SSCCSE	South Sudan Center for Census, Statistics and Evaluation
SSCF	Seed Security Conceptual Framework
VSF-S	Veterinaries Sans Frontiers -Suisse
WFP	World Food Program

## EXECUTIVE SUMMARY

South Sudan faces enormous humanitarian challenges in the form of man-made (civil and tribal conflicts) and natural disasters (recurrent floods and dry spells) with negative effects on seed security and consequently on food security. In response to the 2013/2014 crisis (civil conflict, flood and dry spells), FAO-South Sudan considered providing livelihood support in the form of agricultural inputs including seed to about 7000 households in Northern Bahr el Ghazal (NBELG) and Warrap states.

As part of the strategy to improve the design of seed related interventions, FAO decided to conduct a seed security assessment in NBELG in March 2014 with the objective of examining and analyzing the existing seed security situation, which would guide both emergency response and seed sector development efforts in the two states. The assessment methodology was based on the revised seed security conceptual framework (SSCF) and its four essential elements namely availability, access, quality and varietal suitability at household and community levels. A total of 12 research assistants were trained within two days using the revised SSFC as basis. Subsequently, primary data were collected through sampling and interviewing 83 households and 10 local grain/seed traders using structured questionnaires, while additional information was obtained from 7 focus group discussions (FGDs), 8 key informant interviews and one seed group interview.

The results show that demographically, 80 percent of the households in NBELG are male headed, with an average size of 6.7 persons per household. Children make up about 27 percent while adults in the productive age group (16-60 years old) make up 37 percent of the population. Overall, about 4 percent of the households in the state are IDPs and returnees. In general 77 percent of the households are agro pastoralists, with the major source of income being petty trade (58%) which is characterized by the sale of items such as grass, fuel wood and charcoal thus contributing to significant environmental degradation in some areas where the practice is becoming predominant. The sale of crops is the second most important source of income with 23 percent of the households dependent on it.

Crop production is an important livelihood activity for nearly all the households in the NBELG state. Major crops cultivated in 2013 included sorghum by 100 percent of the households interviewed, groundnut (52%), sesame (40%), Jew mallows (42%), maize (35%) and okra. These crops are typically grown under rain-fed conditions with the planting season starting around May and extending into June depending on the crop and variety. Although a wide range of crops could be grown in the state, a significant number of farming households (45%) are depending only one or two crops, and this is very much pronounced within the lowland area of the Western Flood Plain where 60 percent of the households planted only one to two crops. Crop production in the state is still highly subsistence in nature with the average area under cultivation ranging between 0.2 to 1.3 *feddan*<sup>1</sup> per household. Intercropping is a common practice, particularly for sesame (72%) and sorghum (61%). Famers on the whole use about 10kg of sorghum, 20kg of groundnut and 4 kg of sesame per *feddan*. The crop performance and harvest for 2013 were considered poor by about 60 percent of the farming households. Despite the general poor harvest/yield reported by the famers, the multiplication rates for all the crops were still above 14, giving hope that famers own production could still be a potential source of seed for the 2014 planting season. The major factors which affected crop production in 2013 were mainly dry spells and floods.

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<sup>1</sup>Feddan = 4200m<sup>2</sup>

The major seed sources are own saved seed (55.9%) and local market (41.4%) while seed aid (1.5%) and social network (1.2%) play insignificant roles as seed sources. Because most famers either saved their own seed or bought seed in the local market, such seeds were available at the time when needed and mostly before the planting season began. A visit to some of the local markets and famer groups with storage facilities confirmed availability of major crops and preferred varieties. There were also some significant quantities of locally preferred vegetables seeds such as Perselene, Jews mellow, Rocket and Sugar beet in the local market in Aweil town. However, a number of common exotic vegetables such as tomatoes, eggplants, carrots, cabbages were not available in the market.

Much as local markets are important sources of seed, a significant proportion of the famers (54%) were concerned that they had to walk long distances to get to the nearest local market and that prices of seed at the start of the season were relatively high. Generally, the majority of households surveyed did not express serious concern about the quality of seed. In terms of physical purity, over 80 percent of the famers considered the seed from the various sources as well cleaned while 19 percent considered it fairly cleaned. In addition, over 85 percent of the farming households who planted seed from various sources considered such seed as having good germination capacity while up to 13 percent considered germination as fair. However, it is important to note that few households who got seed from humanitarian organizations were concerned about the untimely or late delivery of such seed aid.

The majority of famers in NBELG state prefers and grows predominantly local varieties which are considered well adapted by the majority of the households interviewed. The popular local varieties of sorghum are *Malual* and *Anyanjang* while those of the other crops are *Bedibedi* for groundnut and *Nyuwella* for sesame.

Since the assessment has clearly revealed that locally produced seed of adapted crops and varieties is available within the state, it is obviously prudent to put more emphasis on seed recollection for distribution or conducting seed/input trade fairs (ITF) as means of providing emergency support to vulnerable households including IDPs in the state, This however has to be done in a timely manner, preferably by end of May 2014. In addition, based on the fact that farmers pay cash for seed in the markets, the possibility of developing a market oriented seed production and supply chain is promising. Emergency seed could therefore be provided to famers at a subsidized cost. With some progressive famer groups producing up to 6 tons of grain in a season, there is a great potential to covert some of these active famer groups into local seed producers. In the interest of developing the seed sector this potential should be further explored and exploited. This will however require building the capacity of SMOAF/CAD and NGOs in supporting community-based seed multiplication. Considering a number of households planted only one to two crops in 2013, it is of paramount importance that seed multiplication be integrated with crop diversification to ensure food and nutrition security in the state. With seed access being of key concern, the medium to long term strategy would be to build the capacity of vulnerable households to diversify their sources of income through engagement in other income generating activities so they have the economic resources to purchase seed when they need it.

## 1.0 INTRODUCTION



## 1.1 Agriculture and livelihoods

Ninety percent of South Sudanese households depend on crop farming, animal husbandry, fishing or forestry for their livelihoods. Productivity across all these sectors is minimal. Agricultural yields remain low due to a number of factors such as the use of traditional tools, limited skills and knowledge on good agricultural practices (GAP) due to poor extension services; and lack of an effective agricultural policy environment. The country's potential is further constrained by an acute lack of economic development, unpredictable rainfall patterns; human and livestock disease epidemics; and poor rural infrastructure including roads, markets and post-harvest storage facilities.

Northern Bahr el Ghazal (NBELG) State is one of the ten states of Southern Sudan. The state lies within the Ironstone Plateau and the western flood plains, two of the seven major agro-ecological (livelihood) zones in the country, with the later covering about 75% of the land area (Fig. 1). Typically, these two livelihood zones experience uni-modal pattern of rainfall which normally begins around May, peaked up between July and August, resulting into localized floods within the western flood plains, which in years of high rainfall can be devastating.

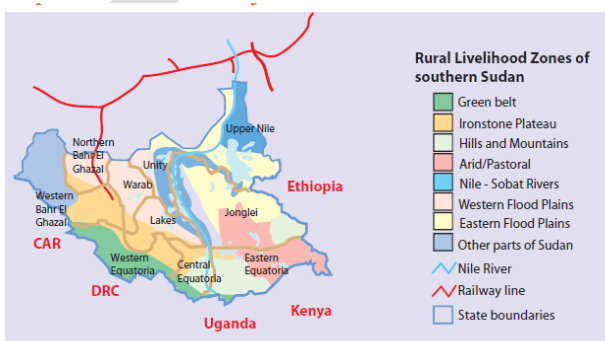


Fig .1 Agro-ecological zones of South Sudan (SSCCSE, 2006)

In the Western Flood Plains, livestock and crop production, supplemented by fish and wildfruit are considered the main sources of food while in the Ironstone Plateau, households are heavily dependent on crop production<sup>2</sup>. Major crops grown in the state are sorghum, groundnut and sesame. Sorghum is regularly intercropped with sesame and some small amounts of bulrush millet while maize is normally cultivated in limited areas close to homesteads and is often consumed green with the first early sorghums in August-September. Groundnut is cultivated on sandy soils in most locations and makes an important contribution to household diet throughout the northern states; it is also the main cash crop. Okra, cowpea, green-gram, pumpkin, Bambara nut and tobacco are also widely grown around homesteads in all areas<sup>3</sup>.

Northern Bahr el Ghazal State has remarkable potential for agricultural production with extensive grazing areas, abundant fertile land and water resources, and a low population density. Despite these opportunities, the State has large concentrations of food-insecure and impoverished households. The situation is intrinsically linked to some state-specific vulnerability context, which is manifested in high human insecurity and population displacement, climate change and environmental hazards manifested in the form of recurrent floods in the flood plains and increasing weeks of dry spell in the Ironstone Plateau. The State's poor infrastructure limits trade, while access to markets is a challenge and agricultural productivity is low. The situation is aggravated by influx of returnees, as well as poor integration of populations displaced by floods and conflict and returnees in productive farming, and the continuing tensions between border areas of South Sudan and the Sudan.

<sup>2</sup>SSCCSE, 2006. Southern Sudan Livelihood profile

<sup>3</sup>CFSAM, 2013. Crop and Food Security Assessment Mission (CFSAM)



## 1.2 Socio-economic characteristics

Globally, some of the worst social indicators are found in South Sudan, particularly relating to women. At least 80 percent of the population is income-poor, living on an equivalent of less than one USD per day and 20 percent of households cannot support themselves. In Northern Bahr El Ghazal more than three quarters (75%) live in poverty while in Unity and Warrap the proportion is 68 percent and 64 percent, respectively. The people in these states spend on average less than SDG2 a day (about US\$0.70) on food compared with up to SDG 3 in the relatively less poor states of Western Bahr El Ghazal, Western Equatoria and Central Equatoria. In South Sudan, less than 40 percent of the population has access to any form of health care. While some progress has been made in the area of immunization, the proportion of fully immunized children is only 5.8 percent. Half of all children do not attend school while 85 percent of the South Sudanese population is illiterate<sup>4</sup>.

## 1.3 Food and nutrition security

According to the 2012/2013 Annual Needs and Livelihoods Analysis (ANLA) report, about 77 percent of the population in NBELG was considered at risk of being food insecure, with some twelve percent of the households considered severely food-insecure and 39 percent moderately food-insecure. High prices of food was a shock experienced by 70 percent of the households in the state, while other shocks affecting residents included insecurity and lack of free access to markets. Most households in the state spend their entire meager income on food<sup>5</sup>.

The 2013/2014 Crop and Food Security Assessment Mission (CFSAM), estimated a deficit of about 60,000 tonnes of cereal in NBELG, with 75 percent of this deficit attributed to the returnees during 2013. Factors which contributed to poor production in the state include; flood (July and August) which affected about 45,000 people<sup>6</sup>, particularly those living within the western flood plains, and the June spell which affected production in a number of areas.

Nutritionally, 37 percent of households have poor or borderline food consumption, i.e. they consume limited or insufficient nutritious foods to maintain an active and healthy life. Of these, 16 percent have poor food consumption, mainly surviving on cereals and consuming no or very little protein, vegetables and dairy products (less than once a week). More than a fifth (20.8%) of the population has borderline food consumption, consuming cereals supplemented with small and infrequent quantities of proteins, vegetables, sugar and oils. Northern Bahr el Ghazal is among the top three states as far as nutrition security at household level is concerned. Over 60 percent of the households have poor food diversity<sup>7</sup>, with only 49 percent having acceptable food consumption score (FCS)<sup>8</sup> compared to the national average of 51.3 percent and 63.1 percent respectively<sup>9</sup>. The recent conflict between the opposition and the government has displaced a number of people, particularly from Unity state, into NBELG state. This

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<sup>4</sup>National Bureau of Statistics (2012). National Baseline Households Survey 2009. Report for South Sudan. National Bureau of Statistics, Juba.

<sup>5</sup>WFP Annual Needs and Livelihood analysis 2012/2013.

<sup>6</sup>OCHA, Flood response (Dec. 2013)

<sup>7</sup>Poor food diversity is defined as consuming fewer than four food groups (WPF).

<sup>8</sup>Food consumption score (FCS), which combines food diversity, food frequency (the number of days each food group is consumed, and the relative nutritional importance of different food groups.

<sup>9</sup>WFP, FAO, NBS, RRC (2012). Report on Food security and Nutrition in South Sudan

scenario put more pressure on the already poor food availability (deficit) from the local production, and may lead to worsening of the nutritional status of the population, particularly children and lactating mothers. Nutrition survey conducted in NBELG in 2012 showed Global Acute Malnutrition (GAM) rates of between 17.8 percent (Aweil West) up to 26.4 percent (Aweil North) with Severe Acute Malnutrition (SAM) of between 3.6 percent in Aweil West up to 8.2 percent in Aweil Centre<sup>10</sup>. These figures are above the WHO thresholds of 15 percent and 5 percent for GAM and SAM, respectively.

## 1.4 Humanitarian assistance (emergency aid)

In the face of recurrent conflict and flood, and high level of vulnerability to food and nutrition security, considerable effort is being made by the government, donors and a number of national and international humanitarian organizations to provide humanitarian support to the affected population in the country. Humanitarian assistance is being provided on regular basis including food and seed aid.

During the past ten years, seed aid has persisted in South Sudan, especially in the states<sup>11</sup> traversed by the Western and Eastern Flood plains some of which are more prone to conflicts. This is mainly in the form of direct seed distribution on the assumption that affected populations have lost their seed due to either frequent conflict or floods. A few organizations promote use of input trade fairs on a limited scale depending on availability of seed within the target location.

Although a seed system security assessment conducted in 2010 highlighted a significant role by the informal seed system in providing seed (availability) to affected populations even during emergencies, the humanitarian organizations have continued to directly distribute significant quantities of seed obtained from outside the country. For example, the government of South Sudan imported over 600MT of assorted crop seed for emergency distribution in 2012, while FAO has continued to provide between 800 and 1800 MT annually over the last ten years<sup>12</sup>. In the wake of level 3 emergency in South Sudan, FAO alone planned to directly distribute over 4,000 MT of assorted “certified” crops seed to about 200,000 affected households in 2014<sup>13</sup>. This seed was to be largely sourced from commercial suppliers outside the country.

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<sup>10</sup> Nutrition Cluster South Sudan Bulletin. Vol. 1. Issue 1, Dec. 2013

<sup>11</sup> NBELG, Warrap, Lakes, Unity, Jonglei and Upper Nile

<sup>12</sup> South Sudan Systematic review of the completed and ongoing seed security assessment

<sup>13</sup>FAO South Sudan, 2014 seed and tool distribution plan.

## 2.0 SEED SECURITY ASSESSMENT

### 2.1 Rationale

FAO plays a leading role in the food security and livelihoods (FSL) cluster coordination under the UN Work Plan for South Sudan. FAO implements emergency response and recovery activities for the restoration of livelihoods for conflict and natural disaster-affected populations (returnees, refugees, host communities and recently displaced). In 2013, FAO secured funds to support livelihood development for agro-pastoralists, particularly women and youth in North Bahr el Ghazal and Warrap states. The project aims to benefit 7,050 households or approximately 50,000 people in the selected States while building the capacity of government and state extension workers to positively impact food and nutrition security among agro-pastoralists in South Sudan. The main objective of this project is to improve food security, livelihoods and income for vulnerable but economically active agro-pastoralists. One of the specific objectives is to support the development of the seed sector with the following sub-objectives:

- i. conducting Seed Systems Security Assessment in Warrap State and Northern Bahr el Ghazal;
- ii. establish linkages with national and regional research partners to introduce new drought-resistant, drought escaping crop varieties, including fruits and vegetables, adaptable to climate change;
- iii. build the capacity of farmers' groups in community based seed production and quality control protocols;
- iv. build the capacity of State/County Actors in quality control and certification of community based seed;

Predominant emergency and rehabilitation support is characterized by provision of agricultural inputs, particularly seed of staple food crops (maize, sorghum, bean, cowpea and groundnut and sesame), and hand tools (hoes, maloda, sickles, panga etc.). Although, a comprehensive seed system security assessment was carried out in 2010 (CIAT et al., 2011), this assessment provided only a baseline synopsis in the face of recurrent crisis. Therefore the plan to provide emergency seed assistance to the vulnerable population as well as the need to support the development of the seed sector prompted this assessment. Against this background, FAO South Sudan, with support from the FAO Sub-regional Emergency Office for East and Central Africa (REOA), and collaboration with the State Ministry of Agriculture and Forestry (SMoA) and NGO partners (VSF and Samaritan Purse) conducted this Seed Security Assessment (SSA) in NBELG state.

### 2.2 Objectives

The main objective of the assessment was to examine and analyze current seed security situation and provide direction for supporting emergency response and seed sector development in the two states,

Specifically,

- To critically and constructively review past emergency and rehabilitation seed-aid related activities in the two states to provide lessons learnt.
- To assess the current seed security situation (availability, access, quality and varietal suitability) among various types of farmers and within the agro-ecological systems in the two state

- Examine seed demand and potential supply sources within the two states with the aim of identifying potential groups and/or local seed enterprises that could be supported to produce the seed on demand.
- To provide a comprehensive information base (report) on the basis of which to design appropriate seed system support intervention linked to promoting agricultural growth and seed security.

## 2.3 Assessment methodology

The seed security assessment conducted in NBELG state was collaboration between FAO South Sudan, the State Ministry of Agriculture and Forestry and two partner NGOs (KUCDA, VSF-S and Samaritan Purse internationals) with technical support from the ECHO Capacity building project through FAO REOA. The methodology for the assessment was based on the revised seed security conceptual framework (SSCF) which looks at four elements – availability, access, seed quality and varietal suitability at household and community levels.

### 2.3.1 SSA Training

Two day training was conducted at the State Ministry of Agriculture office from Friday 21<sup>st</sup> to Saturday 22<sup>nd</sup> February 2014. A total of 12 participants (2 from FAO; 7 from SMAF and 3 from NGO) attended the training. The objectives of the training were to: a) provide sufficient skills to FAO, SMAF and NGOs staff in conducting seed security assessment based on the revised seed security conceptual framework (SSCF), b) to deepen their understanding of the impact of shocks and or stresses on seed security of the affected population. Major training areas were;

- Introduction to seed system security: Seed and variety; Seed system – formal and informal; Seed channels; Seed security – the conceptual framework; Seed and food security.
- Seed security assessment: assessment objectives; Assessment focus –Crop subsystem, Disaster description; Crop/seed system profile;
- Data collection using various techniques/tools such as key informant interview (KII), household survey, local market survey, Agro-input dealers interview, seed growers interview, Seed aid organization interview

### 2.3.2 Data collection

Primary data collection commenced immediately after the training using various data collection techniques (Table 1), while secondary data was obtained through reviews of project and assessment reports, and other existing literature.

Table 1. Data collection technique

Technique	Summary description	Total
1) Key informant interviews	Director General, Director for Agriculture, 3 Senior Inspectors of agriculture at county levels; 1 NGO nutritionist (ACF); 2 project officers (VSF and SP)	8
2) Household surveys	Farming households	83
3) Focus group discussions	1 farmer group; 2 women groups and; 4 community	7
4) "Seed group" interview	1 group	1
5) Local market survey	4 traders from Aweil market and 6 from Aweil East	10

**Key informant interviews:** These were done using a standard KII interview guide which focuses on understanding the general agricultural context; the activities of agro-input dealers and seed production activities; access to seed policy and other relevant agricultural documents; disasters and impact on seed security; and insight into food and nutrition security from an expert point of views.

**Household surveys:** Household surveys were conducted in six payams from three counties (Table 2). The payams and counties were purposely selected based on accessibility while taking into consideration the two livelihoods zones. Each payam was covered by a team of three, with each member sampling and interviewing the 4-5 households along transect at regular intervals. The household survey questionnaire focused at demographic and livelihood characteristics; crop/seed system profile; and seed/channels sourcing in reference to the SSCF.

Table 2. Sampling location and sampling size

County	Payam	Ecological zone	N
Aweil Centre	Aroyo	Ironstone	16
	Nyalath	Ironstone	14
	<i>Sub-total</i>		<b>30</b>
Aweil East	Mangar tong	Flood plain (highland)	12
	Manyiel	Flood plain (lowland)	12
	<i>Sub-total</i>		<b>24</b>
Aweil South	Nyoc Awany	Flood plain (highland)	10
	Wathmouk	Flood plain (lowland)	19
	<i>Sub-total</i>		<b>29</b>
<b>Grand Total</b>			<b>83</b>

**Focus group discussions:** Focused group discussions (FGDs) were held with women groups and mixed groups within the community immediately after the household interviews, to provide additional information on seed security of the community. The focused groups provided additional qualitative information on the seed security situation.

**“Seed group” interview:** The seed group interview was conducted using a semi-structured questionnaire to establish the nature of the group, understand their production activities, capacities (skills and resources at hands); the challenges they are facing; and their investment plan.

**Local market survey:** local market survey was done using a structured questionnaire with 10 grain/seed in Aweil Centre market and Weil East market.

### 2.3.3 Data management and analysis

Household survey data was coded and entered into an excel data sheet for management and analysis. Data were checked and cleaned using data filtering application in excel, while statistical summaries of frequencies (counts)/percentages, averages, SD etc. were generated using pivot table analysis.

## 3.0 KEY FINDINGS AND DISCUSSION

### 3.1 Household demographic and livelihood characteristics

Northern Bahr el Ghazal is predominantly male headed - about 80 percent (Fig. 1a), though most agricultural activities are done by females as reported by the respondents who were mostly women. The majority (95.2%) of the interviewed households are residents while IDP and Returnees form small proportion (4.8%) of the population (Fig 2b). The average household size is 6.7 persons, with about 27 percent being children bellow the age of five and 37 percent being in the productive age group (16-60) that is expected provide most of the required household labor force (Table 3) in a livelihood system which is a predominantly subsistence agro-pastoral.

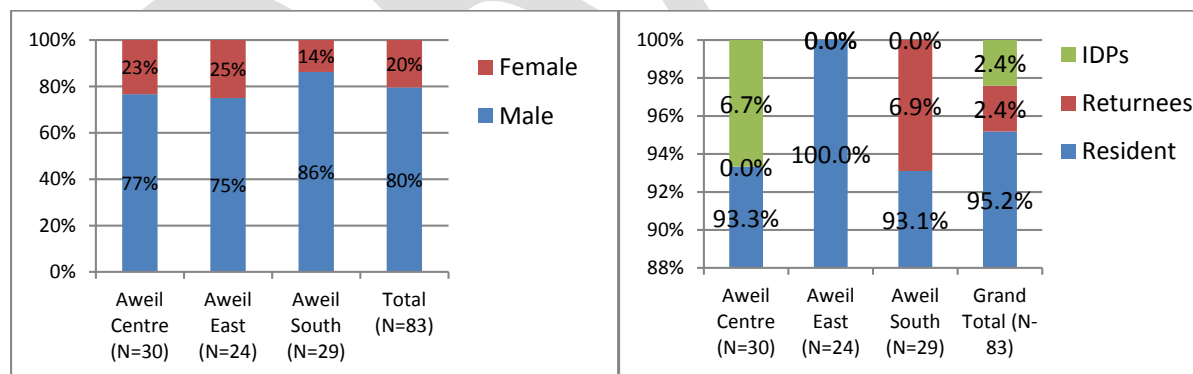


Fig. 2.(a) Head of the households and b) resident status

Table 3. Household size

Row Labels	HH Size	% children (<5)	% of workforce (16-60)
<b>Aweil Centre</b>	6.2	26%	40%
<b>Aweil East</b>	7.7	25%	35%
<b>Aweil South</b>	6.3	30%	36%
<b>Grand Total</b>	6.7	27%	37%

In general 77 percent of the households are agro pastoralists (Fig. 3a), growing crops such as sorghum, sesame, groundnut, okra etc. Common types of livestock kept by the agro-pastoralist are cattle, kept by about 30 percent of the households; goats kept by over 50 percent of the households with significantly higher proportion (70%) in Aweil East county. Sheep are kept by relatively fewer households compared to other animals (Fig 3b).

The average number of cattle (5.5), Goat (7) and sheep varies from county to county, with the number of sheep in Aweil East significantly higher than other counties (Table 4). The average number of poultry does not vary significantly from county to county.

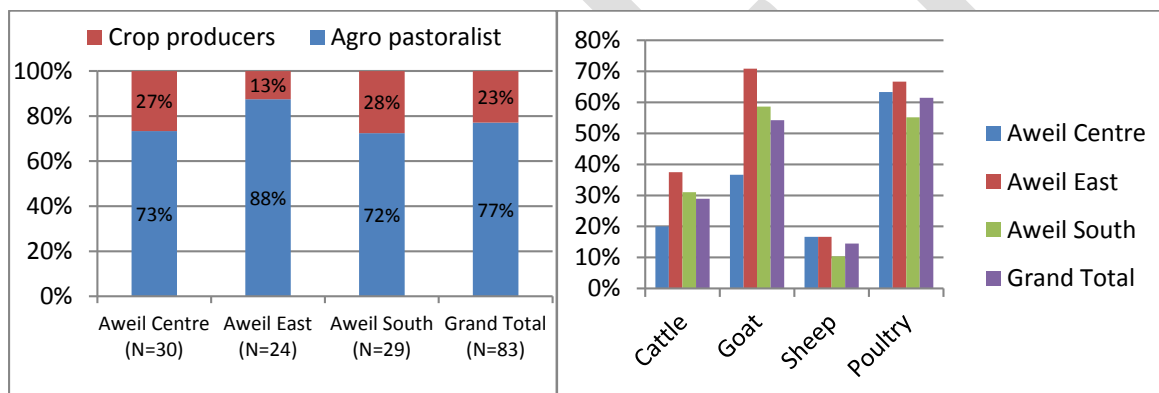


Fig. 3.(a) Overall percent of pastoralist and b) percent of households having different animals

Table 4. Average number of animals per households (among agro pastoralist)

Row Labels	Cattle	Goat	Sheep	Poultry	Animal Units
<b>Aweil Centre</b>	4.0	7.8	5.2	6.3	2.1
<b>Aweil East</b>	6.4	8.5	13.0	7.0	4.8
<b>Aweil South</b>	5.8	4.6	3.0	5.7	3.3
<b>Mean</b>	5.5	7.0	7.6	6.3	3.4
<b>SD</b>	1.2	2.1	5.3	0.7	1.3

The major source of income in NBELG is petty trade (58%) characterized by sale of items such as grass, fuel wood and charcoal (Fig. 4). This, in combination with the need for building materials (poles and burnt bricks) is contributing significantly to environmental degradation in some areas where the practice is becoming predominant.



Crop sale is the second most important source of income with 23 percent of the households dependent on it. This could have been due to the fact that the majority of the households interviewed indicated that they had poor harvest and could not afford to sell significant quantity of their crop to meet their domestic needs. However, in Aweil East county sale of livestock is considered a more important source of income than sale of crops. Salaries are the third most important particularly in Aweil East and Aweil South, where 17 percent of the households indicated this as an important source of income. It is important to note that, this is mainly for households headed by men working in the armed forces.

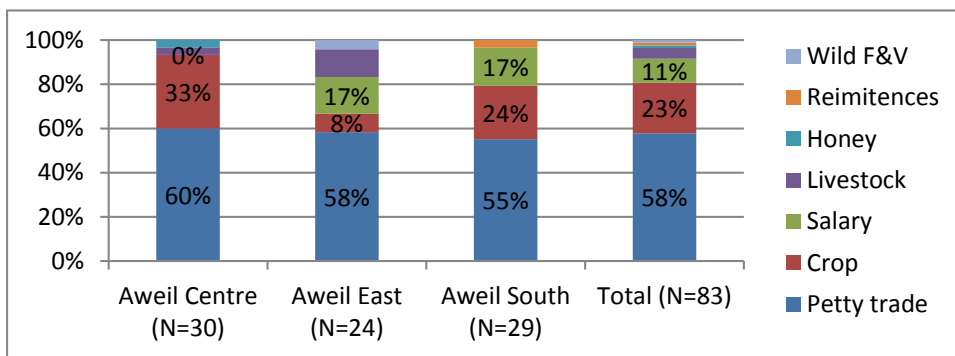


Fig 4. Major sources of income

### 3.2 Crop/seed system profile

Crop production is an important livelihood activity for nearly all the households in the state. Major crops cultivated in 2013 include; sorghum by 100 percent of the households interviewed, groundnut (52%), sesame (40%), Jew mallows (42%), maize (35%) and okra (31%)(Fig. 5).These crops are typically grown under rain-fed conditions with the planting season starting around May and extending into June depending on the crop and variety.

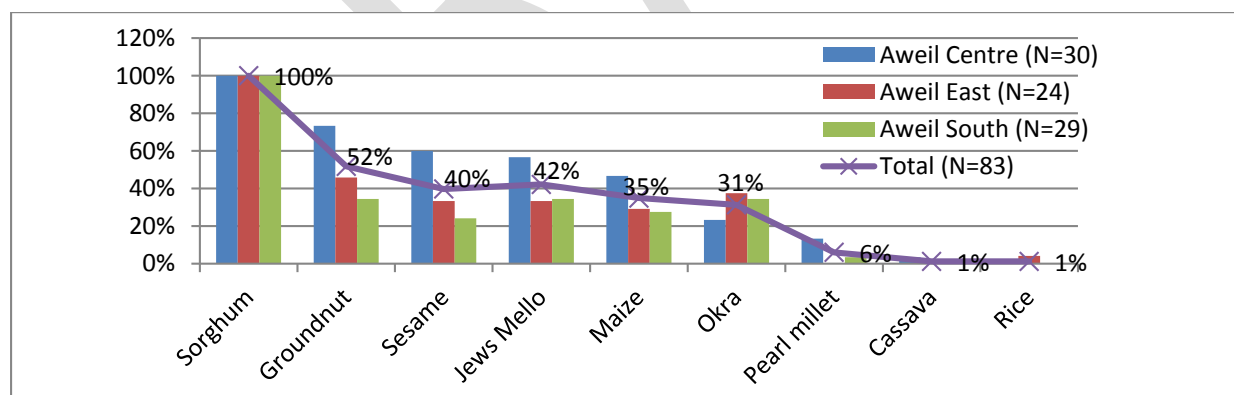


Fig. 5. Crops grown by farming households in NBELG state

#### 3.2.1 Crop diversity at household level

Although a wide range of crops could be grown in the state, a significant proportion of farming households (45%) are depending only one or two crops, particularly in Aweil Centre and Aweil South where 54 and 52 percent, respectively depend on 1-2 crops (Fig 6a). This is very much pronounced within the livelihood zones where 60 percent of the households in the lowland area of the western flood plain (Fig b) depend on just one to two crops (Fig. 6b). Considering that a significant proportion of the households depend on

only 1-2 two crops puts them at high risk of food and nutrition insecurity especially in the event of crop failure due to natural events such as prolonged dry spells and floods, which are quite common in the livelihood zones of NBELG.

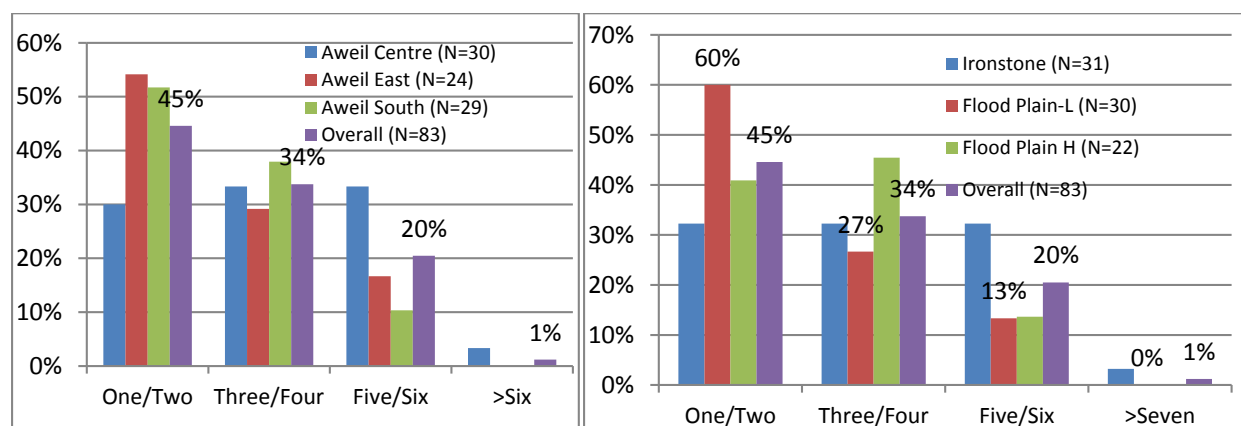


Fig 6. Crop diversity per household based on a) geographic location and b) livelihood zone

### 3.2.2 Crop production and general performance

Crop production in the state is still highly subsistence, with a majority of the famers using traditional hand tools such as *panga*, *maloda* and hoe for land clearing and planting with almost no external inputs. On average, the area under cultivation for each crop ranges from 0.2 to 1.3 feddan<sup>14</sup> per household, with intercropping as a common practice for sesame (72%) and sorghum (61%) which eventually influence the overall total area cultivated by the households. Other factors that influence farm size are household size and access to animal traction.

Although the seed rate can vary with the cropping practice and planting methods, the famers on the whole use about 10kg of sorghum, 20kg of groundnut and 4 kg of sesame per feddan (Table 2). Sorghum and sesame seed rates are slightly higher than those recommended by research, probably due to the practice of broadcasting. Sesame is commonly intercropped with sorghum in a ratio of 1: 6 (sesame: sorghum) seed, and this practice significantly affects the yield of the crop.

It is important to note that the seed rate also depends on particular problems faced by the farmers. For example, some famers in Aweil East County plant one groundnut seed per hill while others plant two seed per hill resulting in twice the seed rate. The practice of planting two groundnut seeds is to overcome certain pest problems in the field, particularly rats and birds that feed on seeds just after planting, a common problem in the midlands of the Western Flood Plains.

Table 5. Average production and seed need per household

Crop	Area (feddan)	Seed used (Kg)	Harvest (Kg)	Yield (Kg/feddan)	Seed Rate (Kg/feddan)	Multiplication rate	Intercrop
Sorghum (N=83)	1.3	11.8	199.9	139.9	9.7	14.5	61%
G/nut (N=43)	1.3	21.9	238.0	186.4	19.9	16.3	33%

<sup>14</sup>Feddan = 4200m<sup>2</sup>

<b>Sesame (N=32)</b>	1.2	5.4	49.5	39.6	4.3	14.2	72%
<b>Okra (N=10)</b>	0.2	5.4	15.6	104.7	52.0	51.1	40%

The crop performance and harvest were considered poor by about 60 percent of the farming households (Fig 7a). The overall average yield estimates (kg/*feddan*) for sorghum, groundnut and sesame were about 140, 180 and 40, respectively (Table 5). Despite the general poor harvest/yield reported by the famers, the multiplication rates for all the crops were still above 14, giving hope that famers own production could still be a potential source of seed for the 2014 planting seasons.

Though there seems to have been very poor harvest, good harvests were observed in the highlands by about 16% of the famers, with an average of 395 kg/*feddan* for sorghum, 415 kg/*feddan* for groundnut and 100kg for sesame. This good yield is similar to that reported by the CFSAM carried out between October and November 2013 in which yields of sorghum were estimated at 920 kg/Ha (383kg per *feddan*), giving a multiplication ratio of 1:38-40 for sorghum.

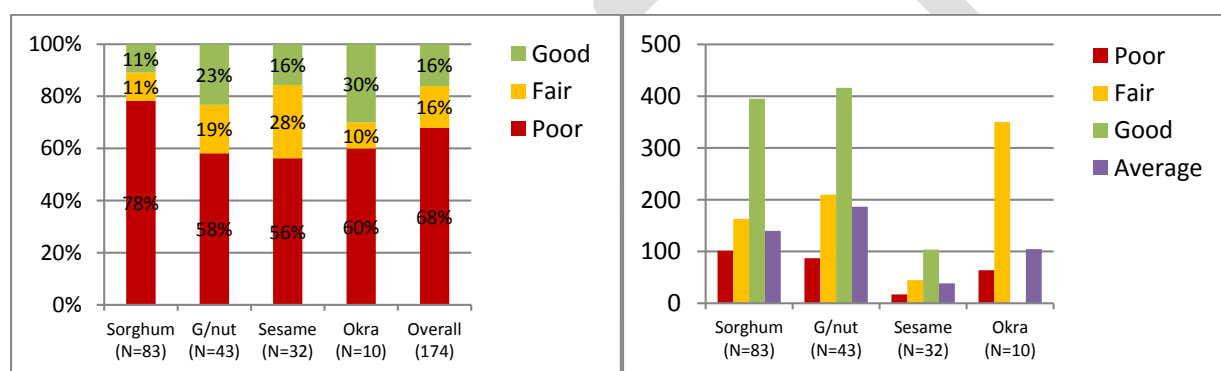


Fig 7. a) Crop performance rating, and b) average yields by households in NBELG

### 3.2.3 Factors which affected production in 2013

One of the major reasons for poor performance of the crops was prolonged dry spell (54%) which was reported by about 76% of the households in the Ironstone Plateau and some 47% from the highland areas of the Western Flood Plains (Fig. 8a). Another major constraint was flood as reported by 24% of the households, with significantly higher number (44%) in the low land areas of the western flood plains. Focused group discussions in the Mariem West Payam revealed poor harvests in a bad year at 200 kg/*feddan* while in a good year, the production ranges from 350 to 450 kg per *feddan*. Being in the flood plain, low crop production is normally experienced in years with heavy rains and extensive flooding.

In a number of focused group discussions, the famers indicated that dry spells were experienced in most areas in the first three weeks of June, almost one month after the onset of the rains in May. This dry spell forced some of the famers to carry out replanting of the early planted crops. The remote sensing vegetation indices (NDVIs) and rain gauge data for NBELG (Fig 8b) confirmed the observation made by the famers. In August and September, localized floods affected crops and settlements across South Sudan<sup>15</sup> and about 40,000 people were affected<sup>16</sup> in North Bahr el Ghazal.

<sup>15</sup> CFSAM, 2014

<sup>16</sup> OCHA, Dec. 2013

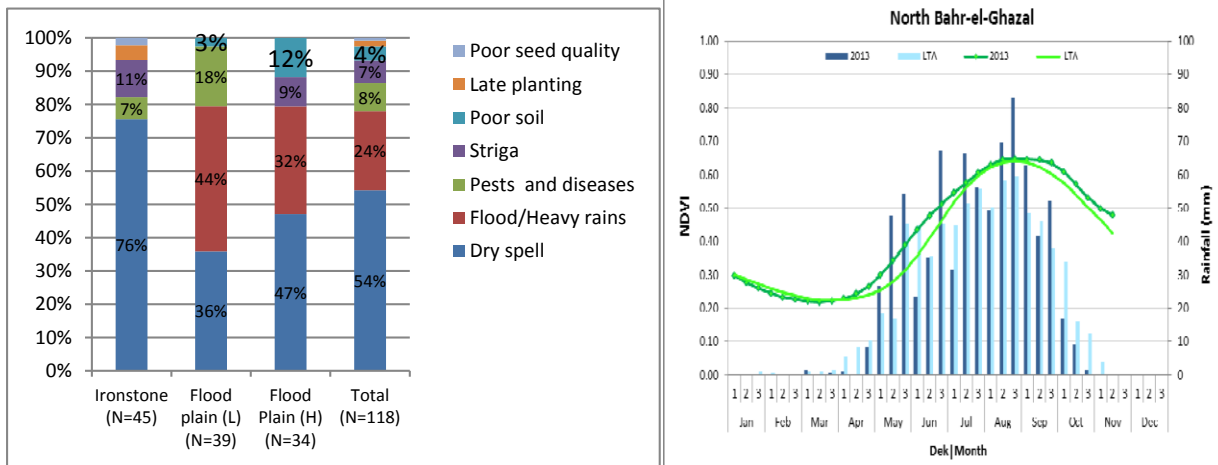


Fig. 8. a) reasons for poor harvests and b) rainfall data for NBELG

### 3.3 Analysis of seed sources (household and community levels)

#### 3.3.1 Availability of seed from major seed sources/channels

Farmers in Northern Bahr el Ghazal source seed from various sources. The major seed sources are own seed (55.9%) and local market (41.4%) while seed aid (1.5%) and social network (1.2%) social network play insignificant roles as seed sources (Fig. 9a) among the farming community in the state. This finding is similar to the 2010 comprehensive seed security assessment where over 80% of the seed planted came from the informal sector, although about 55% of the households indicated inadequate supply of seed from the various seed sources (Fig. 9b).

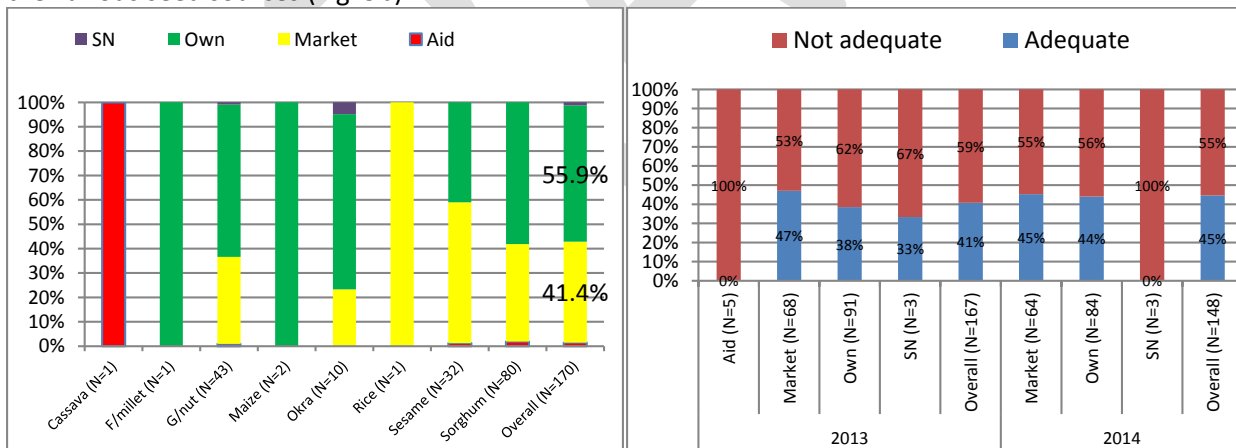


Fig 9. a) seed sources and b) supply from these sources in the state

In Mariem west payam and Nyalath, FDG members echoed similar sentiments about the seed sourcing where most of them confirmed that they depended on seed from their own production as well as the local market. Even among the returnees, the market seemed the most practical option. Unlike direct seed distribution, the market offered them the opportunities to select the varieties they are familiar with. For example when Mrs. Regina Adut returned from Khartoum in 2007, she had to buy all the four sorghum varieties she needed from the local market as she knew the importance and suitability of these varieties even before she was displaced. Buying seed was not difficult as she had money at the time she came back, although this might not be the case for all the returnees or displaced households. The notion that famers sometime eat seed when under stress could be misleading in many cases. Seed availability was well expressed by Ms Regina Adut during the discussion (Box 1).

Box 1: “When I came back from Khartoum in 2007, there were few people around that I knew. I had to go and buy all the four varieties of sorghum from the Market. Since that time, even if I am hungry, I will keep seed for next planting season” Said, Regina Adut.

### a) Proximity and timing

Although a significant number of famers (40%) indicated the local market as one of their major seed sources, some of these markets were far from these famers, and some (54%) had to walk long distances or incur additional costs in order to access seed from these markets (Fig. 10a).

Because most famers either saved their own seed or bought in the local market, these seeds were available at the time when needed and mostly before the planting season began (Fig. 10b), which thus enabled early and timely planting. There were, however, concerns about the timeliness of seed provided by the seed aid organizations, since about 40% of those who accessed seed from such source were provided seed too late in the middle of the season. For example, cassava cuttings were delivered by FAO in mid-September 2013, and most of the stock could not be planted because it was too late. Such practices make the affected population even more vulnerable as the likelihood of these crops failing due to late planting is quite high. Humanitarian organizations should therefore ensure timely delivery of seed to the affected population.

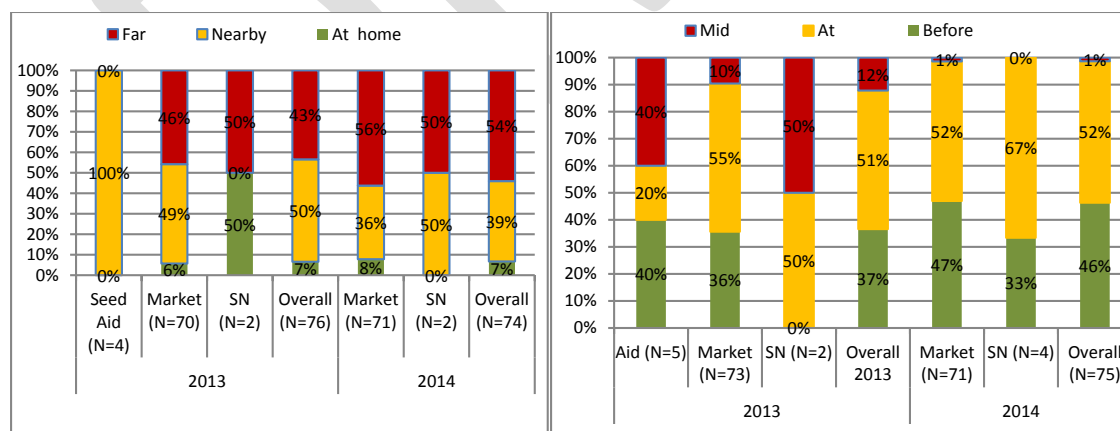


Fig. 10. a) Proximity of the seed source and b) timing of seed supply

### 3.3.2 Seed access by farming households

All the households who received seed from aid organizations got it free of charge, making it affordable as most indicated that they were delivered close to where they lived. Of concern were the prices of seed in the local market. Although more than 80 percent of the famers who got seed from the market complained about the relatively high prices, the majority of them also bought seed with cash (Fig 11.a&b).

Trend analysis showed that significant increase in prices as the planting season approached. Such increase in price was a general trend for agricultural commodities because of dwindling supply. In Aweil market for instance, varieties that were normally planted were sold at the same price as those not planted. A slight variation in price of groundnut in the same market was a result of varietal mixture. Mixed varieties are normally sold at relatively lower prices (17 SSP) compared to pure varieties (18 SSP). The famers normally go to the market for a number of reasons such as when they don't have enough of their own seed after poor harvest; or when they are in need of specific varieties or varieties that other sources could not provide.

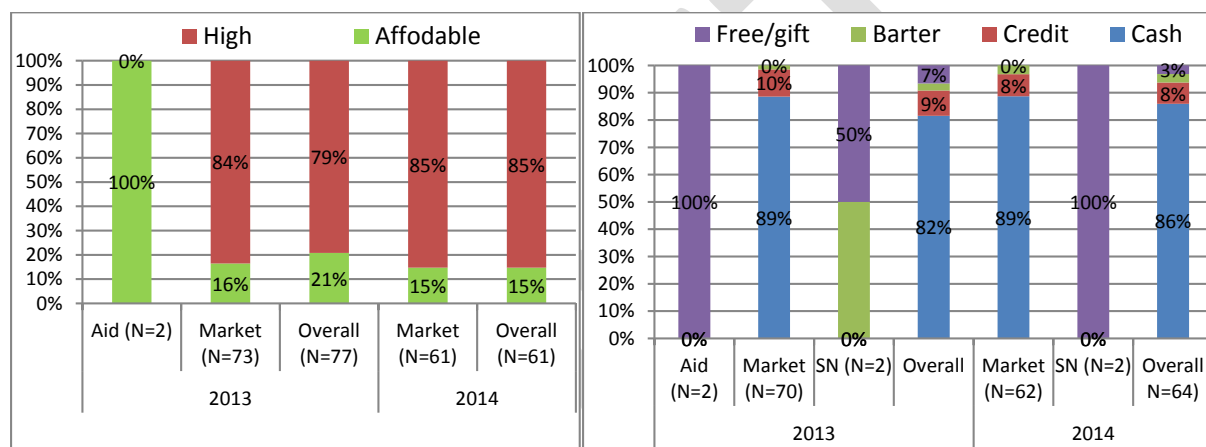


Fig. 11. Price rating and mode of transaction

Considering that those who go to the market do pay cash, the possibility of developing a market oriented seed production and supply is high. In addition, seed could be provided to famers on a subsidized rate other than just giving it for free.

**Opportunities for Improving access to seed of choice.**

Opportunities for improving access to seed lies within improving access to income generating activities, particularly during the dry season prior to the beginning of the planting season. For example the women in Mariem West payam are mostly engaged in dry season vegetable production as an income generating activity. They grow a wide range of vegetables such as Kale (Sukama), Okra, Egg plants, Peslence (Regular), tomato, pumpkin, amaranths, Rocket (jirjir) and other local vegetables. The women depend on APARD, local NGOs which normally partner with FAO, as the source of vegetable seed to the famers in the area. It's important to note that besides the seed aid; they keep seed of okra, tomato, egg plants, pumpkin and other local vegetables.

They, however, find difficulty in producing, processing and storing other vegetable seeds. Other concerns of the women include;

- Pest and diseases for vegetable crops;

- Difficulty in irrigating the crops during the dry season.
- Lack of crop diversity as they are depending much more on sorghum and sesame as the major crops.

### 3.3.3 Seed quality

Generally, there is no much concern about the quality of seed from the majority of households surveyed. In terms of physical quality, over 80 percent of the famers considered the seed from a number of sources as clean with less than 1% considering the seed not clean (Fig .12a). Similarly, over 85% of the farming households who planted seed from various sources considered germination of seed good, while some 13% considered they had fair germination (Fig. 12b).

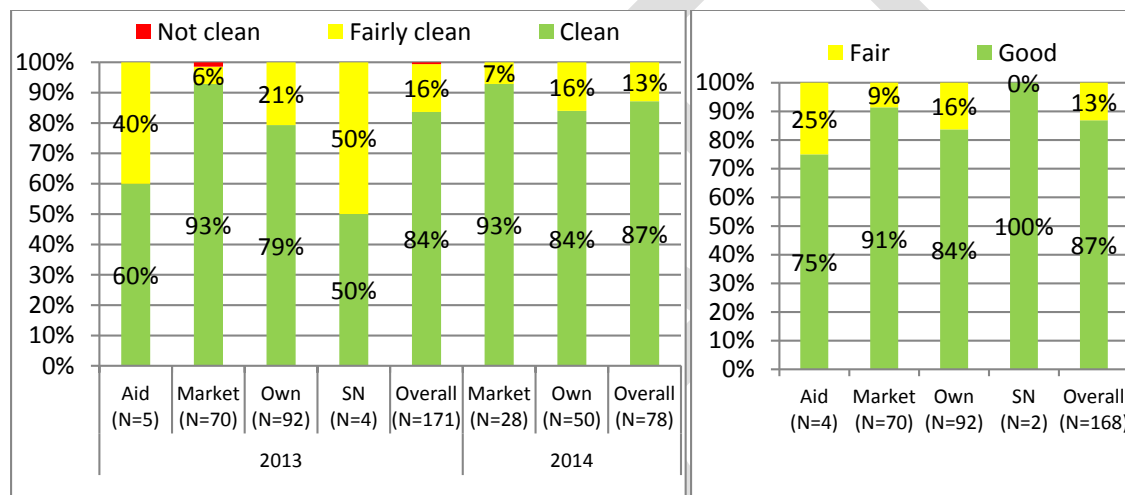


Fig. 12.a) Physical and b) physiological (germination) quality of seed from various seed sources

### 3.3.4 Suitability of crop varieties

A majority of the famers in the state grow mainly local varieties of sorghum, groundnut and sesame. Although up to 2-4 varieties exist for groundnut or sesame, a majority of the famers use only one variety of each crop at a time. For groundnut, the major variety is *Bedibedi*<sup>17</sup> while for sesame the popular variety is *Nyuwella*. From the various focus group discussions across the state, the other less popular variety of groundnut is *Abuabil*<sup>18</sup> and for sesame is *Nyumchol*. Abuabil is a common term used to describe the few spreading types of groundnut which is considered difficult to harvest, especially when planted in soils with relatively high clay content, or when dry spells commence at the start of the harvest.

From the focused group discussions and observation and assessment during the Agricultural Trade Show (ATS) held between 1<sup>st</sup> and 3<sup>rd</sup> March 2014, over 10 sorghum varieties are being grown in the state (Annex), and about 3-4 varieties are grown per payam/boma. Among the various sorghum varieties, *Malual* and *Anyanjang* are the most popular, and are grown by 49 percent and 40 percent respectively of the households (Fig. 13a). *Malual* is red seeded, long maturing (6 months) and flood tolerant while

<sup>17</sup> An erect variety of groundnut.

<sup>18</sup> This is a term used to describe most of the spreading type of groundnut varieties which big seeded and considered difficult to harvest



*Anyanjang* is white seeded, short maturing (3 months) and preferred for food as well as bridging the hunger gap though some 10 percent of the households indicated it is not their preferred variety. In general, most of the local varieties cultivated in the state are considered well adapted and preferred by the farmers, as they know where and when to plant these varieties.

Other varieties such as *Yar*, *Luel*, *Nyithin* and *Rapchol* are very location specific in popularity depending on the agro-ecological zone, and local preference by the community. For example, *Yar* is a popular variety in Mariem West Payam, Aweil East, because it helps in filling the hunger gap due to its short maturing nature (2 months). This variety is normally harvested in July when the floods start and hence escapes the peak of the flooding season. Although a variety such as *Raphier* did not appear among the major varieties during the household survey, the women who participated in the FGD in the Mariem West Payam, considered it the most preferred variety for food due to its attractive white color, taste and elasticity.

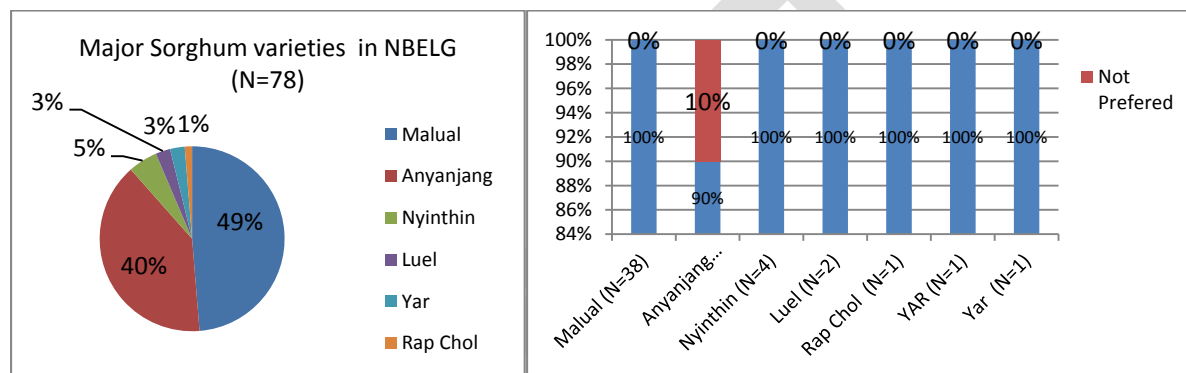


Fig 13. a) Major sorghum varieties and b) their preferences

During a focused group discussion with the women in Mariem West, Ms Bahita Ajok Akok, who was the only seed aid beneficiary (5.6%) among the 18 women, attested that the varieties (could not remember the names) of sorghum and sesame she received were not well adapted to the flood zone and she discontinued using them. From the household survey, the improved varieties of sorghum (*wad Ahmed*), groundnut (*Serenut*, *Sodari*) and Sesame (Sesame 2) provided by humanitarian organizations such as FAO in the early years (2007-2010) did not feature anywhere among the major varieties being grown by the farmers. This raised a concern whether it is worth or relevant providing improved varieties in a humanitarian context, especially when these varieties have not been formally tested.

### 3.4 Local Market Seed Supply and Demand

The market in Aweil towns and Aweil East county HQ are well established with a number of traders selling groundnuts, sorghum, pearl millet, common beans, cowpea and vegetable seed. Weekly and monthly markets are held on specific days known to both farmers and traders. Traders are very knowledgeable about the varieties that are adapted and preferred by farmers as well as the period (April/May) when farmers ask for specific varieties for planting.

Traders source their grain/seed from various sources which include among others; a) own production i.e. some of the traders are themselves farmers; b) buy from other farmers from within the state; c) Some traders buy their produce from as far as the Darfur states of Sudan, particularly sorghum, broad beans (*ful*) and vegetable seeds.

### 3.4.1 Market Varieties and their suitability

Traders dealing in agricultural produce in Aweil Centre and Aweil East markets are very knowledgeable about the varieties, their suitability and use. For sorghum varieties brought from Darfur states, traders acknowledged that these are mainly for food and not in any way used as seed by the farmers. Popular local sorghum varieties such as *Anyangjang* and *Malual* are sold both as food and seed (Table 6). These are also the major varieties planted by the households. There is also large volume unidentified sorghum variety from food aid (WFP & USAID) on the market that is mainly sold for food.

Table 5. Crop varieties commonly found in Aweil Market

Crop	Variety	Type	Source	Adaptability	Use
<b>Sorghum</b>	Federitha	Improved	Darfur (Sudan)	Not well adapted	Food
	Mayo	-	Darfur (Sudan)	Not adapted	Food
	Anyangjang*	Local	NBELG	Well adapted*	Food and Seed
	Malual**	Local	NBELG	Well adapted**	Food and Seed
	USAID & WFP	-	-	Not adapted	Food
<b>Groundnut</b>	Bedbedi***	Local	NBELG	Well adapted***	Food and seed
<b>Sesame</b>	Nyuwela	Local	NBELG	Well adapted	Food and seed

Adaptability: \*Popular in the lowland areas of the western flood plains; \*\* grows well in the ironstone plateau; \*\*\* grown in the “highland” of the western flood plains and Ironstone plateaus

### 3.4.2 Seed Availability and Demand

Currently traders are having significant quantities of grain/seed stock. One trader had stocked about 100 bags (4500kg) of *beriberi* groundnut varieties and two other traders had 30 bags (2700kg) of sorghum and intended to stock addition 20 bags of *Anyangjang* and 10 bags of *Malual* in anticipation for the March April demand.

Box 2. Mr. Santo Wieu, A trader in Aweil Market had 85 bags (7,650kg) of *Anyangjang* and 30 bags (2,700kg) of *Malual* at the beginning of February and by the beginning of March he had already sold 70 bags (6300kg) of *Anyangjang* and only 15 bags (1,350kg) of *Malual* giving him a sale ratio of about 5:1

Although traders sell their produce both for food and seed, most of them pointed out that the demand for seed normally comes around April/May when the supply is dwindling, and this is also when they sell at high prices (Table 7). The annual (2013) price fluctuation from the Aweil market shows that the price peaked up in May which is also the start of the planting season in Northern Bahr el Ghazal state (Fig. 14)

The demand for a given crop grain/seed also varies according to the variety. For examples, Sorghum variety *Anyangjang* has higher demand in the local market than *Malual* (Box 2).The high demand for *Anyangjang* is attributed to its adaptability as well as its white color and the sweetness which is much more preferred for food as well as for production. For groundnut, the prices varied not only with variety but also depended on the mixture of varieties. Pure varieties (based on the seed color) fetched slightly higher values (5.8%) than mixture of varieties.

Table 7. Prices major crops in Feb/March and the Expected April/May price

Crop	Price (SSP) per kg					
	Feb/March	April/May	% increase	Lowest	Current	Highest
Sorghum	4.0	5.0	25.0%	3.0	4	6
Groundnut	2.8	4.4	37.3%	2.2	2.8	4.4
Sesame	5	7	40%	2.7	5.0	7.5

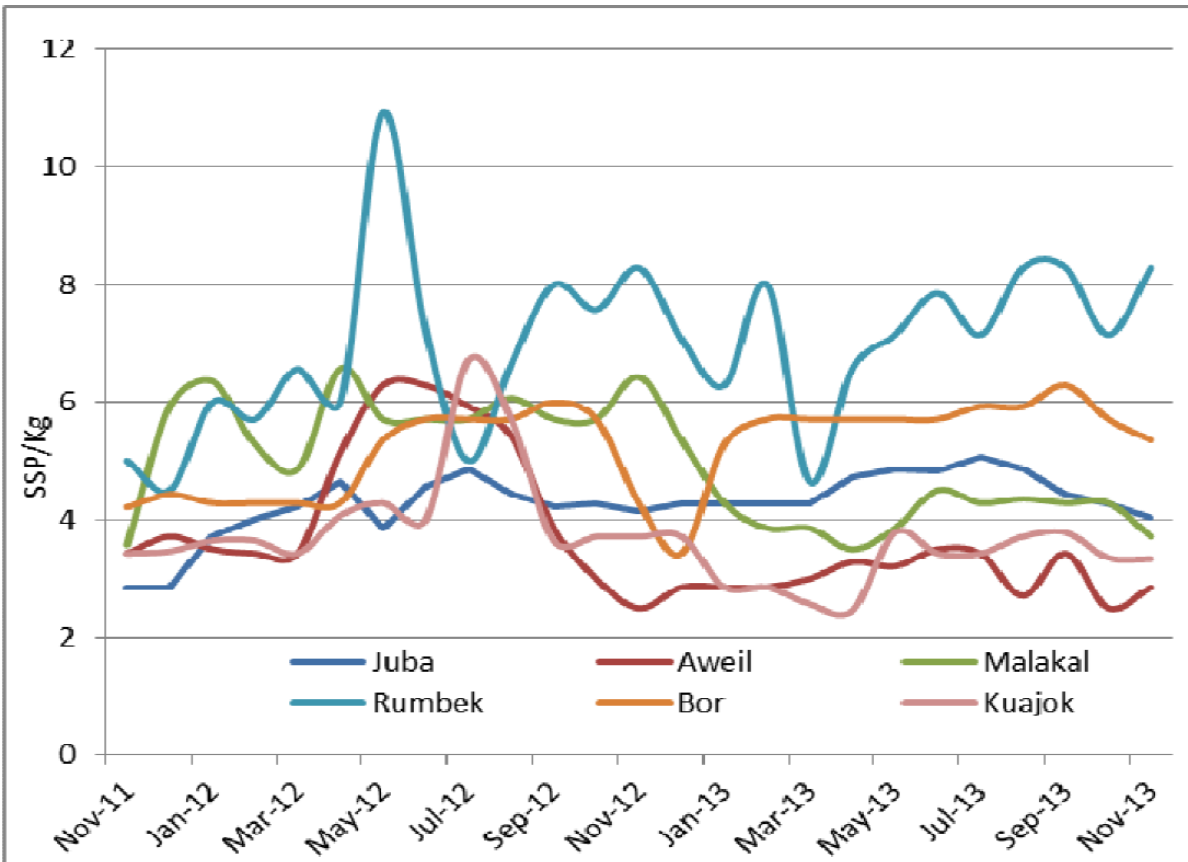


Fig. 14. Seasonal variation in prices of sorghum in South Sudan markets in 2013 (Source CFSAM, 2014)

Where there is external demand, i.e. Where other traders from locations outside the state come to buy in bulk from the farmers, the prices of agricultural commodities tend to rise with such demand. Sesame for example was bought by Arab traders from the north, while groundnut was at high demand in Western Bahr el Ghazal state.

### 3.4.3 Seed/Grain storage and conditioning

Traders stored their grain/seed partly in stalls within the market as well as other stores located outside the market. Though the stall floors are well cemented, some bags of grain were put on the floor without any pallets. In addition, the store had poor ventilation and some of the grains were displayed in an open sun where the external average day temperature goes as high 35-45°C around March. These practices by the traders could easily affect viability and germination of some seed.

Limited efforts were undertaken by the traders into improving the commercial value of their grain/seed including the selection of the grain from their suppliers based on cleanliness of the grain; additional cleaning of the grain/seed themselves as well as sorting out broken, shriveled and discolored grains/seed especially for groundnut.

### 3.4.4 Vegetable seed

Two traders in Aweil market were the major suppliers of vegetable seed in Aweil town and the surrounding counties. They specialized in selling four vegetable seed; perslene (regular), Jew mellow,

Rocket and Sugar beet. These seeds were mainly brought from Nyala in South Darfur state. The prices for these varied according to the exchange rate, and currently the traders are selling a kilogram of Perslene at 85 SSP/kg while the rest of the seeds are sold at 65 SSP/kg. The price of Perslene is considered a bit expensive by the farmers, but they have continued to buy it, and complain when they run out of stock. There are however, smaller units of measurement ranging from as small as 100g to 500g depending on what the farmers can pay for.

On average, for each crop type, the trader sells about 7 bags (350kg) per week and indicated that there is plenty of supply from their supplier in Darfur. However, it was noted that between August and September, the roads become impassible which can adversely affect supply and cause shortages for a few days or weeks.

Traders noted that farmers sometimes ask for other vegetable seeds such as cucumbers, eggplants and tomatoes including agro-chemicals but they lack the means to bring all these. There are no agro-input dealers in the state.

### 3.5 Potential for Market-Oriented Seed Production

Preliminary information from FAO field staff and the Senior Inspector for Agriculture in Aweil East County revealed the presence of seed producers groups in the state as well as some individual seed producers at county levels. Meeting with Waradoth Farmer Group in Nyalathpayam, Aweil Centre County, State however revealed more of farmer group efforts to increase production through self-help group formation. Waradoth farmer group was formed in 2010 as self-help group, and has a total of 53 members (75% women, 55% youth), with chairperson, vice chairperson, secretary and store keeper.

#### 3.5.1 Crops, varieties and seed source

Waradoth farmer group is involved in production of the sorghum and groundnut, mainly to increase food availability among members. Major variety of sorghum cultivated by the group is *Machot* while for groundnut is *bedibedi* although there are other sorghum (*Nyindok*) and groundnut varieties (*Abuabil*) grown by the farmers within the payam. All these are local varieties considered adapted to the Ironstone Plateau. *Machot* is considered to be high yielding and easy to thresh compared to *Nyindok* which was white in color and much more liked for the quality of flour it produces. The groundnut variety, *bedibedi*, is an erect type (easy to uproot) and the *Abuabil* is a spreading type (difficult to uproot).

The initial seed stock for production was provided to the group by a Charity Organization (CO), a local Community-Based Organization (CBO) that partnered with FAO to provide agricultural support to the farming community in the area. Discussion with FAO staff in Aweil field office revealed that the seed was 'recollected' from the local seed vendors within the state. No concern was raised about the quality of the seed provided. It should be noted that this charity organization supports about 7 of such farmers' groups in the county.

#### 3.5.2 Production

*Production activities:* Production is normally done in group fields where members contribute their labor for field operations (opening up land, planting, weeding, harvesting and drying). After harvest, except in 2011 when some 20 bags of groundnut were sold, the produce is normally divided among the group.

members and part of it kept as seed for the next planting season. Over the years, the group has progressively increased their groundnut output from 1350kg in 2010 to 6,750 in 2011 (Table 8)

Table 8. Groundnut production by Waradoth Famers group

Year	Area (feddan)	Production	Quantity Sold	Sale Value (SSP)	Overall Crop Value (SSP)
2010	4	1350			7500*
2011	9	3150	900	5,000	17,500
2012	15	5400			30,000*
2013	17	6750			37,500**
<b>Total</b>					

\*estimates based on 2011 price; \*\* based on 2014 price

### 5.5.3 Capacity of the Group

*Training and skills acquired:* With support from the state Ministry of Agriculture and Forestry (SMoAF) the group was trained during 2011 and 2012 in agronomic practices such as proper seed bed preparation, row planting, timely planting, weeding and harvesting. However, there was no indication that the group members were trained in seed quality aspects such as simple sorting of varieties, rouging of diseased and off-types, isolation distance or isolation in time, or selection of seed for the next seasons' planting.

The group members have fairly good knowledge of seed storage and management practices such as storing seed separately from food and treatment with ash to avoid pest damage. They were specifically able to described simple store procedures and requirements such as sprinkling ash inside the store and closing the store for seven days; having seed bags placed on pallets; not opening the store at night to deter insects and rats entering the store.

*Equipment and structures:* The group has medium (5.6m x 9m) and small (3m x 4m) sized store built with brick and cement with iron sheet roofing. The store had pallets for safe storage of bags above the floor. Given such facilities, the group had an advantage over other groups particularly in market oriented community-based seed production and supply in the state.

### 5.5.4 Future plans for the Group

The group has the plan of introducing the production of cassava which is considered an important source of calories as well as vegetables (leaves). Nyalath payam is among those that do not flood ("highland"), and therefore have the potential to support cassava production.

## 4.0 CONCLUSION AND RECOMMENDATIONS

### 4.1 Conclusions

The major field crops grown in Northern Bahr el Ghazal are sorghum, groundnuts and sesame while okra and jews mellow are the major vegetable crops. Generally, the poor productivity of the major crops has affected the supply of seed from farmers' own sources, since they could not save sufficient seed on the farm. Despite this poor performance, there were pockets of good harvests across the state with some 15-25 percent of the households obtaining fairly good harvests. Delivery of seed aid assistance to such vulnerable groups should be carefully handled to ensure that good seed of suitable varieties is provided in time for planting.

Own seed (55%) and the local market (41%) were the major sources of seed for households in the state, and contributing to 96% of the seed planted in 2013. Social networks and seed aid were insignificant in terms of seed planted in 2013. Though no concerns were raised regarding the availability and quality of seed from the local markets, distance market and high prices of seed were key concerns expressed by many of the households who bought seed, and who therefore seemed to have limited access to the desired quantity of seed sold in the local markets. Access to seed of adapted and preferred sorghum, groundnut and sesame varieties could be a challenge to recently displaced people (IDPs) from Unity state.

Farmers' groups and progressive large-scale farmers in the states have the potential to produce seed locally. However, this requires significant efforts from the key stakeholders in building the capacity of these farmers as well as the extension agents in the areas of marketing, quality seed production and the supply chain.

### 4.2 Recommendations

#### 4.2.1 Emergency Seed provision

The emergency seed provision needs to be well focused and a particular attention should be given to IDPs from Unity states after carefully assessment of their access to land for production. Two key factors to consider are access to new varieties and timely delivery of seed.

- Improving access to seed of adapted crop varieties to IDPs. This can be done in two ways:
  - Seed fairs - it could be the best option if time allows.
  - Recollection and direct distribution to the IDPs – This is the most practical option considering the limited time available. If the objective is to provide short maturing varieties, seeds of local varieties of sorghum such as *Anyanjang* could be recollected and distributed. There is plenty of groundnut seed of the variety (*Bedibedi*) in the local market as well as with the farmers' groups. This opportunity should be exploited.
- Timely delivery of seed: Timely delivery of emergency response is critical when the focus is on the IDPs to resume production activities by the ideal planting time during May. Cassava was delivered to NBELG in September last year (2013), and most of the cuttings were not distributed and/or planted - this needs to be avoided. We should not use "Better late than never" in Seed delivery. Time is a critical factor in seed delivery.



#### 4.2.2 Crop diversification

Many of the farmers visited depended mainly on sorghum, groundnut and sesame thus the concern being raised by nutritional experts in the state about crop dietary diversity. Considering the need to enhance crop diversity in the state, the following diversification options could be explored:

- i. Popularizing consumption and production of rice in the flood plains of Aweil East, West, South and Centre. Rice production is well demonstrated in the state through the Aweil Rice Scheme
- ii. Popularizing consumption and production of cassava in the ironstone plateau of Aweil West and Aweil Center Counties

#### 4.2.3 Community-based seed multiplication

The plan to support community-based seed multiplication in the state needs careful consideration by FAO and its partners. The following recommendations are considered key for the success of the seed component of the project:

- Training of CAD and NGO extension agents: training in seed production as a business needs to be given top priority. In addition the trainees would need skills in seed inspection at the field, storage and marketing levels. Furthermore, measures should be taken to ensure that the seed laboratory in Yei and Halima have well trained seed lab technicians and are well equipped to support seed quality analysis.
- Training of farmers' groups: The groups supported by FAO and its partners need further training in seed quality control (at field and storage level) and seed marketing. The following should be noted in this regard:
  - The intention to have an FAO partner such as Samaritan Purse supporting 10-15 farmers' groups is unrealistic considering that these groups need to be properly trained and their production fields inspected at least twice during the season. Having limited extension capacity (staffing and logistic) makes having high number of groups not feasible
  - FAO and its partners should consider starting with few groups/partners with not more than five groups per county or per partner in the first year. This can be progressively scaled up in the coming years. This is in consideration that FAO/CAD/NGO have limited capacity for handling larger groups and inspection activities.
- Introduction of new crop varieties: In the first year, new varieties should be introduced through the FFS so that these varieties are compared with some popular local varieties with each variety covering at least one *feddan* (4,200 m<sup>2</sup>) per FFS. The varieties could be bulked later in subsequent years.
  - For Sorghum, *Macia* (an improved variety) could be evaluated against popular white varieties such as *Anyanjang*, *Yarand Dengba*.
  - For Groundnut, *Serenut 4* (an improved variety) could be evaluated against the popular *Beriberi*
  - For Sesame, *Sesame 2* (an improved variety) could be evaluated against *Nyuwela* and *Nyumchol*
  - Cassava introduction and multiplication should be restricted to the Ironstone Plateau or to a very limited scale in the "highland" of the Western Flood Plains.

- Establishing Seed Quality Control Committees at state and county levels: These committees should be composed of SMOAF/CAD, FAO and Partners technical staff. The State ministry of agriculture should be fully involved in ensuring quality seed production through regular seed inspection and testing. This however, requires that their capacity is built in seed inspection (both at field and storage), sampling and testing for quality declaration
- i. Other support needs:
  - There is need for improved seed storage facilities, or for training the seed groups in improving their existing storage structure
  - Creating linkage with traders as initial marketing outlets.
  - The groups could also be encouraged to participate in any future seed fairs when the need arises.

#### 4.2.4 Income generating activity for women

The women in Mariem West Payam acknowledged dry season vegetable production as a major source of income that supports their livelihoods. However, some of the key challenges they faced could be tackled through:

- i. Provision of micro-irrigation equipment, and enhanced skills in the use of this equipment
- ii. Training in integrated pest and disease management (IPDM).
- iii. Training in vegetable seed extraction/processing and storage

## Appendix

### Appendix 1.Characteristics of some sorghum varieties in South Sudan.

Variety	
<b>Anyanjang</b>	<ul style="list-style-type: none"> <li>• White, small, soft seeded variety</li> <li>• Maturity period: 2 months and can easily avoid flood when planted early (May)</li> <li>• Sweet variety – good for making flour because of the colour</li> <li>• Normally planted in June to avoid birds</li> <li>• Medium height (2m) and can produce 3-4 tillers</li> </ul>
<b>Luel</b>	<ul style="list-style-type: none"> <li>• Red seed with hard seed coat</li> <li>• Erect conical head</li> <li>• Height – tall 3-4m depending on the soil types</li> <li>• Tillering – 3-4 tillers per plant</li> <li>• Tolerant to flood especially if flood occurs when it has flowered</li> <li>• Common in both midland and lowland areas**</li> <li>• Medium Maturity period – 5 months. This helps avoid bird attack</li> </ul>
<b>Malual</b>	<ul style="list-style-type: none"> <li>• Red seeded</li> <li>• Plant height 3-4 meters depending on the soil type</li> <li>• Flood tolerant</li> <li>• Long Maturity – 7 months (planted in May – harvest in Dec)</li> <li>• High elasticity of the flour – small quantity can satisfy many</li> <li>• Can be used for dry season planting</li> <li>• Less susceptible to birds monkey attack</li> <li>• Grow well in the highland**</li> </ul>
<b>Raphier</b>	<ul style="list-style-type: none"> <li>• White seeded and therefore highly preferred for food and marketable</li> <li>• Medium maturity variety – 5 months</li> <li>• Can be used for dry season planting</li> <li>• Susceptible to flood</li> </ul>
<b>Rapchol</b>	<ul style="list-style-type: none"> <li>• Cream colour varieties</li> <li>• Need some moisture in the soil before planting and therefore the preferred time for planting is June</li> <li>• Susceptible to flood</li> <li>• Medium maturity – 5 months</li> </ul>
<b>Mabier</b>	<ul style="list-style-type: none"> <li>• Yellowish, medium size seed</li> <li>• Well adapted to ironstone plateau</li> <li>• Long maturity – 6 months</li> <li>• Drought tolerant</li> <li>• Normally planted in June</li> </ul>
<b>Cham</b>	<ul style="list-style-type: none"> <li>• Short maturing variety - 2 months</li> <li>• Suitable for bridging hunger gap</li> <li>• Can avoid/escape flood when planted early (May)</li> </ul>
<b>GadamAmam</b>	<ul style="list-style-type: none"> <li>• Short variety (1m)</li> <li>• Short maturing varieties (2 months)</li> <li>• Easy to notice and scare birds</li> <li>• Whitish seed with some purplish rind</li> <li>• Mostly grown in the highland and normally planted in August</li> </ul>
<b>Nyithin</b>	<ul style="list-style-type: none"> <li>• White seeded</li> <li>• Short maturing variety</li> </ul>