



South Sudan Crop Watch Updates to 3rd Dekad of July 2018

Disclaimer: The authors would like to acknowledge the technical difficulties in conducting this analysis within a highly complex context. This report provides a first step in understanding the status of food crops in South Sudan. The information and views set out in this working paper are those of the authors and do not necessarily reflect the official opinion of FAO.

Highlights

- In the Green Belt areas, located in the Southern part of South Sudan, the 2018 rainfall season started from March/April in most areas. In areas where the rains started in March, there was dry spells in April for about two to three weeks in localised areas that caused mild to moderate damage on crops at early seedling stage. Early planted crops, especially maize performed well across these areas providing early season green maize for consumption in June and July. Farmers in most of these areas have already started dry harvesting of first season maize, while land preparation and planting of the second season crops are ongoing. The amount of rainfall in bimodal areas of the Green belt, including Western Equatoria has decreased in July, which is the end of the first season and harvesting time of first season crops. This has brought the vegetation situation to be nearly the same as the long-term averages (Figure 1). Late planted crops in the former Central Equatoria (Jubek, and Terekeka) and parts Greater Kapoeta were affected by the prolonged dry spells of July.
- In the Greater Bahr el Ghazal region, planting started around mid-May. Localized dry spell affected crops at germination, seedling and early vegetative stages. The most affected were former Northern Bahr el Ghazal counties where large areas of the short season sorghum fields were replanted up to two times, until the first dekad of July (beyond the normal planting window). Overall, crops have performed well in most areas of Greater Bahr Ghazal, despite the challenges caused by dry spells that needed replanting and gap filling of affected fields.
- In the Greater Upper Nile Region, especially in the former Upper Nile State, planting which normally takes place in June and July was accomplished with no major climatic shocks over most cropping areas. However, in Jonglei, some counties such as Bor South and the surrounding areas were affected by prolonged dry spells, with few intermittent showers, between mid-May and end of July causing moisture stress on sorghum and maize. Areas such as Pochalla received normal rains in April and planted immediately. As a result, farmers had a successful first season crops being harvested from end of July up to August, and land preparation was ongoing for immediate planting of the second season crops.
- Although quantitative analysis is yet to be done, the area planted with crops during the season is expected to be higher than last year in most places, due to slight improvement in security, better availability of inputs and increased interest by farmers to produce more and cover their food needs.
- Fall Armyworm damage to cereal crops has continued this year. Fall Armyworm damage on crop ranges from serious to mild across the country depending on the locality and time of planting. During this cropping season, the pest has been observed in almost all the maize growing areas both in the first season of the bi-modal Green Belt and unimodal areas across the country (see Annex). While the infestation levels vary from county to county, detail yield loss will be captured as part of the harvest assessments starting from August 2018. All the other pests and diseases during the season were within normal levels.
- In general, Fall Armyworm has been one of the main constraints to maize production in some pocket areas during the season. Elsewhere, apart from the major effects of dry spells in Northern Bahr el Ghazal, Central and Eastern Equatoria, Jonglei and in some pocket areas of the country, the prospect for better production is higher than last year. The delayed planting of sorghum in these areas may extend the harvesting time of crops, which might delay availability of food from farmers' own harvest.
- For the main season in 2018, FAO has reached nearly every county of South Sudan with seeds and tools. FAO distributed 4 800 tonnes of crop seed either directly to beneficiaries through its NGO partners or via seed fairs.

1. INTRODUCTION

This report provides a general outlook on rainfall and crop performance in South Sudan during the period of March - July 2018. The report is based on crop planting assessments carried out in the field; crop monitoring reports from more than 40 counties; remote-sensing products, including Normalized Difference Vegetation Index (NDVI), satellite-based rainfall estimates and data from local rain gauges. Others, such as the Vegetation Health Index (VHI) and the FAO Agricultural Stress Index (ASI) are also used. The analysis examines rainfall and crop performance in bimodal and unimodal areas of South Sudan during the period under review. Despite the accuracy of this analysis, the performance of crops may change rapidly within a short time depending on the rainfall situation across the country. Lack of long-term series of rainfall data as well as problems faced accessing information in most of the conflict-affected areas are some of the constraints faced in the production of this report.

2. RAINFALL AND CROP PERFORMANCE IN GREATER EQUATORIA

The rain started in early March 2018 over most of the southern bimodal areas (Green Belt) of South Sudan and has continued with short breaks in April and intermittent showers that allowed the growing of early-planted crops. The rainfall situation in April was unreliable in some areas, causing a slight delay in planting. However, the May rainfall was average to above average in many areas of the Green Belt, creating favourable conditions for the continuation of planting and recovery of stressed crops.

1) Former Western Equatoria State

Rainfall in the former Western Equatoria (WE) generally started around March 2018 in most parts of the state, and the amount and distribution was average in most of the counties, creating favourable conditions for crop growth. Planting of the first season crops across the state started in mid-March and continued up to June. Harvesting of the first season crops is completed, in most places despite the variable growth stages of crops caused by different planting times. As a result, consumption of green maize started as early as May for early-planted crops. This is also true for other similar areas in Eastern Equatoria, such as Magwi.

Yambio State (Yambio and Nzara): Although there were no reports of significant dry spells, the short breaks that occurred in April have affected the productivity of groundnuts through limited pod formation. The dry spells further created favourable conditions for Fall Armyworm (FAW) infestation of maize in some areas. The FAW damage in Yambio during the first season was generally mild, though serious in some farmers' fields, while the infestation level and damage in Nzara County was relatively minimal. However, depending on the weather condition, the infestation level may increase during the second cropping season. While chemical pesticides are not used in these areas, farmers have resorted to traditional pest control measures using extracts of a plant species known as **Babatiru (*Chromolaena odorata*)**, mixed with hot pepper and powder soap. Results of a sample study made around Yambio town (Yambio County) by the crop assessment team indicate that an average of three to four maize fields, out of ten were infested by FAW, and the damage level on these infested fields, using "W" shape sampling method, shows that about 51.3% of the plants were affected by FAW. The estimated yield reduction from these infested fields was 25%. The occurrence of other common pests was within normal levels and the impact on growing crops was mild.

Cassava, maize and groundnuts are the main crops in the reporting season. The dominant crop in terms of area coverage is cassava intercropped with maize and groundnuts, followed by groundnuts and maize. Rice was planted alone, as a sole crop. According to field assessment reports, the area planted with crops in the first season has increased slightly compared to last year. Access to farmland is constrained by insecurity, especially in areas where warring parties continue to operate. Shortage of farmland near areas with high concentration of IDPs has been reported.

Despite the presence of 15 tractors in Yambio state, only four were functioning. Tractor hire service is very rare due to the high cost of fuel, coupled with shortage of spare parts for tractors. Most farmers use hand tools purchased from local markets, while others received tools from FAO. Most farmers used local varieties of own saved seeds, followed by market purchase and FAO. Prices of seeds have increased by 30 to 40 percent this year compared to last year. Additional sources of seeds for some farmers were from kinship support.

During the period, some households in Yambio and Nzara still had crop stock saved from last year's harvest that would last until the first harvest. Prices of food commodities in main markets are high especially for the poor. Cassava is considered as a transitional crop used during the hunger season. About 0.5 hectare of mature cassava was available in the field for most farming households (assessment report of May 2018).

Livestock keeping in Yambio County is limited to small ruminants, poultry, pigs and rabbits. The number of small ruminants and pigs is increasing. Pasture and water conditions are very good, resulting in good body condition of animals during the season. There has been no reports of outbreak of livestock diseases during the season.

Mundri East and West: In Mundri East and West, early rains started in March that encouraged some courageous farmers to start planting in April. The rainfall in Mundri generally started late and the amount was average to below average. The effective rains established in April in bimodal areas and in mid-May in the rest of the areas that delayed planting of the first season crops. There was a dry spell in April in the unimodal areas of Mundri for about two to three weeks, with insufficient small showers that could not maintain the growth of crops. These dry spells caused replanting of maize, and the short maturing sorghum cultivar (*Moro*) in May. Those farmers, who had planted maize and groundnuts in April, succeeded in establishing their crops, which were ready for harvest in July. On the other hand, those cautious farmers who had decided to avoid risks started planting of maize, sorghum, sesame, and groundnut from mid-May up to the end of June, resulting in late harvesting. The presence of endemic pests in general has been normal and the damage was mild so far.

The leading crop in terms of area coverage in Mundri West is cassava with an average area of 0.77 ha, sorghum 0.56 ha, maize 0.32 ha and groundnuts 0.20 ha per household. Cassava area has been increasing every year due to intercropping with maize, and groundnut adding to the overall cassava area. In other areas, such as Mvolo, sorghum is the leading crop, because of its adaptability to the local environment. Plant population density of maize on average is 56 200 plant/ha, sorghum plant density is 101 800 plant/ha, cassava density is 10 000 – 15 000 plant/ha, groundnut plant density is 94 000 plant/ha, and sesame plant density is 253 000 plant/ha, which are all in an acceptable range.

In general, the first season rainfall and crop conditions in the bimodal areas of the former Western Equatoria has been good, except the short dry spells around April, which resulted in yield reduction of groundnuts.

II) Former Central Equatoria State

In most counties of the new Jubek State, rainfall started in April and became effective in May in most cropping areas. The onset of rains was mostly normal and early in some areas such as Lirya and was described by most farmers as average. However, there was a dry spell between April and May for two to three weeks, with some intermittent showers in between. Cultivation is mainly rainfed with some small-scale irrigated vegetables farming in Rejaf along the River Nile and pivot irrigation by the Israeli Green Horizon company at Jebel Ladu (6 pivots each irrigating 50 ha). Flooding occurred in islands along the River Nile in May, affecting maize crop planted in April, especially in Jebel Ladu, Rejaf, Kondokoro and Mongalla. The low-lying areas were more affected by the floods.

Land clearance in most areas of Jubek State started in February-March with family, communal, and hired labour using *katala* (5 m x 10 m). Land access is limited to homestead areas and normal in the far fields except that insecurity poses threats in the far fields in Mongalla, Lirya, Lokiliri, Lobonok, Rejaf for fear of child abduction and civil strife in other areas of the state (Wonduruba, Ganji, Rokon, and Dolo). Land access is normal to the indigenous people and could be granted or hired, while the local community chiefs give permission for those who are not from the area. Land rent for vegetable growing in Rejaf area for 2-3 feddans (0.84 - 1.26 hectares) is SSP 2 500 – 3 000 per month.

The main crops grown in Jubek State are sorghum, groundnuts, maize and cassava. The average area cultivated per crop per household (GPS-measured) is 0.41 ha for sorghum, 0.34 ha for groundnuts and 0.3 ha for maize. Some progressive farmers in Jebel Ladu, Nesitu, Aru Junction, Rejaf and Lobonok have planted larger areas ranging from 1 ha to 4 ha of maize, and sorghum area ranging from 4 ha to 9.26 ha. The Israeli Green Horizon Company cultivated 100 ha (maize 50 ha, sorghum 38 ha and rice 12 ha) using pivot irrigation.

Planting of the first season main crops (sorghum, maize, groundnuts and cassava) started in April/May and continued up to the end of June. Delayed planting of maize due to the late onset of rains in some areas like Aru Junction may delay harvesting of first season maize from the normal time (July) to August and September. The Green Horizon planted maize, sorghum, and rice in March.

Smallholder farmers use hand tools mainly purchased from the market. A hoe costs SSP 1 500 compared to SSP 750-800 in the previous year. Most farmers use their own saved seeds supplemented from the market purchase. However, FAO and its NGO partners distributed hand tools and seeds, while the World Food Programme (WFP) distributed food through food-for-work programme.

There is no use of chemical fertilizers by smallholder farmers in Jubek State in general. However, Rejaf Vegetable Growers and the Israeli Green Horizon Company have been using fertilizers. The Green Horizon used Nitrogen Potassium Phosphate (NPK), Urea, and Triple Superphosphate (TSP), and Rejaf vegetable growers use Diammonium Phosphate (DAP), and Calcium Ammonium Nitrate (CAN). The Green Horizon also used selective herbicides to control weeds and insecticides to control the Fall Armyworm. The most common pests are squirrels, millipedes, monkeys, local birds, porcupines, wild foxes and rats. There is limited presence of Fall Armyworm, but there is no control measure taken by smallholders against the pest.

Yei River: The rainfall in the 2018 cropping season started late around late-March in the vast majority of the cropping areas in the county compared to mid-March last year. There was a short dry spell of about 10–15 days in April, but has no significant effect on crops. There was no replanting and gap filling of their crops because of dry spells except by some farmers who received seeds that failed due to poor viability and had to re-plant maize seeds. The amount of rainfall during the current season was generally average and better than last year in most areas.

Access to land was reported to be a problem especially in the far areas due to insecurity. Farmers cannot access land 5 km outside of town, while there are limited opportunities to expand land in nearby of farmers' residential areas. Therefore, most farmers were afraid of going far fields to expand farming due to insecurity, fear of destruction by wild animals and theft. According to the interviewed farmers and key informants, the number of people involved in farming during this cropping season is higher than last year, but only cultivated small area within residential areas and farm plots of absentee farmers. This is attributed to the arrival of returnees, high food crop prices and economic pressure on people that encouraged cultivation of more land. Although the county received four tractors from distributions by the Government, none of them were functional due to lack of implements, shortage of spare parts and high fuel prices.

The prices of seeds were high, at about SSP 400 per kg of maize at the time of planting, compared to SSP 200 last year. The seed rates used by farmers vary greatly from area to area with an average seed rate of 20 kg/ha for maize and 60 kg/ha for groundnuts (shelled). The average land cultivated across the county by smallholder farmers during the current season is estimated at 0.38 ha per household, 0.29 ha for maize, 0.38 ha for cassava and 0.25 ha for groundnuts.

The main pest reported during the season was Fall Armyworm, causing damage on seedlings, particularly on maize. However, the damage caused by this pest was reported to be mild. The occurrence of endemic pests in general was within the normal range, causing mild to moderate damage in most cases. Other commonly reported pests include stock borers, small snails, aphids, variegated grasshoppers (*Waja Waja*), and green grasshoppers. No control measures were taken except use of salt solution for the killing of snails.

Almost all of the smallholder farmers in Yei used hand tools for land preparation and the related cultural practices. These small tools include hoe, panga, axe and slasher. Majority of the farmers in the county used tools purchased from markets supplemented by distributions made by development partners, particularly FAO. While the prices of hand tools were high, they were available in local markets. The price of one hoe during the season was SSP 700, which is nearly double the price of last year, while the price of one panga is about SSP 1 000 compared to SSP 500 last year. Regarding labour, most of the labour force required for farming activities comes from family members, with limited hire for digging the soil and weeding practices. Labour was expensive due to inflation. A hectare is cultivated at SSP 7 000 to 10 000.

Green harvest of maize started towards the end of May and harvesting ongoing from end of July onwards. The overall performance of crops during the first cropping season is good and there is high prospect for good yield. Estimation of yields of crops is taking place in August. The favourable climatic condition and the improved security situation has contributed to a better production of crops this year, compared to the worst condition of last year.

Terekeka: The current Terekeka State (i.e. former Terekeka County) started receiving rainfall in April across the state (county), which is early to normal and the amount was average. There was a dry spell in April for two to three weeks with small showers in between. Cultivation is mainly rainfed with no irrigation farming. About 70% of the total households in Terekeka are farming households. Groundnut and sorghum did not suffer from the dry spell. Land clearance started in February- March with family and communal labour used. Land access around homesteads is limited and normal in the far fields. Planting of groundnuts and sorghum started in April and continued up to June.

The major crops cultivated in Terekeka are groundnuts and a long-cycle sorghum variety called *Lodoka*. Sorghum is mostly intercropped with sesame. The average groundnut area per household is 0.43 ha and sorghum 0.56 ha per household. The increase in sorghum area over groundnuts, unlike the past years, is a response to high cereal prices in the local markets, which also provides an opportunity for bartering sorghum with livestock. Currently, a full granary of un-threshed sorghum can be directly bartered with a bull or heifer.

Land preparation is done by hand by most of small-scale farmers, and hand tools (mainly traditional hoes) that are purchased from the local markets. A hoe costs SSP 1 500 compared to SSP 800 last year. Although there are more than 13 tractors owned by an individual (the former Governor of Central Equatoria State), only three are functional due to lack of spare parts and mismanagement by poorly trained tractor operators. Animal traction is used in Tali area whose number is not known. Almost all farmers use their own kept seeds or from bartering and kinship and FAO.

Common pests during the cropping season include squirrels, rats, guinea fowls, termites, millipedes and nematodes, all with mild infestation.

Unlike other areas of the former Central Equatoria, there is huge presence of livestock, both cattle and small ruminants, in Terekeka. The body condition score for cattle was 2-3 and that of small ruminants was 3-4. Cattle are mainly transhumant and the endemic diseases reported in the season include, but are not limited to, Contagious Bovine Pleuropneumonia (CBPP) and Black Quarter (BQ) for cattle, and *Peste des petits ruminants* (PPR) and Contagious Caprine Pleuropneumonia (CCPP) for small ruminants. Pasture and water are available due to the average rainfall in the season.

In general, the unimodal areas of the former Central Equatoria faced prolonged dry spells in July that affected maize, sorghum and groundnuts. In the bimodal areas, the rainfall condition and the performance of main crops has been good during the first season. However, the prolonged dry spell of July has affected the late-planted crops at flowering and seed formation stage.

III) Former Eastern Equatoria State

Torit, Loppa/Lafon, Ikwoto, Magwi and Pageri Area: The 2018 rainfall in the southern and western parts of the former Eastern Equatoria State started normally, around early March, although there were some areas (Obbo, Palwar and mountains of Loppa/Lafon) that received rains in mid-February, with effective rains starting from March. The amount of rainfall was generally average and better than last year in most of these areas. As a result, no dry spells were reported and hence no replanting, except gap filling plantings done by some farmers either because of poor seed viability/ germination or removal of seeds by pests.

Access to land is normal in most areas with the exception of Pageri where farmers cannot access far fields due to insecurity, fear of crop destruction by wild animals and theft. Hence, the expansion is mostly limited to nearby areas around homesteads. According to the interviewed farmers and key informants, the amount of land cultivated during the cropping season is higher than last year in all the counties, this is attributed to the coming back of the returnees, improved security situation, use of tractors and ox-ploughs particularly in Magwi, Ikwoto counties and Mugali area of Pageri. Also early onset of rains and high demands of cereal in Juba encouraged farmers to increase their acreage. Smallholder farmers have tried to cultivate more land despite the challenges of hunger that caused physical weakness to carryout cultural practices. Most of the tractors, which were provided by the government, were not functional due to lack of spare parts and high fuel prices. Only private tractors were providing hiring service, although the rates were as high as SSP 7 000 per *feddan* compared to SSP 3 000 per *feddan* in 2017. However, efficient utilization of the existing private tractors is highly constrained by lack of implements, shortage of spare parts and high fuel prices.

Majority of the farmers planted their long-maturing sorghum (*Aderi*) and groundnut seeds starting from late May (on time) up to June except in some areas of Ikwoto County where they were planted in March. The short and medium maturing varieties (*Osingo*) were dry planted in February on the mountain areas of Loppa/Lafon and wetland areas of Ikwoto counties. In Magwi and Pageri, maize and groundnuts were planted in March to April, while some farmers in Obbo and parts of Lobone (Palwar) planted maize in late February.

The prices of seeds have doubled in one year, for example, maize seeds were SSP 60 per kg and groundnuts were SSP 280 per kg at the time of planting in 2018, compared to SSP 30 per kg and SSP 140 per kg in 2017, respectively. The seed rates used by farmers vary greatly from area to area with an average seed rate of 5 kg per *feddan* for maize and sorghum and 45 kg per *feddan* for groundnuts.

The average land cultivated by smallholder farmers during this season varies from place to place with 0.63 ha in Torit, 0.4 ha in Loppa/Lafon, 1.5 ha in Ikwoto, 1.6 ha in Magwi and 0.87 ha in Pageri.

The main crops grown in these areas are sorghum, maize, groundnuts, cassava and some millet and rice. Majority of the farmers used their own seeds during this cropping season supplemented by

market purchases and gifts from relatives. Most of the seeds distributed arrived late when farmers had already planted seeds from their own stocks and market purchases; however, the distributed seeds are most likely to be planted in the second season.

A majority of the smallholder farmers in the four counties used hand tools for land preparation and the related cultural practices. These small tools usually purchased from the market include hoe, panga, rakes and axes. The price of hand tools was very high in the local markets since these products are brought by traders from neighbouring areas. The current price of one hoe is SSP 500, which is high compared to SSP 300 last year, while the price of a panga is about SSP 900 compared to SSP 500 last year. NGOs have distributed hand tools (hoes, rakes, pangas) in all the four counties and Pageri area.

Most of the government tractors given to the counties are not functional. The only functional tractors during the cropping season are those owned by individuals. However, efficient use of these tractors has been constrained by a combination of shortages and high prices of prices of fuel and unavailability of spare parts. The hire rate for private tractors has more than doubled to SSP 8 000/*feddan* compared to SSP 3 500/*feddan* last year. Regarding labour, most of the farmers during this cropping season used communal and family labour for farming activities, with limited labour hire made by progressive farmers for digging the soil and weeding practices.

The major pest reported during the season was Fall Armyworm. This occurred in areas of Pageri area (Mugale), Ikwoto County (Isohe) and Magwi County (Palwar and Lobone), causing damage on seedlings, particularly of maize. However, the damage caused by this pest was reported to be mild due to excessive rains that killed the larvae. Other commonly reported pests and diseases include sorghum smut, cassava mosaic, millipedes, stalk borer, squirrels, local birds, wild rats, termites, Striga, blights (on groundnuts), wild and domestic animals (monkeys and pigs). The occurrence of endemic pests in general was reported to be within the normal range, causing mild to moderate damage in most cases.

Based on the PET (Pictorial Evaluation Tool) manual, livestock body condition score for both cattle and small ruminants was classified between 3 and 4 out of 5 this season in Greater Kapoeta region, a slight improvement compared to same time of last year (classified as 3 [average]). The pasture and drinking water are available in good condition for animals and are better than last year in most places mainly due to favourable rainfall conditions. Regarding diseases, there were no outbreaks of livestock diseases reported during the cropping season, which is likely to have brought a positive impact on livestock productivity. The livestock management system is sedentary, where livestock are kept around the homesteads.

Green maize harvesting started from end of May in Magwi County (Obbo, Palwar and Lobone), and wetlands of Ikwoto County. The harvest of maize and early sorghum in Ikwoto has significantly contributed to the household cereal stock especially during the critical time of the lean season. The overall crop performance during this cropping season is good with high prospects for better yields. Similarly, the early and medium maturing sorghum cultivars in Lopit hills of Loppa/Lafon County were at flowering to grain filling stages in June and can be harvested starting from July. In general, the favourable climatic condition and the improved security situation is expected to significantly contribute to better crop production in the area this year.

Greater Kapoeta Region: The region comprises Kapoeta East, Kapoeta North, Kapoeta South and Budi counties). The rainfall in Kapoeta East, Kapoeta North and Kapoeta South started early in March, while in Budi County the effective rain started in April as in normal years and the amount was above average, with no reports of dry spells or floods. For Kapoeta North and South, planting started in April and continued in May. Kapoeta East experienced dry spell of about two weeks in April, followed by heavy rainfall and flooding in May that washed away germinating seeds in some areas of the county. In general, the amount of rainfall up to June was average in most areas and above average in some areas. The amount of rain in most areas was rated as better than last year. However, the month of

July was marred by prolonged dry spell in parts of Greater Kapoeta, which caused water stress on growing sorghum, and this may affect the productivity of this crop at the end of the season. In Kapoeta North, occurrence of floods in Chumakori and Karkomuge caused serious damage to crops in May and June. For Kapoeta North and South, planting started in April and continued in May.

The outbreak of grasshopper infestation in Greater Kapoeta caused serious damage on field crops during the cropping season. Replanting was very common in the region due to serious damage of crops by grasshoppers and floods in Chumakori and Karkomuge Payams of Kapoeta North. Sorghum was the most affected crop, which had to be replanted multiple times (two to three times) starting from germination stage. However, there was no control measure taken by farmers or the County Agricultural Offices in the area. Fall Armyworm was observed in Budi County, with average level of infestation on maize crop planted in May. Crop damage in Budi County was minimal due to well-distributed heavy rainfall. Crops that were earlier affected by the pest have recovered and performed well with the progress of the season.

The security situation in the area has significantly improved leading to reduction of cattle raiding. This has provided good opportunities for farmers to perform the required seasonal activities on time. Assuming the continuation of favourable rainfall conditions in August and beyond, most farmers in the Greater Kapoeta region are expected to harvest better crops than last year. Last year's production was affected by the prolonged dry spells, followed by serious flooding (caused by excessive rains) that damaged crops at flowering stage. As a result, crops from previous harvest did not last up to the planting season of 2018. Most farmers exhausted their stocks starting from January/February, while some better-off households managed to keep their production up to April 2018. Currently, farmers are purchasing food from the market at very high prices.

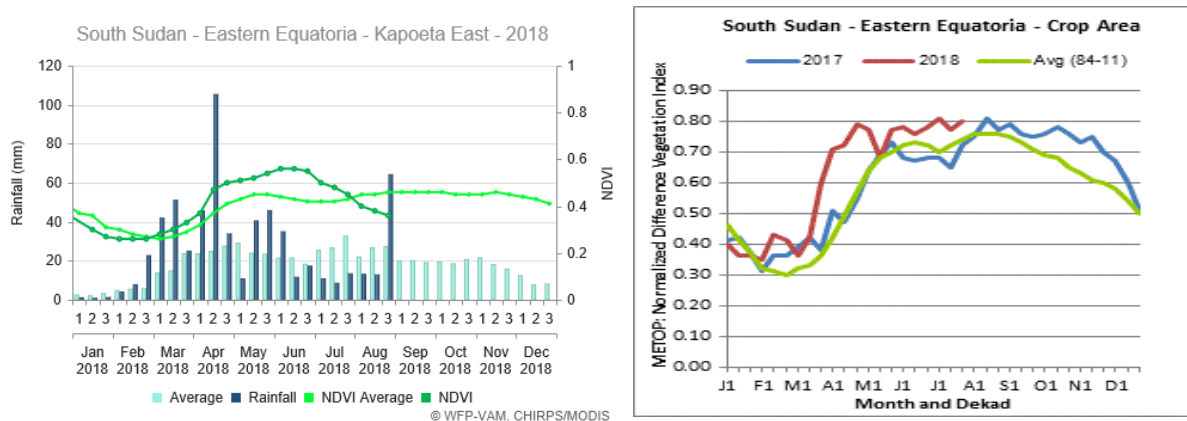


Figure 1: Rainfall and NDVI figures for the former Eastern Equatoria – comparison of 2018 with long-term average

3. RAINFALL AND CROP PERFORMANCE IN GREATER BAHR EL GHAZAL REGION

Greater Bahr el Ghazal Region experiences unimodal pattern of rainfall with one growing season per year. In most areas of the region, the first rains appeared in March and continued with short dry spells and intermittent showers in April, enough for the growth of pastures for animals but not adequate for planting crops. The effective rains started around mid-May and has allowed farmers to resume planting in many parts of the region.

1) Former Warrap State

The effective rains over most of the former Warrap State started from early to mid-May 2018. The distribution was normal and the amount was generally average to below average, with varying periods of dry spells ranging from two to four weeks, from late May, June and early July. The effect of dry spells on growing crops was more serious in Twic County (especially in Turalei area), Gogrial West and

Abeyi where crops were damaged and replanting was done. Planting of sorghum, maize, sesame and groundnuts was done in May and June in most locations. There was replanting of sorghum due to prolonged dry spells in the above-mentioned areas.

Planted area across former Warrap State has increased significantly, by nearly one third this season compared to the previous one. This is attributed to the presence of functional government and private tractors, improvement of the security situation and increased use of ox ploughs. However, in Abeyi the use of ox ploughs is very rare, and the security situation is unpredictable due to Miseriya that have caused fear and land access problems especially in the northern Abeyi. Use of ox ploughs is efficient as it costs less and offers best alternative for tractors. Tractor hire service is very expensive due to high cost of fuel and spare parts. There are also 315 ox ploughs in Twic, Tonj South and Gogrial West provided to small-scale farmers by NGOs. The cost of ox-plough implements is high, ranging from SSP 50 000 to SSP 60 000. The hire rate of ox ploughs varies from SSP 4 500 per *feddan* in Gogrial West, SSP 5 500 in Tonj South and SSP 8 000 in Twic. There are 103 tractors in Twic, Gogrial West, Tonj South and Abeyi, out of which only 69 were functional (45 Government and 24 private) during the cropping season. All the remaining 34 non-functional tractors are those owned by the Government.

FAO has supported farmers with tools and seeds through NGO partners. Most farmers however used their own seeds. Chemical fertilizers are rarely used in Warrap, while animal dung is commonly used to improve soil fertility. The soil in Abeyi is considered as very fertile and hence most farmers do not use animal manure.

Last year's conflict between Apuok and Aguok communities, which destabilized farming activities, is not present this season, and the security situation across former Warrap State in general has improved this year following disarmament and peace negotiations between the two communities. However, dispute over land ownership occurred in Malual Ajak of Gogrial West among indigenous communities with the creation of a new county, protested by the other side of the same ethnic group.

Presence of Fall Armyworm has been confirmed in Gogrial West (Alek), Tonj North, Twic and Tonj South with moderate damage on maize and sorghum crops. Farmers control the Fall Armyworm by applying ash, cattle urine mixed with Neem tree sap. The use of cattle urine and Neem sap has been effective for killing and repelling Fall Armyworm. Infestation of sorghum by caterpillars and groundnuts by rodent was reported in Abeyi, causing mild damage on these crops. Black ants, caterpillars and local birds affected sorghum crops at germination stage in Twic County. Despite the huge damage caused by pests and diseases, the efforts made to control infestations remain minimal, with farmers accepting the losses as inevitable. Weeding on majority of maize or sorghum for instance, is not carried out adequately and timely by most smallholder farmers, this is usually done only once during the cropping season and groundnuts are weeded twice.

Livestock body conditions were good (PET Score 3 for cattle and 3-4 for small ruminants). There were no reports of livestock disease outbreaks; however, endemic diseases such as Foot-and-Mouth Disease (FMD), Trypanosomiasis and East Coast Fever do occur. FMD was a threat in Tonj South last year, causing a reduction of the number of animals due to massive culling to the extent of affecting availability of oxen for land preparation.

The food security status of farming households is good as a majority of households still have food stocks derived from the previous year's harvest. Selling of crops is very common as opposed to livestock selling. Livestock are sold for purpose of culling. However, in some pocket areas production from the current season is expected to be lower than last year mainly because of erratic rains, the effect of dry spells and damage caused by Fall Armyworm. Farmers who planted their crops earlier in the season (maize and sorghum) are expected to harvest starting from mid-September.

II) Former Western Bahr El Ghazal

Rainfall in former Western Bahr el Ghazal State normally starts from April, and stops in October, sometimes extending to November. The mean annual rainfall is between 900 and 1 300 mm per annum. This year, the rainfall started early across the state, from late March to beginning of April, compared to the previous year, which was late. The distribution of rain was variable across the state.

Across the former state land preparation started in February and March with bush clearing either through burning or through the cutting of trees and shrubs. Planting took place immediately after the onset of the rains in April; however, a three to four week dry spell affected farming activities from late May to June in many places, especially in Kuejena and Deim Zubeir areas. The absence of rain delayed the planting of groundnuts and short season varieties of sorghum in many areas. With the resumption of the rains in the last week of June, farmers continued planting up to early July. Since then, the amount of rainfall was generally average and favourable for crops across the former state. If the favourable rains continue in August, better performance of crops and good production is expected especially from the early-maturing sorghum varieties that are dominantly grown by farmers in most areas. However, in areas affected by dry spells such as Kuajena and Dam Zubeir, the performance of almost all the crops and expected production will be lower than last year. The most affected crop was maize because of its intolerance to the water stress caused by the dry spells, while sorghum has recovered from the effects of moisture stress following the improved rains in late June and early July. Whereas Alur Payam, which is not far from Kuajena, received ample showers at the time of dry spells, which helped the crops to do well (Figure 2).

Most farmers used their own saved seeds and buying from the market, despite the high prices. For instance, a hoe costs SSP 500 to SSP 750 and a maloda costs SSP 500 to SSP 700, which is double the cost of the previous year. This year, substantial amount of inputs were distributed to even bigger number of households compared to the previous year by humanitarian actors. This is an indication that planted areas may have increased compared to the previous year and therefore production this year is expected to increase if rainfall and security remain stable. In addition, a few areas in Wau County are beginning to open up with improved security and an increase in usage of ox plough in Jur River County.

Poor performance of crops was observed in Udici where there was delayed weeding of the crops especially groundnuts, which may lead to low yields at the end of the season. Most farmers in Kuejena, Mapel, Udici, Kangi and Marial Bai practice little or no cultivation before planting because they usually burn the land or plant crops on uncultivated land, which later requires early weeding at emergence and early vegetative stages of the crops. This practice, however, does not apply to other farmers in some of the localities, including progressive farmers who are using ox ploughs and tractors across the former state because they usually apply most of the required cultural practices before planting, and then up to harvesting.



Figure 2: Vigorous sorghum crop in Marial Bai, Western Bahr el Ghazal

Planted areas for groundnuts continued to increase like in the previous year because of its high returns (serving as cash crop) in the market and the farmers' decision to minimize conflict between them and cattle keepers. This is because groundnuts are harvested before the arrival of the pastoralists, unlike sorghum, which takes longer time and subsequently damaged by the movement of cattle. Hence, the area planted with sorghum has decreased except in Marial Bai and Kangi where short-term sorghum varieties and long-term *Ulel* sorghum variety are grown, respectively. Most farmers of Jur River are not willing to abandon their long-term *Ulel* variety although it takes more than nine months in the field. Most of the progressive farmers are however adopting short-term sorghum varieties like *Sesso-3* and *Gadam Hamam* that can be harvested together with groundnuts before the arrival of the pastoralists. The management of crops, especially sorghum, is generally poor and most farmers end up with high plant population density, which may lead to low productivity of sorghum.

In general, the overall performance of crops in Western Bahr el Ghazal is mixed. The effect of a dry spell on the first batch of groundnuts seems to be serious due to low number of pods produced (about three to five pods per plant). The early dry spells have affected all crops, including sorghum, that were planted in early May, which will decrease crop yields in the affected areas. This situation is likely to worsen food insecurity in the former state due to low productivity of crops, including groundnuts. In addition, the continuous insecurity in the areas has pushed farmers to plant short-cycle improved sorghum varieties. The delayed rainfall has also affected sesame crops in parts of Jur River. This will lead to low yield of sesame especially in Udici, Gete and Attido *Bomas* of Udici *Payam*. Should the current security situation in many parts of the former counties of Jur and Wau continue to improve, and displaced communities return to weed their fields, and rains continues to August and beyond, average production similar or slightly higher than the previous year is anticipated in the former state.

III) Former Lakes State

The rainfall in most areas of the former Lakes State including Rumbek North, Cueibet, Awerial, Yiro West and Wulu started between mid-March and early April. However, the amount was average to below average causing dry spells of two to three weeks in some areas, particularly in Rumbek North. Figure 3 shows the rainfall and NDVI figures for the former Lakes State.

Access to land near urban centres is limited to areas around homesteads while in most of the typical villages there is no problem of access to farmland in and around homesteads and in the far fields. In former Lakes State, the average area cultivated with groundnut in the current season is 0.56 ha per household, sorghum 0.82 ha and maize 0.14 ha. About 90% of the farms were planted with mixed crops (e.g. groundnut with sorghum, groundnuts with maize and sorghum, sorghum with sesame),

while only few farms – about 10% – are grown as pure stand, particularly groundnuts and sorghum. Maize is a minor crop grown in small scale around homesteads, while some progressive farmers have larger areas ranging from 2 ha to 6 ha.

Planting of groundnuts, sorghum, sesame and maize started with the beginning and establishment of the rains in April in various locations. In Awerial and Yirol West, groundnuts, sorghum, sesame and maize were planted from April to May, while in Wulu, Cueibet, Rumbek Centre and Rumbek East the planting of groundnuts, sorghum, sesame and maize started in May. In Rumbek North, where the rains started late, the planting of groundnuts, sorghum, and maize started in June, and the planting of groundnuts, sorghum and sesame continued up to late July in almost all locations.

Hand tools are obtained mainly from the market and the unit price of a traditional maloda was SSP 1 000, compared to SSP 500 last year. Cultivation is mainly by oxen across Greater Lakes; oxen hire was SSP 4 500 per day for groundnut fields and SSP 3 500 for sorghum. Deeper ploughing required for groundnut (more energy), while sorghum requires shallow ploughing (less energy). Twenty Government tractors were received by each of the new states (60 tractors received in total by the former Lakes State). However, most of them are currently grounded due to lack of spare parts. For example, in Gok State (Cueibet) out of 20 tractors received only six are functional. Tractor hire service is SSP 10 000 per *feddan*, plus 20 litres fuel which costs about SSP 11 000, making it a total of SSP 21 000 per *feddan* (0.42 ha). Most farmers use their own saved seeds supplemented from the market and kinship support and from FAO.

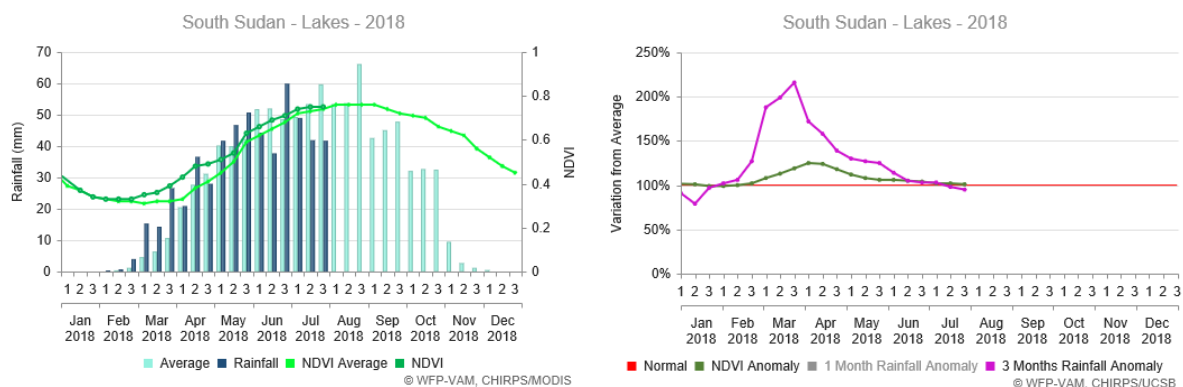


Figure 3: Rainfall and NDVI figures for Lakes

Presence of Fall Armyworm was reported in Rumbek North (Amok and Meen), Awerial (Bun Agok), Wulu and Cueibet with mild damage on crops. Other pests encountered during the season include squirrels, monkeys, millipedes, snails, green grasshoppers and Striga, all with mild damage on crops.

In general, with exception of Cueibet, the prospect for good production in most locations is positive should the rain continue to be favourable, and with no flooding in Awerial and Rumbek North. In Cueibet fair to poor harvest is expected due to the delayed start of rains, which resulted in reduction of cultivated area by about 20% this year.

IV) Former Northern Bahr el Ghazal

The 2018 rainy season started very late and was characterized by prolonged dry spells in almost all counties of former Northern Bahr el Ghazal state. Although there were early showers in April and early May, these rains did not continue and have misled many farmers to plant their seeds, which finally resulted in poor germination and drying up of emerged seedlings in many areas. As a result, many farmers who tried to use these early rains were forced to replant sorghum seeds two to three times. The planting and replanting of sorghum was carried out from early May up to the end of June and even up to early July, which is not normal. In general, the dry spells in all the counties stayed four to

five weeks on average, with intermittent showers in between which were largely insufficient to maintain the growth of planted crops. Normally, the planting of sorghum should have been completed at the end June, while the continuation of planting and replanting until the first dekad of July. However, the success of these late plantings and replanting efforts depends on the continuation of the rains towards the end of the season. On the other hand, while some farmers have started planting groundnuts in July (which is the normal time), most farmers are still struggling with planting/replanting sorghum, resulting in competition for family labour, due to overlapping of activities.

Due to the poor distribution and amount of rains, sorghum crops are at different stages of growth in all counties, some at vegetative growth stage (as high as 1 m and above), early seedling stage (three to four leaves) and some reaching flowering stage. Such variations in growth stages were noted even within the same field of individual farmers. Because of the dry spells, the plant population densities of sorghum were variable, some below the normal density and others with very high population density, especially for replanted crops. While planting/replanting was done up to three times, those farmers who have lost their first and second plantings also missed the final opportunity due to lack of seeds and the decision to not take the risk of planting in July, which is out of the normal planting window. In general, the overall area planted with sorghum is expected to decrease because of the delay and poor distribution of the rain compared to last year, and that of groundnuts is yet to be seen. The below normal rainfall and vegetation index for NBEG are shown in Figure 4.

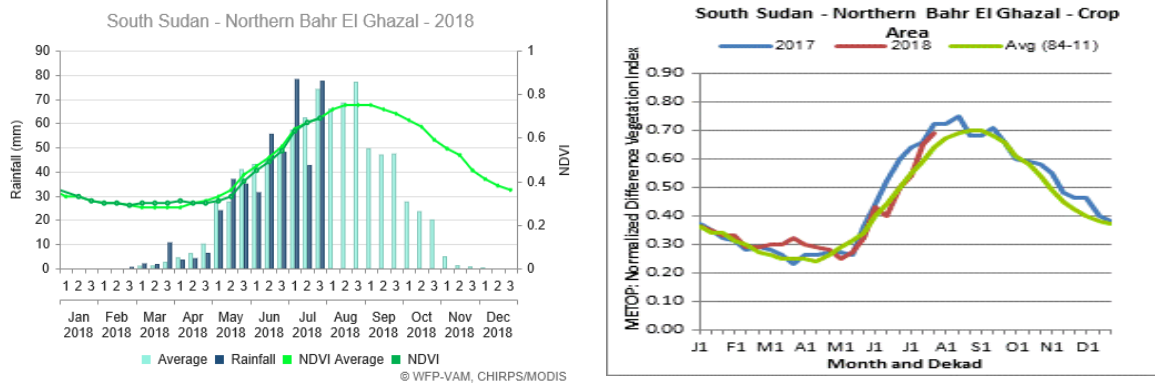


Figure 4: Rainfall and NDVI figures for Northern Bahr el Ghazal

The delayed planting may extend the harvesting time of sorghum. Since the crops are at the early stage in July, there is a high concern among farmers that normal floods in August may affect young crops as they may not be able to tolerate the possible effect of flooding.



Figure 5: Poor plant population due to dry spell (Aweil South)



Figure 6: Late planted sorghum at early stage, Aweil South (July 2018)

Similarly, the rainfall amount in Aweil Centre, where the Aweil Rice Scheme is located, was insufficient at the beginning of the season to conduct planting. The Aweil Rice Project Manager indicated the impact of delayed start of rain on land preparation and planting. The project had planned to cultivate 1 000 *feddans*, although by early July only 500 *feddans* had been ploughed. They are expecting to meet their target up to the third week of July, though with some difficulty. Out of the 15 Belarus tractors provided by the Government in 2016, only three were functional due to lack of spare parts.

In general, average to below average production of the main crops is expected during the current season, which may lead to poor food security situation in former Northern Bahr el Ghazal. The most affected areas are the Aweil North, while Aweil South has a positive prospect for good production, assuming that the improved rains continue in August and afterwards. However, the delayed planting of crops will extend the harvesting time of staple food crops beyond September in most locations, which will affect availability of food.

The decline in rainfall amount contributed to the stunting and wilting of sorghum in the highland areas and increased the damage by pests and diseases. For example, Fall Armyworm was reported in all the former five counties with damage levels from mild to high. Millipedes were reported on sorghum in Mayen Ulem (Aweil North), with mild damage.

The performance of crops is variable with better performance in Aweil South and ranges from fair to good in the other four former counties. Crops in Aweil North have the worst performance in the season. Planting of groundnut is over in July and the performance is so far good in all the counties. There are no serious cases of diseases and pests so far.

In general, average to below average production of the main crops is expected during the current season, which may lead to poor food security situation in Northern Bahr el Ghazal. Aweil North could be affected while Aweil South has a positive prospect for good production, if the improved rains continue in August and thereafter. However, the delayed planting of crops will extend the harvesting time of staple food crops beyond September in most locations, which will affect availability of food.

4. RAINFALL AND CROP PERFORMANCE IN GREATER UPPER NILE REGION

1) Former Jonglei State

Most of Jonglei receives unimodal rainfall with the exception of former Pochalla County. The rainfall in former Bor South and the surrounding counties in former Jonglei State started normally in early May. Planting started on time in the first week of May and went well until the crops were affected by waterlogging and flooding caused by the excessive rains in some lowland areas of Bor and Anydi, starting from mid-May up to mid-June. This was followed by prolonged dry spells from the second dekad of June up to the end of July for about six weeks, which affected most of the sorghum crop. The amount of rainfall was above average from May to mid-June and below average from mid-June to the end of July.

Most farmers have replanted their fields one to two times due to failure of crops caused by waterlogging, which happened from mid-May to mid-June, and the prolonged dry spells that prevailed from mid-May to end of July 2018.

The vast majority of farmers used family labour for land preparation, which is very common in the area. Most farmers get their tools from markets, supplemented with distribution from FAO. Although there are tractor hire services, the hire rates are expensive and unaffordable to small farmers, which was about SSP 17 000 per *feddan* (0.42 ha) compared to SSP 10 000 in 2017.

According to the Director General for Agricultural Mechanization, there are many government tractors in the state but most of them are grounded due to lack of spare parts, and only five of them are

functional. The Agricultural Bank of South Sudan also has eight tractors (four in Bor and four in Twic) and ten tractors owned by the private sector (four in Bor and six in Twic), which are all functional. Ox ploughing is not common in the area generally.

Most of the farmers used their own saved seeds in addition to market purchase and distribution from NGOs, which they said were always arriving late. No chemical fertilizers were used in the former Jonglei state, and manuring is only used for vegetable growing along the river where irrigation is practiced.

Occurrence of Fall Armyworm was reported in Bor South affecting maize and sorghum crops. The damage level has decreased due to prolonged dry spell that has affected both the host crops and the invading pest (Fall Armyworm). Other non-migratory pests include cutworms, stalk borers, birds (on cereals) and blight on vegetables. The extreme events reported are insecurity, cattle raiding, child abduction, flooding and prolonged dry spell.

In Akobo, the rainfall started in May with prolonged dry spell in July for a period of two to three weeks. The rainfall amount is considered as an average, and better than last year. Most farmers in Akobo received seeds and tools from NGOs but supplemented by own saved seeds. The general types and amount of seeds provided for each household include maize (5 kg), sorghum (5 kg), sesame (1 kg), cowpeas (1 kg) and vegetable seeds. Each household received at least one piece of the tools (fork hoe, panga, sickle, axe or hoe).

On the performance of crops and production prospects, all the crops are performing well, with most of the maize at tasselling and green harvest stage and sorghum reaching at flowering stage. Sesame and cow peas are planted in very small areas and are doing well.

Regarding pests, there was Fall Armyworm infestation at early stages of maize but the effect was mild. Crops have since recovered and maize is at tasselling stage (at the end of July) and farmers are harvesting the early-planted crops. Other pests such as stock borers, grasshoppers, rats and birds were also reported during the season, but with only mild damage on crops.

In Pochalla, which is a bimodal area enjoying two cropping seasons, the rainfall started during the first week of April in all locations. This is a normal start and the amount of rainfall was average. However, there was dry spell for about 2-4 weeks, from end of May up to June. On the other hand, there were no reports of flooding unlike the previous year. No replanting was done except the gap filling planting by some farmers. Land preparation started in February and March. There are no tractors and ox-ploughs in the area, with all farming practices accomplished using hand tools. Since there are no functional markets in Pochalla, almost all the hand tools were distributed by FAO partner NGOs. There is limited access to land (shortage) in homestead areas, while there is abundant land in the far fields. However, access to far fields is limited by insecurity. The average area cultivated per household is about 0.47 ha for maize, cultivated twice, including the second season.

The main crops grown in Pochalla are maize, sorghum, cassava and pumpkin. Maize is double cropped, in the first and second season. Due to absence of flood damage and minimal impact of Fall Armyworm, better production is anticipated during the first season, compared to the same time of last year. The early planted maize (in April and May) have escaped the Fall Armyworm infestation, while the late planted crops (in June), which are still at vegetative stage were affected by the FAW and the dry spells. Other pests reported during the first season were grasshoppers, termites and birds (on sorghum), termites, monkeys and wild pigs. Fall Armyworm damage was more serious on the maize planted late (in June). The maize planted in April, which covers the largest area, is already harvested, while harvesting of the May planted maize is expected to start soon. Hence planting of the second season maize is expected to start from mid-August. Although cassava is a high potential crop because of its adaptability to the area, the crop is grown only on the borders of farmlands, as a boundary crop.

The average plant population density for maize is 22 032, which is low, but planted in rows and well managed in most farmers’ fields. Due to the good management of crops, the average yield of *Longi-5* maize variety (first season), from the samples taken at harvest time, is in the range of three to four tonnes per hectare. Hence, the overall production of crops from the first season in Pochalla is good and higher production is expected than last year.

II) Former Unity State

There is very limited information from former Unity State due to insecurity, which constrains a detailed field assessment in rural areas.

Based on secondary information collected from the former state and remote-sensing analysis (Figure 7), the rains started normally in May with localized dry spell towards the end of June in some parts of Guit, Rubkona and Koch. The amount of rainfall is considered as average although rains this year are heavier than that of the previous year. Due to these heavy rains, some lowland areas are facing flooding.

Most farmers used their own saved seeds and seed from FAO. With regard to performance of crops in the former state, almost all the crops are doing well after the establishment of rains in July. Maize crops planted right after the start of the rains will be harvested in August and those planted in late June will be ready for harvest in September. While the sorghum crops are also doing well, there is fear of waterlogging in low-lying areas should the rains continue in the current trend. There are no cases of Fall Armyworm reported in Guit, Rubkona and Koch but the usual pests like birds, rats and foxes prevailed during this season.

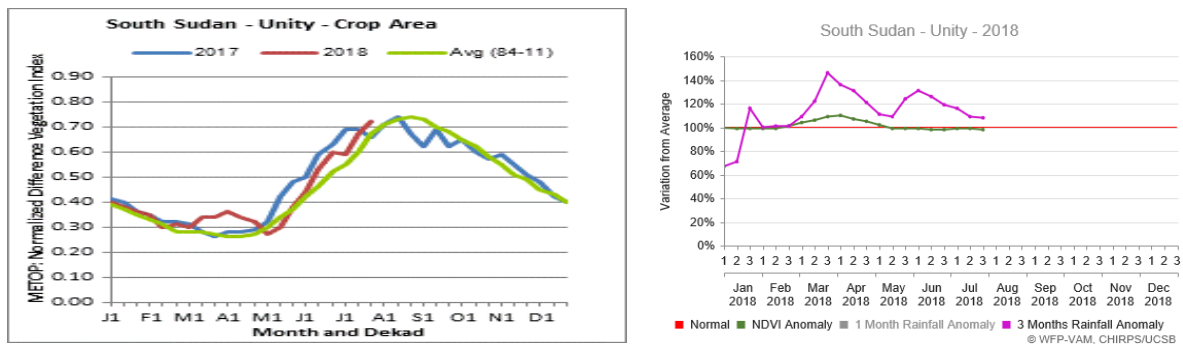


Figure 7: NDVI figures for the former Unity State– 2018 compared to long-term average.

III) Former Upper Nile State

Rains started normally in May with good distribution and average amount. Farmers immediately planted maize, however in July there was a prolonged dry spell for a period of four weeks that affected maize crops grown earlier in the season and delayed the planting of sorghum. Figure 8 shows the NDVI figures compared to the long-term average.

There were no serious pests except the usual pests like birds that come in at harvest time. There were no reports of Fall Armyworm infestation in the area but the prolonged dry spell had serious effect on crops in areas that are considered highland areas such as Damajai area that have suffered greatly from the effect of the dry spell and maize crops either performed poorly or failed.

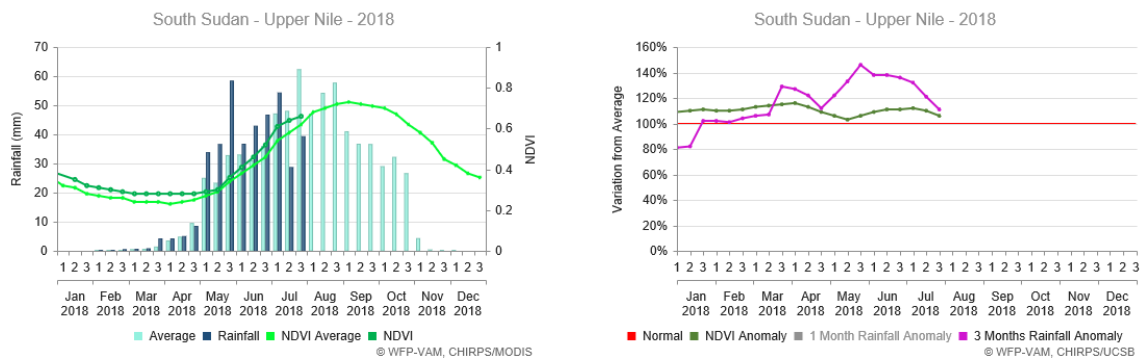


Figure 8: NDVI figures for the former Upper Nile State– 2018 compared to long term average.

Majority of the farmers used their own saved seeds, though FAO partners distributed seed that include maize, sorghum, groundnuts and vegetable seeds and hand tools.

Maize crops are in tasselling stage and doing well in lowland areas close to rivers. Green harvests are seen in the market in late July. Maize crops in Gismalla, Shatta, Khadija, Mamura and Bunj are doing well despite the dry spell experienced in July.

ANNEX

Annex 1: Map showing Fall Armyworm-affected areas in South Sudan - July 2018

