Food and Agriculture Organization
of the United Nations

SPECIAL REPORT

2020 FAO CROP AND FOOD SUPPLY ASSESSMENT MISSION (CFSAM) TO THE REPUBLIC OF THE SUDAN

2 April 2021

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ACRONYMS AND ABBREVIATIONS

ABS	Agricultural Bank of Sudan
CBS	Central Bureau of Statistics
PET	Pictorial Evaluation Tools
FAO	Food and Agriculture Organization of the United Nations
FEWS NET	Famine Early Warning Systems Network
GDP	Gross Domestic Product
GDPAE	General Directorate of Planning and Agricultural Economics
GIEWS	Global Information and Early Warning System on Food and Agriculture
ILO	International Labour Organization
IMF	International Monetary Fund
LTA	Long Term Average
mm	millimetres
MoANR	Ministry of Agriculture and Natural Resources
NGOs	Non-Governmental Organizations
SDG	Sudanese Pound
SRC	Strategic Reserve Corporation
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
USAID	United States Agency for International Development
USD	US dollar
WFP	World Food Programme

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HIGHLIGHTS

- The national cereal production in 2020/21 (sorghum, millet and wheat) is estimated at almost 8 million tonnes, 12 percent up from 2019 and 25 percent higher than the average of the past five years, driven by an increased sorghum output.
- Sorghum production is expected at about 5.1 million tonnes, 39 percent higher than the level of the previous year and 16 percent above the past five-year average. The national millet production is estimated at 1.9 million tonnes, 28 percent lower than in 2019 but still 46 percent higher than the average of the past five years.
- The rise in total production is mainly due to the increase of both planted and harvested areas.
- Planted area increased due to high market prices of grains, which prompted farmers to increase plantings, and to an increased availability of fuel and agricultural finances.
- In August, instead of replanting sesame crops affected by floods and Sesame Gall Midge, farmers opted for the late planting of sorghum crops that successfully reached maturation due to the extended rainy season, up to late October.
- The rainy season was characterized by exceptionally abundant rainfall amounts that, coupled with the overflow of rivers, resulted in widespread floods, with substantial decreases in yields compared to the previous year.
- The restrictive measures implemented to contain the spread of the COVID-19 pandemic resulted in labour shortages at the beginning of the season.
- The production of wheat, for harvesting in March 2021, is forecast at 900 000 tonnes, 24 percent up from the previous year and 50 percent above the past five-year average.
- Despite a year-on-year decline due to input shortages and pests, the 2020/21 production of sesame and groundnuts remained about 50 and 20 percent, respectively, above the average of the previous five years.
- Abundant rains and improved security benefited the availability of, and access to, pasture and water for livestock. Conflicts between farmers and pastoralists have been reported due to the expansion of cultivated areas. COVID-19-related movement restrictions have disrupted transhumance patterns.
- Despite some shortage of animal vaccines and medicines due to movement restrictions, livestock health was generally good, with no major disease outbreaks.
- Prices of sorghum and millet continued to increase in 2020 and, in November 2020, they were more than four times above the already high year-earlier values.

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OVERVIEW

With the support of the Food and Agriculture Organization of the United Nations (FAO) and other partners, including the World Food Programme (WFP), the Famine Early Warning Systems Network (FEWS NET) and USAID, between 17 December 2020 and 3 January 2021, the Ministry of Agriculture and Natural Resources (MoANR) carried out its annual assessment Mission to determine crop production and food supply situation throughout the 18 states of the country. Due to the COVID-19 pandemic and the restrictive measures introduced to contain it, the methodology was modified, with institutions of the Federal Government, normally conducting the survey, delegating to staff at State level the task of collecting all the requested data, under the supervision of federal staff from the Food Security Technical Secretariat (FSTS) and the General Directorate of Planning and Agricultural Economics (GDPAE).

Following this procedure, 22 state teams headed by the Director-General of the State Ministry of Production and Economical Resources or by the Director-General of the national irrigated scheme covered the 18 states and the four national irrigated schemes. The teams' visits were designed to collect data and information from state ministries and irrigation schemes and to audit them through field visits and interviews with farmers and key informants. The combined quantitative and qualitative information, from both primary and secondary sources, allowed the teams to assess the 2020/21 cereal (sorghum and millet) and other field crop production and to forecast wheat production to be harvested by March 2021. Discussions about factors affecting crop and livestock conditions were held with the representatives from local Government offices, United Nations (UN) agencies and Non-Governmental Organizations (NGOs). Field visits were conducted by local specialists from state ministries and irrigation schemes, who also provided the latest information on all aspects of agricultural production within their domains, including the provision of follow-up data, where required. The teams cross-checked the official estimates by conducting extensive field inspections, rapid case studies with sample farmers and interviews with herders and traders. The security situation generally improved compared to the previous years and imposed less constraints to field observation and interviews to farmers. In the areas where it was not possible to conduct field visits, data provided by state authorities were audited through triangulation with secondary data and consensus-building discussions among all staff that participated in the survey, were conducted. Data were compiled by state, crop and sub-sector (irrigated, rainfed mechanized and rainfed traditional) to provide the overall area and production estimates. Using these data, a national cereal balance sheet was drawn up comparing the total cereal requirements for the coming marketing year (January-December) with the domestic cereal availability.

At the national and sub-national levels, the teams collected the latest available information and data on rainfall amounts and distribution, vegetation conditions, crop protection campaigns, availability of

and accessibility to agricultural inputs, cereal reserve stocks and prices of the main crops and livestock. Periodic food security reports were perused and the main socio-economic indicators were provided by the Central Bank of Sudan, the Agricultural Bank of Sudan, the Central Bureau of Statistics and the Strategic Reserve Corporation. Rainfall data was obtained from the Sudan Meteorological Authority and from other sources in the field. Remote sensing data were used to review rainfall amounts and distribution and the evolution of vegetation conditions over the course of the cropping season.

The 2020/21 national cereal production is estimated at almost 8 million tonnes, 12 percent up from 2019 and 25 percent higher than the average of the past five years, driven by an increased sorghum production, which is estimated at about 5.1 million tonnes, 39 percent higher than the level of the previous year and 16 percent above the past five-year average. The national millet production is estimated at 1.9 million tonnes, 28 percent lower than in 2019 but still 46 percent higher than the average of the past five years. The rise in total production is mainly due to the increase of both planted and harvested areas. Planted area increased due to the high market prices of the crops, which prompted farmers to increase plantings, and to an increased availability of fuel and agricultural finance. The adequate availability of most agricultural inputs, including fuel (95 percent of the fuel requirements were fulfilled) and increased availability of agricultural finances were also positive factors. In August 2020, instead of replanting sesame crops affected by the floods and Sesame Gall Midge, farmers opted for the late planting of sorghum crops that successfully reached maturation due to the extended rainy season, up to late October.

The rainy season was characterized by exceptionally abundant rainfall amounts that, coupled with the overflow of rivers, resulted in widespread floods, affecting nearly all states, with substantial crop losses and a decrease in yields compared to 2019. The impact of the restrictive measures to contain the COVID-19 pandemic resulted in labour shortages at the beginning of the season, until some restrictions were phased-out in August 2020.

The abundant rains and the extended duration of the rainy season also improved the availability of pasture and water for livestock. However, the expansion of the cultivated areas at the expense of rangelands is reported to have disrupted transhumance routes, leading to conflicts between pastoralists and farmers. Animals were generally in good conditions and no major disease outbreaks were observed during the field visits. However, the inadequate availability of vaccines was reported by most stakeholders as a major constraint for animal production.

Using the population projection for mid-2021 by the Central Bureau of Statistics to estimate the food use during the marketing year January-December 2021, the cereal balance sheet indicates that the 2020/21 production of locally-produced sorghum and millet is expected to cover the country's utilization needs. In the case of millet production, it allows a building up of stocks equivalent to the food requirements for about three months. With regards to mostly imported wheat and rice, the structural deficit between production and consumption is expected to be covered by the normal levels of commercial imports.

Prices of locally produced sorghum and millet in most markets started to increase since 2018, following the rapid depreciation of the local currency and rising inflation. Prices continued to soar in 2020, at a steeper rate, essentially due to a reduced output in 2019, compounded by the high costs of production and transportation. In November 2020, prices of sorghum and millet were at exceptionally high levels, more than four times above the already high year-earlier values.

SOCIO-ECONOMIC CONTEXT

General

The country has been facing macro-economic challenges since the secession of South Sudan in 2011, which took three-quarters of the oil output, leaving the Sudan with half of fiscal revenues and one-third of export earnings. After the secession, the country has been also suffering from shortages of foreign exchange reserves, mainly due to low foreign investments, limited access to international financing and fiscal deficits as a result of weak revenue collection and heavy subsidies on fuel (more than 10 percent of Gross Domestic Product [GDP] in the 2018-2019 period, according to the International Monetary Fund [IMF]).

Economic conditions significantly worsened since late 2017, following a sharp devaluation of the local currency. The weakening of the currency is a result of the increased demand for imports and, consequently, for US dollar after the removal of international sanctions on the country. This prompted high inflationary pressures and particularly an increase in prices of imported goods, such as fuel and wheat, and triggered widespread protests. As a result, the President was ousted and a transitional Government was established to rule until the general elections that are scheduled to be held in late 2022. In December 2020, the country was removed from the United States of America's list of states sponsors of terrorism and this will allow to have access to international financial aid and debt relief programmes.

The Central Bureau of Statistics (CBS) estimates the country's GDP in 2020 at about SDG 4 066 billion (at current prices). According to its estimates, the agricultural sector contributed to about 20 percent of the GDP in 2020, while contributions of the industrial and service sectors were 23 and 57 percent, respectively. In the agricultural sector, the contribution to the GDP is highest in livestock (about 65 percent), followed by staple and cash crops (about 33 percent), while the importance of the forestry and fishing sectors is marginal. According to the IMF, the GDP is estimated to have contracted for the third consecutive year and at a steeper rate (8.5 percent) in 2020, reflecting reduced investment and large deficits, exacerbated by reduced economic activities due to the COVID-19 pandemic.

At the end of the third quarter of 2020, the trade balance recorded a deficit of about USD 3.9 billion, slightly higher than last year's already elevated level. Compared to the same period in 2019, exports of crude oil decreased by more than 60 percent in volume terms due to a decline in international demand after the outbreak of the COVID-19 pandemic. By contrast, exports of gold in the first nine months of 2020 increased by nearly 50 percent year on year, mainly reflecting higher foreign demand.

With regard to agricultural commodities, exports in volume terms in the January-September 2020 period were 15 percent higher than the same period in 2019. Total revenues from exports of sesame and groundnut, which generate the highest export earnings, are estimated at USD 855 million between January and September 2020, about 32 percent higher than in the same period in 2019. The increase in exports of these crops is due to strong international demand, especially from China (mainland), as well as the above-average production in 2019. The country has been the most important supplier of sesame and the second largest supplier of groundnuts to China (mainland) in 2020. Exports of watermelon seeds and hibiscus flowers also increased by 50 and 60 percent, respectively. By contrast, exports of sorghum and sugar declined substantially year on year, reflecting the reduced 2019 production and strong domestic demand. In the case of sorghum, the increasing use of sorghum flour in wheat bread-making, due to the limited availability of wheat, mainly imported, supported the high domestic demand.

Imported quantities of wheat products (grain and flour) during the first three quarters of 2020 were slightly lower than in 2019, despite the rising domestic demand. Imports of other food items, such as dairy products, vegetables and animal and vegetable oils were generally higher than in 2019, and imports of sugar more than doubled in the first nine months of 2020. The upsurge in sugar purchases is due to limited domestic availabilities from the declining production and low carryover stocks following the below-average imports in 2019.

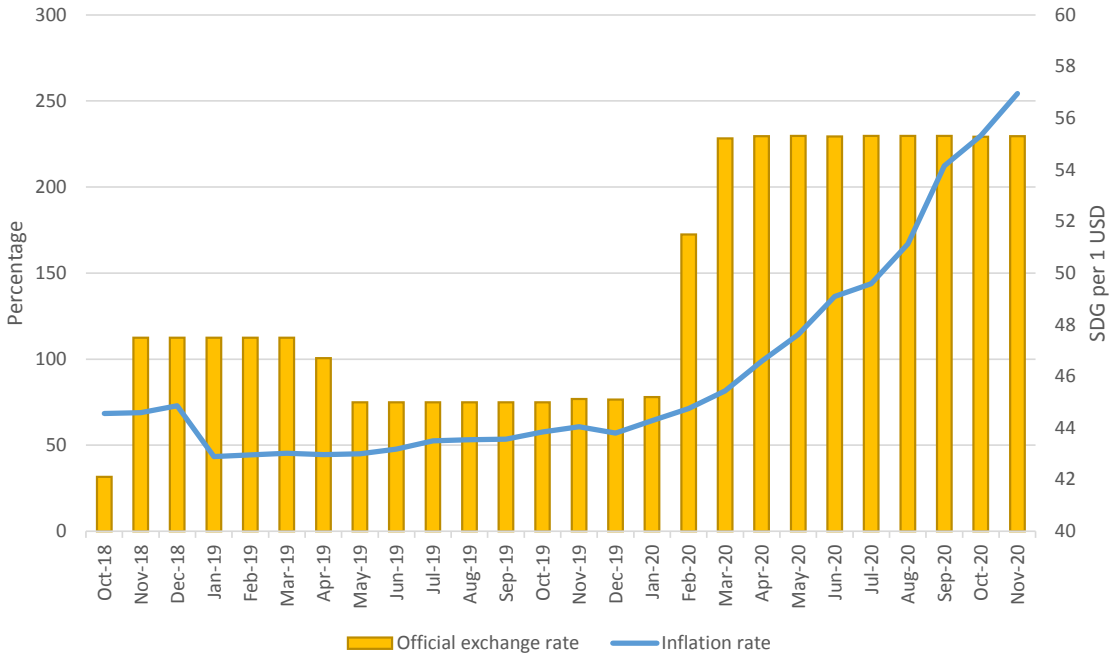
The average annual inflation rate, estimated at 50 percent in 2019, continued to soar at a steeper rate in 2020, reaching 250 percent in November 2020 (Figure 1). The upsurge is mainly due to the intensified monetization of the increasing fiscal deficit in 2020. On one hand, revenues decreased as oil transit fees that the country receives from South Sudan as well as oil exports decreased on account of the decline in international oil prices amid the outbreak of the COVID-19 pandemic. On the other hand, expenditures increased due to higher wages for civil servants and sustained subsidies following the soaring inflation. According to the CBS, prices in food and beverage as well as transport sector increased most sharply, reflecting higher input costs, including fuel, which are mostly imported. High inflationary pressures have contributed to diminish the purchasing power of urban consumers and farmers, significantly constraining their access to food and agricultural inputs.

Table 1: The Sudan - Exports of crop products, 2019 and 2020[1/]

Crop/product	2019		2019[2/]		2020[3/]	
	Weight	Value	Weight	Value	Weight	Value
Cotton (in bales)	116 589	160 761	88 660	124 823	94 613	129 845
Gum Arabic	86 322	109 502	64 598	82 169	64 195	75 738
Sesame	582 130	771 641	390 826	495 509	527 385	606 978
Sugar	6 473	2 738	6 473	2 738	2 379	1 126
Groundnuts	304 313	205 696	230 438	155 198	327 545	248 251
Sorghum	182 269	37 507	153 246	32 649	35 940	10 473
Hibiscus flowers	10 102	11 569	6 713	7 934	10 819	11 664
Watermelon seeds	67 055	42 061	60 830	38 208	90 611	56 837

Source: Central Bank of Sudan.
[1/] Weight in tonnes and value in 000 US dollars.
[2/] 2015/16-2019/20 average.
[3/] 1 January-30 September.

Figure 1: The Sudan - Inflation rate (percent) and official exchange rate (Sudanese Pound/US dollar)



Source: Central Bureau of Statistics (for inflation rate) and Central Bank of Sudan (for exchange rate).

The Sudanese Pound (SDG) was devaluated from SDG 45.2 to SDG 51.5 in February and to 55.3 per US dollar in March 2020 to narrow the increasing gap with the exchange rates in the parallel market. Here, the Sudanese Pound has been weakening since late 2017 as the lift of international sanctions on the country increased the demand for US dollars. Although the official exchange rate was pegged at SDG 55.3 per US dollar since March 2020, USD 1 was traded up to SDG 250 as of November 2020 in the parallel market. The weakening of the Sudanese Pound exerted upward pressure on prices, especially those of imported goods, including fuel, wheat and agricultural inputs. Furthermore, the difficult macro-economic situation, exacerbated by the COVID-19 pandemic, prevented the country from attracting foreign investments. The Central Bank of Sudan estimates that foreign investments during the first nine months of 2020 were 22 percent lower than in the same period in 2019, with a negative impact on economic growth.

In September 2020, in an effort to restore economic stability and strengthen competitiveness, the Government agreed with the IMF to implement a comprehensive reform of the monetary and financial sectors. It also aims to strengthen revenue mobilization, gradually phase out fuel subsidies, reduce corruption and improve the business environment. As a part of the reform plan, the Government reduced fuel subsidies in October 2020 and introduced the Sudan Family Support Programme, a cash-transfer scheme aiming to provide a safety net to the vulnerable households whose livelihoods are threatened by the increasing food and fuel prices. In addition, international partners pledged, in June 2020, to provide USD 1.8 million to support the country's efforts on economic stabilization.

Population

The latest Population and Housing Census was carried out in 2008 and, since then, the CBS extrapolates the country's population size using specific growth rates at state level. The total population in mid-2021 is officially projected at 45.1 million. The most populated states are Khartoum (19 percent of the total population), Aj Jazirah (12 percent) and South Darfur (8 percent). As of November 2020, the United Nations High Commissioner for Refugees (UNHCR) estimated the number of refugees and asylum-seekers residing in the country at 1 million people, with about

three-quarters from South Sudan. A rapid increase in asylum seekers was recorded in the eastern part of the country in November 2020, as 50 000 people from Ethiopia fled the Tigray Region due to conflict. Although the UNHCR estimates that 1.9 million Sudanese were internally displaced as of mid-2020, there has been a steady trend of returns over the past years as the armed confrontation in Darfur has subsided.

Agriculture

The economy of the Sudan is highly dependent on agriculture, which occupies an estimated 39 percent of its labour force (International Labour Organization [ILO] estimates for 2020) and accounts for about 30 percent of its GDP (World Bank). About 175 million feddans, equivalent to 73.5 million hectares, are suitable for agriculture and the annual average area sown in the last three seasons is approximately 26 million hectares. The country's crop portfolio is quite diversified, including cereals (sorghum, millet, wheat, rice and maize), oilseeds (sesame, groundnuts and sunflowers), industrial crops (cotton and sugarcane), fodder crops (alfalfa, fodder sorghum and Rhodes grass), pulses (broad beans and pigeon peas) and horticultural crops (okra, onions, tomatoes, citrus, mango, etc.).

Moreover, most land is suitable for animal husbandry, with an estimated total livestock population in 2020 of about 119.9 million heads of cattle, sheep, goats, camels and others.

Crop production is practiced under three main patterns:

- Irrigated agriculture, which includes:
  - Large national irrigation schemes (Aj Jazirah, Suki, New Halfa and Rahad) using river flows from the Nile and its tributaries.
  - Large spate irrigation schemes (Gash and Tokar) using seasonal floods.
  - Small-scale irrigation along the banks of the Nile and its tributaries.
- Semi-mechanized rainfed agriculture.
- Traditional rainfed agriculture.

Crop production in the rainfed sectors exhibits very wide annual fluctuations as a result of erratic rainfall amounts and distribution, which can result in late sowing, long dry spells, flooding from intense downpours, the necessity to re-sow and, not uncommonly, complete crop failure. The situation in the irrigated sector, however, is much more predictable. Nevertheless, viewed globally, yields are generally low in all sectors for various reasons in addition to rainfall. These include, inter alia, a shortage of efficient, well-maintained farm machinery, a shortage of credit and working capital, the use of low yielding crop varieties and low plant density with scarce availability of improved seeds, inadequate maintenance of irrigation canals, inefficient irrigation pumps and poor agricultural practices such as inadequate weed and pest control.

Regarding commercial crops, the country is the third major producer of sugarcane in Africa, after Egypt and South Africa, with a total planted area of about 82 000 hectares. The country is also a significant importer of sugar, especially from India and Thailand. Unlike most major sugar producers, the Sudan is allowed to export unlimited amounts of its own sugar production to the European Union without paying taxes. This is possible due to the Everything But Arms (EBA) agreement, a component of the European Union's Generalized Scheme of Preferences to assist the economies of the Least Developed Countries. The difference between the Sudan's annual domestic sugar requirement and the sum of its production and imports allows the country to export substantial amounts.

Until the 1980s, the country was a major producer of cotton, exporting on average more than 1 million bales (227 kg) per year. Cotton production has declined dramatically since then due to a significant reduction in planted area. However, in 2016 and 2017, high international prices and highly productive GMO varieties provided a new impetus to the sector that is now facing renewed growth.

Irrigated agriculture

The area under irrigation is estimated at about 1.6 million hectares (3.7 million feddans). Large-scale mechanized federal schemes account for about 1.26 million hectares (3 million feddans),

including the Aj Jazirah Scheme which, at approximately 1 million hectares (2.38 million feddans), is one of the largest irrigation schemes in the world. The irrigated sector is the main user of imported agricultural inputs as production is more reliable. However, yields in the federal irrigated schemes remain low compared to world standards, largely due to the poor maintenance of canals, the low capacity of drainage systems and the shortage of efficient modern pumps. In addition, the adoption of traditional agricultural practices that do not allow to make the most efficient use of the constant water resource and exploit the full potential of more intensive farming.

Irrigation water is mainly obtained from the Nile River and its tributaries by gravity or pumps and from spate flows from seasonal rivers at Gash and Tokar deltas. The main crops of the irrigated sector include sugarcane, cotton, sorghum, groundnuts, wheat, legumes, spices, vegetables, fruits and green fodders. The irrigated sector also takes advantage of rain, especially during the establishment of summer crops. For example, rain is estimated to provide about 40 percent of the water requirements of crops in the Suki Irrigation Scheme. Rain is important to reduce production costs of privately-owned irrigated smallholdings along the banks of the Nile and its tributaries that depend on diesel-powered pumps.

Semi-mechanized rainfed agriculture

In the semi-mechanized rainfed agriculture, mechanization is limited to land preparation, seeding and, only partially, to harvesting, while other field operations are carried out manually. Semi-mechanized rainfed agriculture is practiced in a broad belt of 6.7 million hectares which runs mainly through Kassala, Gedaref, Blue Nile, Sennar, White Nile and South Kordofan states and receives annually more than 500 mm of rainfall on average. This belt is considered as the granary of the country, with sorghum accounting for about 80 percent of the total cultivated land and usually producing about 45 percent of the country's requirements. Sesame, sunflowers, millet and cotton are also grown.

Farms in the semi-mechanized sector are frequently very large with an average surface of 420 hectares and up to more than 50 000 hectares. Given the usual erratic nature of rainfall and, therefore, the possibility that yields could be very low, the system may be considered as opportunistic and operations are carried out as economically as possible. Standard crop varieties are sown using disc seeders with up to 30 discs and no fertilizer is applied. If rains are favourable, yields of up to 1 tonne/hectare can be obtained, otherwise crops are usually not harvested and sold to pastoralists for grazing.

Traditional rainfed agriculture

The traditional rainfed sector covers about 9 million hectares and occupies the largest number of farmers. The sector is characterized by small family units farming from 2 to 50 hectares for both income and own consumption. On larger units, mechanization is used for land preparation, but the rest of the agricultural operations are carried out manually. The traditional rainfed sector prevails mainly in western parts of the country, in Greater Darfur Region and in most of Greater Kordofan Region, where the main cereal crops are millet and sorghum. Input levels are low and yields are especially vulnerable to unfavourable rainfall. Other important crops in this sector include groundnuts, sesame, hibiscus (karkade), watermelon and Gum Arabic.

Livestock

Livestock is raised in almost all parts of the country and animals are owned primarily by nomadic tribes. In 2020, the livestock population was estimated at about 109.9 million heads, comprising about 31.8 million cattle, 41 million sheep, 32.2 million goats and 4.9 million camels. Pastoralists efficiently use natural resources, moving herds around the country in response to weather conditions and availability of forage. The major problem faced by pastoralists is the loss of rangeland due to the expansion of mechanized farming. The traditional practice of farmers allowing herds to graze crop residues, with animals simultaneously fertilizing land, is declining as farmers prefer to sell their residues for cash. Clashes between pastoralists and farmers are common, even in years of good rainfall, prompting the Government to set up committees in each state to resolve disputes.

Table 2: The Sudan - Estimates of livestock population by State, 2020

State	Cattle	Sheep	Goats	Camels	Total
North Kordofan	794 675	4 223 000	2 738 530	944 640	8 700 845
South Kordofan	4 650 438	2 214 000	2 190 824	253 872	9 309 134
West Kordofan	3 560 144	4 366 500	2 448 568	644 520	11 019 732
North Darfur	740 637	3 936 436	3 056 344	615 492	8 348 909
South Darfur	2 500 048	2 214 000	1 743 638	91 192	6 548 878
East Darfur	2 045 493	1 808 100	1 426 613	74 612	5 354 818
Central Darfur	1 964 437	1 845 000	2 087 726	200 244	6 097 407
West Darfur	2 403 097	2 246 800	2 554 887	244 524	7 449 309
Gedarif	1 118 902	2 235 372	1 116 829	356 208	4 827 312
Kassala	909 108	2 115 426	1 764 866	717 828	5 507 228
Red Sea	146 220	436 170	758 341	298 152	1 638 883
Blue Nile	2 171 052	4 089 096	477 985	14 760	6 752 892
Sennar	1 703 783	1 439 362	1 728 098	121 524	4 992 767
Aj Jazirah	2 673 287	2 589 761	2 261 235	128 412	7 652 694
White Nile	3 766 760	2 671 543	2 697 855	36 900	9 173 057
Northern	270 190	1 025 000	1 213 346	51 168	2 559 703
River Nile	108 076	1 079 521	1 273 094	119 064	2 579 755
Khartoum	260 653	463 431	680 209	6 888	1 411 181
Total	**31 787 000**	**41 000 000**	**32 218 000**	**4 920 000**	**109 925 000**

Source: Ministry of Animal Resources and Fisheries.

Using the Pictorial Evaluation Tool (PET), the overall livestock body condition was assessed as average to above average at the time of the field visits. Although no major outbreaks of contagious animal diseases were reported, blood parasites, pneumonia and mastitis affected cattle, sheep and goats in some areas. The most prevalent livestock diseases are summarized in the Table 3.

The livestock body condition and disease outbreaks in select states are reported as follows:

Aj Jazirah State: Livestock body condition was average to above average. No outbreaks of contagious diseases were reported. However, blood parasites, pneumonia and mastitis were reported in cattle, sheep and goats. Rangeland conditions and pasture availability were above average and similar to the previous year. Water point levels were average.

Blue Nile State: Livestock body condition was good, comparable to the previous year. Some contagious diseases were reported, including Peste des Petits Ruminants and Lumpy Skin disease in goats. Pasture and water availability were at above-average levels, normal livestock movements were reported.

Gedaref State: Livestock body condition was above average and comparable to the previous year. No serious outbreaks of contagious diseases were reported. Pasture conditions and water points levels were average.

Kassala State: Livestock body condition, pasture and water availability were very good. No serious outbreaks of contagious diseases were reported.

Table 3: The Sudan - Main livestock diseases reported in 2020 by State

Disease	Livestock type	Affected states
Brucellosis	Sheep	Kassala
Trypanosomiasis	Sheep, Camels	Gedaref
Black Quarter	Cattle	Blue Nile
Botulism	Sheep	North Kordofan
Sheep pox	Sheep, Goats	Gedaref, Sennar, North Kordofan, River Nile, Kassala, North Darfur, South Kordofan
Rabies	Cattle, Camels, Goats, Donkeys	River Nile, Kassala, North Kordofan
Foot and mouth	Cattle	South Kordofan, River Nile, Northern, South Darfur
Haemorrhagic septicaemia	Cattle, Sheep	North Darfur, North Kordofan, South Kordofan, South Darfur, Sennar, Kassala
Peste des petits ruminants	Sheep, Goats	North Darfur, North Kordofan, South Kordofan, South Darfur, River Nile, Northern, Kassala, West Kordofan
Newcastle	Poultry	Khartoum
Contagious Bovine Pleuropneumonia	Cattle	North Darfur, Aj Jazirah, South Kordofan, South Darfur
Lumpy Skin	Cattle	Kassala, Central Darfur, River Nile, East Darfur, South Darfur
Theileriosis	Cattle	South Darfur, Blue Nile, Kassala, North Kordofan
Babesiosis	Sheep, Goats, Cattle	Kassala, North Kordofan, Gedaref, Sennar
Food toxicity	Cattle	North Kordofan
Haemonchus	Sheep	North Kordofan
Heart water	Sheep	Kassala, North Kordofan, Gedaref
Abortion	Sheep, Goats, Cattle	River Nile

Source: General Administration of Animal Health and Epidemic Control.

Greater Kordofan Region: Livestock body condition was reported to be good to very good. Contagious diseases, including Peste des Petits Ruminants and Haemorrhagic Septicaemia, were reported in a few areas of North Kordofan. Pasture condition was very good and water availability was adequate.

Greater Darfur Region: Livestock body condition was reported to be very good for all types of livestock. Contagious diseases, mainly Peste des Petits Ruminants and Haemorrhagic Septicaemia, were reported in a few areas. Pasture condition and availability were above average, similar to the previous year, while water point levels were average.

Main factors affecting cereal production in 2020/21

Rainfall

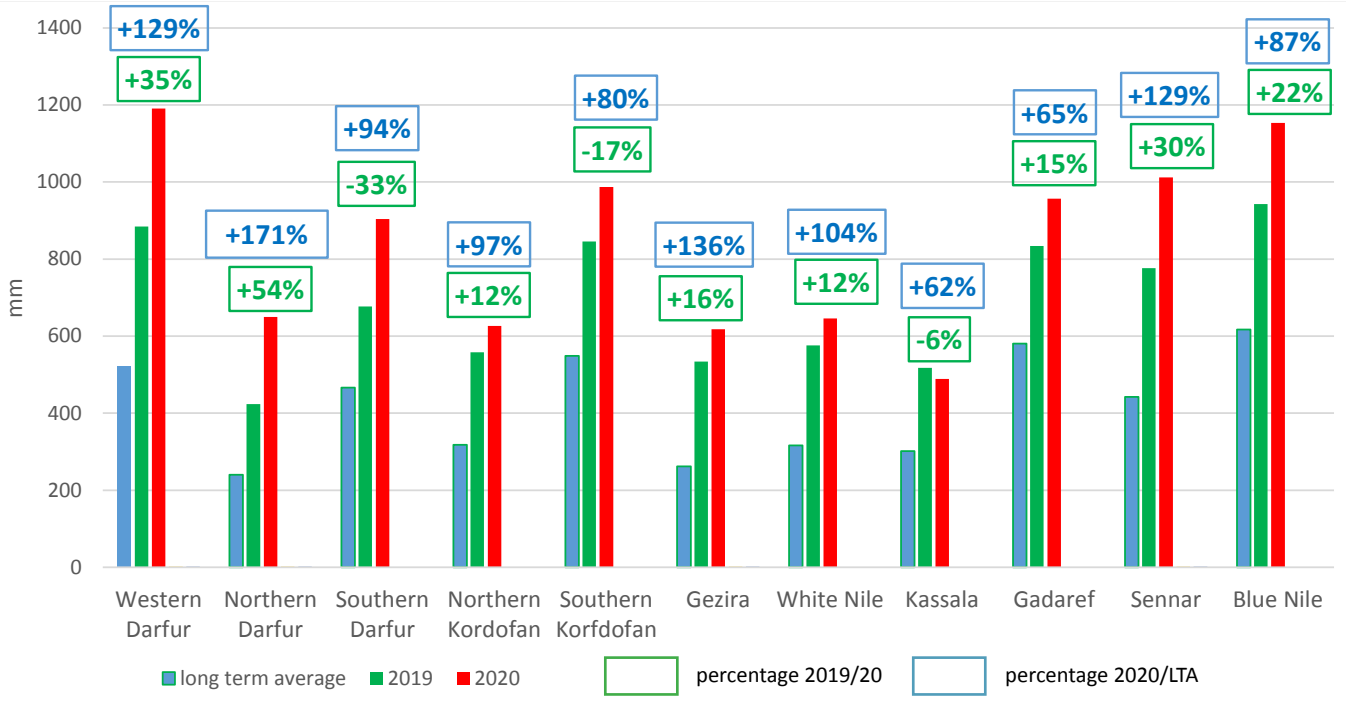
With rainfed agriculture accounting for about 95 percent of the total cultivated area in the country, rainfall is the most important driver of national food crop production. Precipitation is crucial also in the irrigated sector as it supplements irrigation water and supports crop establishment and development.

The rainy season in 2020 was characterized by exceptionally abundant precipitation and by the longest duration of the last ten years.

According to remote sensing data, cumulative rainfall amount between June and October 2020 (Figure 2) was estimated well above the Long Term Average (LTA) in all cropping areas across of the country. Rainfall volumes in 2020 were between 12 and 50 percent higher than those in 2019, except in Kassala State, where they were slightly lower, but still well above average. Rainfall data from remote sensing were confirmed by information provided by the ground stations of the Sudan Meteorological Authority (Annex 2) as well as by information obtained during the field visits.

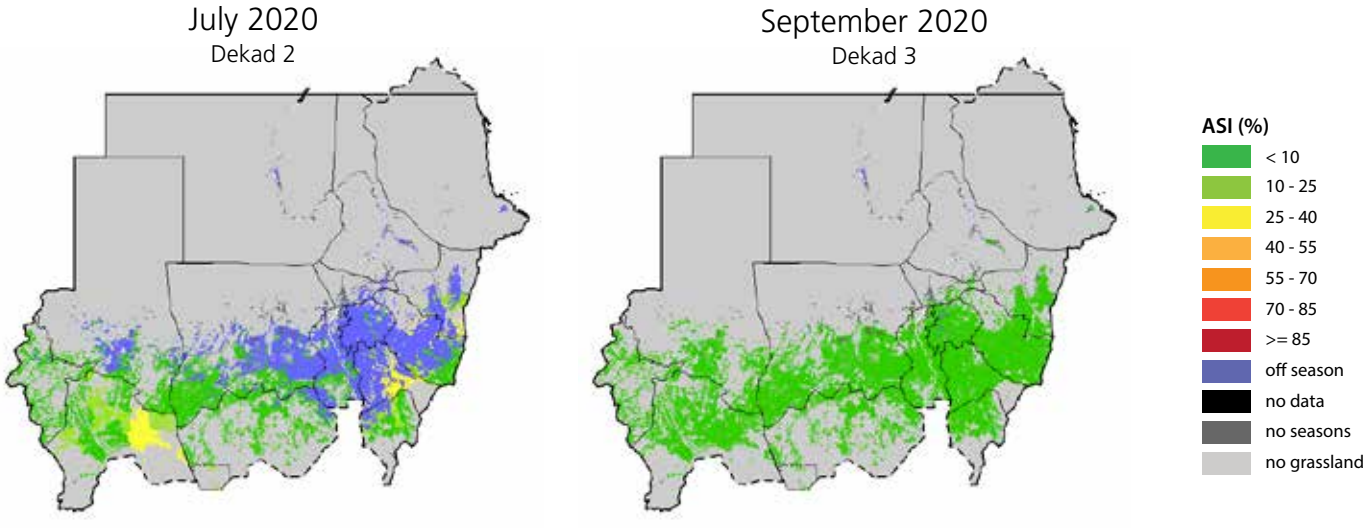
The spatial and temporal distribution of rains in 2020, with some localized exceptions, was better compared to 2019. An early onset of the seasonal rains in May in most cropping areas was followed by average to above-average rainfall amounts in June and by below average to average rains in July. Dry spells of about two weeks affected crops in some areas of South Kordofan and Aj Jazirah states in June, and in northern parts of Gedaref State in July. According to the FAO Agricultural Stress Index (ASI), in July, between 25 and 40 percent of the cropland was affected by drought in localized areas of Eastern Darfur, Gedaref, Sennar and Kassala states.

Figure 2: The Sudan - Cumulative rainfall comparison in selected states (mm and percent)



Source: FAO/GIEWS.

Figure 3: The Sudan - Agricultural Stress Index (ASI) for Cropland



Source: FAO/GIEWS Earth Observation - *www.fao.org/giews/earthobservation*.
Note: The Index calculation is based on METOP-AVHRR data. % of cropland area affected by severe drought per GAUL 2 region.
Disclaimer: *The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal status of any country, territory, area or of its authorities, or concerning the delimitation of its frontiers and boundaries.*

Subsequently, exceptionally abundant rains were received in August (recorded as the wettest August since 1998) and September, which lifted crop prospects in the areas affected by poor rains in July (Figure 3). Heavy rains triggered widespread floods in 17 out of 18 states, affecting 3.5 million feddans (1.47 million hectares) of crops. However, the negative impact of floods was mitigated by the unusual continuation of the rainy season until October, which allowed the full maturation of sorghum crops that were late planted in August instead of replanting sesame crops that were affected by floods and Sesame Gall Midge.

Irrigation

Normally, rainfall assists in the establishment of crops, which reduces the burden on the irrigation system in July and August, while in September and October the required amount of water is supplied by a number (two to three) of scheduled irrigations. However, irrigation water is seldom sufficient for all the main crops (sorghum, groundnuts and cotton), in particular if the canals were not de-silted and cleaned from the weeds. In the Aj Jazirah Scheme, some constraints to irrigation were mitigated by rainfall and re-distribution of irrigation water among different canals conducted in close coordination by the scheme and the MoA. In the New Halfa Scheme, the overall efficiency of irrigation was better than in the previous year, but weed infestations were observed in some areas due to the heavy rains and low capacity of drainage systems. In the Rahad Scheme, the irregular electricity supply from the Mina station in the months of May and June led to a delay in planting of groundnut and sorghum crops. Subsequently, heavy rains in July and August led to waterlogging of more than 30 000 feddans. While maintenance and cleaning of canals was adequately performed, the drainage system was not adequately maintained.

Agricultural finance and credit

The provision of short-term agricultural credit through the Agricultural Bank of Sudan (ABS) is a regular procedure in both the irrigated and the rainfed sectors, but it is particularly dedicated to the entrepreneurial semi-mechanized rainfed sector. Loans to eligible farmers are provided through the interest-free salam, with the ABS charges levied in kind at a value fixed at planting time jointly by the Ministry of Finance, the Strategic Reserve Corporation, the ABS and the farmers' associations.

The total sum of agricultural finance provided to the agricultural sector in 2020 for the summer

cropping season was SDG 14 924.4 million, more than twice the amount provided in 2019, about one-third in kind and two-thirds in cash. The beneficiaries were 66 498, about 50 percent more than in 2019 (Table 4). Regarding the distribution of loans, about 82 percent was provided to the semi-mechanized rainfed sector, 14 percent to the irrigated sector and the remaining 4 percent to the traditional rainfed sector and other sectors (Table 5). Although the total amount provided by the ABS in 2020 was substantially higher than in 2019, the area financed, approximately 2.8 million hectares, was only 3.7 percent more than last year, due to the high inflation, which resulted in increased cost of inputs and agricultural operations (Table 6).

Table 4: The Sudan - Finance to agriculture by ABS and number of beneficiaries for summer crops (2018-2020)

Region	2018		2019		2020	
	Finance (million SDG)	Beneficiaries	Finance (million SDG)	Beneficiaries	Finance (million SDG)	Beneficiaries
Eastern	1 681.0	6 668	2 419	8 975	7 189.5	11 010
Sennar and Blue Nile	645.0	3 756	1 888	3 486	3 902	3 308
White Nile	173.0	950	325	964	851.6	1 748
North Kordofan	41.0	11 447	181	9 146	122.2	8 572
South Kordofan	66.0	1 214	234	1 574	415	1 734
Aj Jazirah	367.0	12 322	1 146	18 692	1 900.8	27 748
Darfur	2.0	405	118	996	81.2	4 409
Northern	-	-	-	-	18.7	53
River Nile	4.0	n.a.	27	96	120.8	126
Khartoum	0.4	n.a.	6	16	6.5	5
Main Branch	162.0	25	126	9	316.2	7 785
Total	**3 143**	**36 787**	**6 470**	**43 954**	**14 924.2**	**66 498**

Source: Agricultural Bank of Sudan.

Table 5: The Sudan - Area financed for summer cropping by sector (2018-2020) and distribution of loans (2020)

Sector	Area financed (000 hectares)			Distribution of loans in 2020 (percent)
	2018	2019	2020	
Semi-mechanized rainfed	2 524	2 392	2 600.6	82.3
Traditional rainfed	55	95	59.1	1.3
Irrigated	229	152	128.9	13.5
Horticulture	26	13	7.1	1.3
Other	71	53	3.7	1.6
Total	**2 905**	**2 705**	**2 799.4**	**100**

Source: Agricultural Bank of Sudan.

Table 6: The Sudan - Area financed for summer cropping by sector (2020)

Sector	Area financed (000 hectares)	Finance (million SDG)	Percent
Semi-mechanized	2 600.6	12 286.0	82.3
Traditional rainfed	59.1	192.4	1.3
Irrigated	128.9	2 014.1	13.5
Horticulture	7.1	189.9	1.3
Other	3.7	242.0	1.6
Total	**2 799.4**	**14 924.4**	**100.0**

Source: AoS and CFSAM.

Regarding the winter cropping season, the total finance provided up to December 2020 was SDG 11 284 million, of which 96 percent was granted to the irrigated sector, as shown in Table 7.

Generally, the availability of all agricultural inputs was adequate, including fuel, availability of which increased compared to 2019. However, their cost was substantially higher than in the previous year, underpinned by the sustained inflation (Table 8).

Table 7: The Sudan - Finance for winter season until end-December 2020 (million SDG)

Region	Irrigated		Horticulture		Machineries		Total
	In-kind	Cash	In-kind	Cash	In-kind	Cash	
River Nile	319.46	188.43	103.72	-	-	81.38	692.99
Eastern	617.38	3.12	0.54	0.08	1.2	-	622.32
Aj Jazirah	8 181.16	2.87	25.68	0.47	-	-	8 210.19
Northern	671.52	256.78	-	-	-	40.64	968.94
White Nile	302.93	14.00	-	-	-	-	316.93
Khartoum	18.12	416.89	2.18	-	-	-	437.18
Blue Nile	36.03	0.00	-	-	-	-	36.03
Total	**10 146.6**	**882.08**	**132.12**	**0.55**	**1.2**	**122.02**	**11 284.58**

Source: Agricultural Bank of Sudan.

Table 8: The Sudan - Agricultural input costs 2020/21 compared to 2019/20 season

Item	Price in SDGs		Percent change
	2019	2020	
Tractor Massey second hand (unit)	1 100 000	4 000 000	264
Tractor New Holland new (unit)	2 250 000	5 000 000	122
Sprayer (unit)	330 000	1 400 000	324
Fuel (barrel)	1 200	11 700	875
Commercial fuel (barrel)	16 000	24 000	50
Urea sack (50 kg)	1 750	3 500	100
Herbicide 2-4-D (litre)	450	1 700	278
Sorghum seeds (tonne)	15 400	80 000	419
Millet seeds (tonne)	28 000	110 000	293
Sesame seeds (tonne)	72 000	280 000	289
Sunflower seeds (tonne)	860 000	1 760 000	105
Cotton seeds (tonne)	120 000	160 000	33
Groundnuts seeds (tonne)	28 000	110 000	293
Empty sacks (300 sack batch)	33 000	130 000	294
Labour costs (per man-day)	400	1 000	150

Source: Agricultural Bank of Sudan.

Agricultural inputs

Generally, the availability of all agricultural inputs was adequate, including fuel, availability of which increased compared to 2019. However, their cost was substantially higher than in the previous year, underpinned by the sustained inflation (Table 8).

Seeds

The total quantity of seeds delivered by the MoANR to the state ministries of agriculture in the 18 states amounted to 1 651 tonnes, representing about 90 percent of the target. Sorghum (Arfa Gadameck, Wad Ahmed, Tabat, Butana varieties) represented 81 percent of the total, millet 5.6 percent, groundnuts 5.5 percent, sesame 5.5 percent and other crops (including cotton, and beans) 2.3 percent. The quantity delivered in 2020 was 14.6 percent lower than in 2019 due to high inflation underpinning the cost of seeds.

In addition, FAO provided about 205 tonnes of groundnuts seeds, 184 tonnes of sorghum seeds, 51 tonnes of sesame seeds, 18 tonnes of millet seeds, 14 tonnes of cowpea seeds, 9.5 tonnes of vegetables seeds and 2.7 tonnes of watermelon seeds. To support the livestock sector, FAO distributed more than 2.6 million doses of animal drugs, 570 tonnes of concentrated feed and 23 tonnes of mineral supplement. FAO also distributed agricultural tools, namely 1 029 donkey carts, 3 800 rakes with handle, 3 240 donkey ploughs and 11 605 weeding hoes. Interventions aimed to support the agricultural sector by increasing farm productivity and small farmers' income by improving the nutrition situation and by mitigating the impact of floods.

Agricultural machinery

The availability of agricultural machinery was generally adequate. However, the cost of maintenance and spare parts was high, with spare parts often reported to have low quality. In addition, the restrictions imposed to contain the spread of the COVID-19 pandemic, including the closure of markets, disrupted maintenance and repair activities, especially at the beginning of the summer season. The rental rate of agricultural machinery doubled in 2020 compared to 2019, with a negative impact on farmers who do not own it.

Table 9: The Sudan - Seeds distributed by MoANR to small farmers by State (tonnes)

State	Sorghum	Millet	Sesame	Groundnuts	Cotton	Pigeon peas	Target	Received	Percent
North Darfur	75.0	10	7	10	-	-	102.00	102.00	100.00
South Darfur	90.0	10	7	14	-	1.0	122.00	107.80	88.40
Central Darfur	85.0	5	7	10	-	1.0	108.00	108.00	100.00
East Darfur	80.0	10	7	13	-	-	110.00	105.00	95.50
West Darfur	80.0	10	7	10	-	0.5	107.50	85.00	79.10
North Kordofan	80.0	10	8	8	30	1.0	137.00	137.00	100.00
South Kordofan	118.0	5	5	10	-	1.0	131.00	131.00	100.00
West Kordofan	80.0	8	8	10	-	1.0	107.00	105.50	98.60
White Nile	73.5	5	5	1	-	-	84.00	41.50	48.80
Blue Nile	90.0	5	7	-	-	1.0	103.00	103.00	100.00
Sennar	75.0	5	7	-	-	1.0	88.00	79.00	76.70
Aj Jazirah	80.0	5	3	-	-	-	88.00	88.00	100.00
Gedaref	100.0	5	8	5	-	-	118.00	118.00	100.00
Kassala	80.0	-	5	-	-	1.0	86.00	86.00	100.00
Red Sea	60.0	10	-	-	-	-	70.00	70.00	100.00
Khartoum	-	-	-	-	-	-	65.00	35.00	53.90
Northern	-	-	-	-	-	-	30.00	0.00	0.00
River Nile	-	-	-	-	-	-	41.00	20.00	48.80
Abiey	-	-	-	-	-	-	66.50	58.50	88.00
Reserve	-	-	-	-	-	-	70.75	70.75	100.00
Total	**1 246.5**	**103**	**91**	**91**	**30**	**8.5**	**1 835**	**1 651**	**90.00**

Source: Ministry of Agriculture and Natural Resources/Agricultural Production General Directorate.

Fertilizers and herbicides

Both fertilizers and herbicides were adequately available, but at a very high cost. For example, the price of urea in 2020 doubled compared to the previous year, while prices of herbicides were almost four times their year-earlier levels.

Labour

As a result of the COVID-19-related restrictions of movements within and between states at the beginning of the season in April-May, labour shortages were reported in some states, especially in the semi-mechanized sector (Gedaref and Kassala). However, the labour availability in 2020 was overall adequate, but daily wage rates increased by 175 percent compared to 2019. In the traditional sector in Western Sudan, farmers with small agricultural holding depend on family labour in performing the manual agricultural operation and were not affected by the labour shortages.

Fuel

The availability of fuel for the 2020/21 summer cropping season improved from the previous year and about 200 000 cubic metres were approved and distributed by the Ministry of Petroleum between April and November 2020, amounting to 95 percent of the 210 000 cubic metres proposed by the Ministry of Agriculture and Natural Resources.

Crop pests and diseases

In the 2020 summer cropping season, the incidence of pests, diseases and weeds was significantly higher than in previous years. The significantly humid

Table 10: The Sudan - Areas surveyed, affected and treated by main pests and diseases, 2020

Pests	Activities	Target	Duration	Percent of affected area treated
Sorghum bugs	Treated trees: 462 949 Treated areas: 192 030.5 hectares Treated bush areas: 28 595.5 hectares	14 states	Jan-Jun	95-100
Fall Armyworm	Surveys and control of sorghum, maize in irrigated and traditional rainfed areas	Area affected: 16 465 hectares	Jul-Sept	-
Watermelon bugs	Treated areas: 16 465 hectares	8 states	Apr-Jul	-
Fruit flies	Treated farms: 6 829 Treated areas: 16 698 hectares	Minimize infestations to ensure high quality of fruit and boost exports in 13 states	Throughout the year	-
Rats	Surveyed areas: 706 420 hectares Treated areas: 350 965 hectares	Minimize infestations to ensure high quality of agricultural produce	Throughout the year	25-99
Birds	Locations: 644 Surveyed areas: 143 625 hectares Treated areas: 84 040 hectares	Minimize infestations to ensure high quality of agricultural produce	Sept-Dec	100

Source: CFSAM, 2020/21.

environment fostered by the torrential late season rains and coupled to the long duration of the rainy season, favoured the proliferation of weeds and pests during the grain development and filling stages.

Severe desert locust infestations affected coastal areas along the Red Sea coast and riverine areas along the Atbara River. In December 2020, 101 300 hectares were surveyed and about 20 percent of this area was treated with 13 884 litres of concentrated pesticides.

For the third consecutive year, a significant extent of the areas planted with sesame were affected by the Sesame Gall Midge. The area affected is progressively expanding, from about 50 000 feddans in Gedaref State in 2018, to 150 000 feddans in 2019, when the pest was reported also in Kassala State and in small areas of Sennar State, to about 700 000 feddans (294 000 hectares) in 2020, when it was reported in Gedaref, Kassala, Sennar and White Nile states, with particularly high infestation levels in Kassala State.

COVID-19 pandemic

The measures implemented by the Government to contain the spread of the COVID-19 pandemic affected crop production, mainly at the beginning of the season, with market closures resulting in shortages of some agricultural inputs and movement restrictions causing labour shortages and high costs of agricultural practices. However, the phasing out of some restrictions in August 2020 benefited agricultural operations. Livestock rearing activities were also affected by the restrictive measures, mainly through shortages of medicines and vaccines and access constraints to pastures. Table 11 summaries the impact of the COVID-19-related restrictive measures on crop and livestock production by State/Scheme.

Table 11: The Sudan - Impact of COVID-19-related restrictions on crop and livestock production by State/Scheme

State/Scheme	Impact on	
	Crops	**Livestock**
Tokar Scheme, Red Sea	Labour shortages	Fodder shortages
	High costs of agricultural labour	Shortages of vaccines and drugs
	Lack of transportation services	-
Kassala	High costs of agricultural inputs	Shortages of vaccines and drugs
	High costs of agricultural labour	High costs of fodder
Gedaref	Decrease of area sown with some crops as a result of market closures affecting input availability	Decrease of pastoralists' incomes due to markets closure
	High costs of agricultural inputs	Decrease of livestock exports
	Shortages and high cost of agricultural labour due to international borders closure	Shortages of vaccines and drugs
Northern	Closure of markets resulted in shortages of empty sacks, delaying the harvesting of the last 2019/20 winter crops and resulting in higher costs of harvesting operations and increased losses	High costs of fodder
Central Darfur	Market closures depriving farmers of income from secondary businesses	No impact
South Kordofan	Very limited impact	No impact
North Darfur	Market closures High costs of agricultural inputs Labour shortages due to movement restrictions	Shortages of vaccines and drugs Labour shortages High costs of inputs sourced from other states
North Kordofan	High costs of agricultural inputs High costs of agricultural labour due to the movement restrictions	Shortage of vaccines and drugs
South Darfur	Shortage and high costs of agricultural labour due to movement restrictions	Unavailability of veterinary services due to movement restrictions and market closures
West Kordofan	High costs of agricultural inputs due to market closures	High costs of production inputs
Blue Nile	Shortages and high costs of agricultural machinery spare parts High costs of agricultural labour	Shortage of vaccines and drugs High costs of production inputs Restrictions of movement for pastoralists resulting in over-grazing in some areas
East Darfur	Shortages and high costs of agricultural labour High costs of agricultural inputs	Restrictions of movement for pastoralist resulting in constrained access to pasture for livestock Decrease of pastoralists' incomes due to market closures

Source: CFSAM, 202/21.

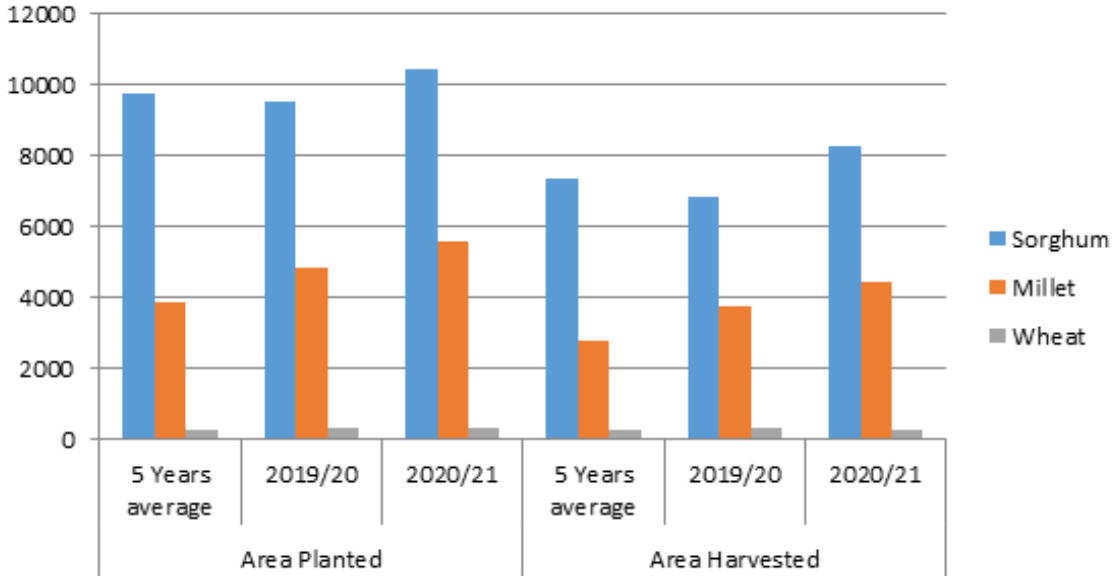
Area planted and harvested in 2020/21

The total area planted with sorghum in 2020/21 is estimated at 10.4 million hectares, 9.7 percent above the previous year and 7 percent above the average of last five years. Compared to 2019, significant increases occurred in the irrigated sector (+51.6 percent) and in the traditional rainfed sector (+14.5 percent). In the mechanized rainfed sector, the area planted with sorghum increased by 3.2 percent from the previous year, but it was 7.3 percent lower compared to average of the previous five years. The area planted with millet is estimated at 5.6 million hectares, 15 percent and 44.5 percent, respectively, higher compared to the previous season and the five-year average. The planted area increased due to the high market prices of cereals, which prompted farmers to increase plantings and to an increased availability of fuel and agricultural finance. In addition, in August, instead of replanting sesame crops affected by the floods and Sesame Gall Midge, farmers opted for late planting of sorghum crops that successfully reached maturation due to the extended rainy season, up to late October.

The total area harvested of sorghum was estimated at 9 million hectares, 29 percent up from the previous year, but 15 percent below the five-year average. The total area harvested with millet was estimated at 4.4 million hectares, 26 percent up from the previous year and the five-year average, as a result of good weather conditions and the better tolerance of the crop to water logging and dry spells compared to sorghum.

Sowing of the 2020/21 wheat crop began in irrigated areas in December 2020. As of 25 January 2021, the total planted area was expected at about 357 000 hectares, compared to 318 000 hectares in the previous year and 257 000 hectares of the five-year average, mainly due to the high market prices of the grain.

Figure 4: The Sudan – Main cereals: area planted and harvested, 2019/20-2020/21 and last five-year average



Source: CFSAM, 2020/21.

Table 12: The Sudan - Cereal area harvested by State/Scheme/Sector (000 hectares)

State/Scheme/ Sector	Sorghum					Millet					Wheat				
	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average
Irrigated															
Northern	2	1	4	500	200	-	-	-	-	-	43	55	50	90	116
River Nile	8	8	64	800	800	-	-	-	-	-	18	18	20	114	112
Khartoum	1	2	2	100	200	-	-	-	-	-	0	0	1	-	300
Aj Jazirah	143	120	132	110	92	-	-	-	-	-	139	159	193	122	139
Suki	14	9	11	111	75	-	-	-	-	-	-	-	-	-	-
Sennar	28	22	25	114	89	-	-	-	-	-	0	0	3	-	700
White Nile	45	43	39	91	87	-	-	-	-	-	19	33	44	135	232
Rahad	32	23	32	139	100	-	-	-	-	-	0	1	1	100	300
New Halfa	28	21	24	114	86	-	-	-	-	-	25	28	31	109	122
Gash	24	29	108	372	450	-	-	-	-	-	-	-	-	-	-
Kassala	4	1	0	0	0	-	-	-	-	-	-	-	-	-	-
Tokar	7	11	8	76	120	9	4	5	125	57	-	-	-	-	-
North Kordofan	4	4	8	200	200	-	-	-	-	-	-	-	-	-	-
Total	**340**	**294**	**547**	**186**	**161**	**9**	**4**	**5**	**125**	**57**	**246**	**294**	**344**	**117**	**140**
Semi-Mechanized															
Sennar	708	499	783	157	111	75	-	71	-	95	-	-	-	-	-
White Nile	459	305	384	126	84	32	16	58	363	181	-	-	-	-	-
Blue Nile	510	480	473	99	93	60	-	-	-	-	-	-	-	-	-
Gedaref	2 454	1 255	1 517	121	62	102	101	270	267	265	-	-	-	-	-
Kassala	493	490	573	117	116	-	-	-	-	-	-	-	-	-	-
North Kordofan	14	16	17	106	121	-	-	-	-	-	-	-	-	-	-
West Kordofan	288	646	-	-	-	-	-	-	-	-	-	-	-	-	-
South Kordofan	686	346	415	120	60	13	15	6	40	46	-	-	-	-	-
Total	**5 612**	**3 289**	**4 162**	**127**	**74**	**282**	**132**	**405**	**307**	**144**					
Traditional Rainfed															
River Nile	58	50	30	60	52	-	-	-	-	-	-	-	-	-	-
Khartoum	40	21	79	376	198	-	-	-	-	-	-	-	-	-	-
Aj Jazirah	362	382	392	103	108	14	27	29	107	207	-	-	-	-	-
Sennar	237	220	150	68	63	47	75	71	95	151	-	-	-	-	-
White Nile	223	189	186	98	83	17	17	58	341	341	-	-	-	-	-
Blue Nile	97	88	116	132	120	32	48	5	10	16	-	-	-	-	-
Kassala	116	224	74	33	65	8	6	8	133	0	-	-	-	-	-
Red Sea	18	24	7	29	39	8	3	5	167	63	-	-	-	-	-
North Kordofan	419	289	504	174	120	53	42	617	1 469	1 164	-	-	-	-	-
West Kordofan	517	351	519	148	100	738	570	544	95	74	-	-	-	-	-
South Kordofan	231	158	132	84	57	51	34	50	147	98	-	-	-	-	-
North Darfur	190	235	161	69	85	222	276	675	245	304	-	-	-	-	-
West Darfur	202	260	495	190	245	556	563	541	96	97	2	2	1	50	50
South Darfur	557	483	710	147	127	741	794	761	96	103	2	1	1	67	50
Central Darfur	159	185	181	98	114	359	561	202	36	56	-	-	-	-	-
East Darfur	619	252	588	233	95	302	294	370	126	123	-	-	-	-	-
Total	**4 045**	**3 411**	**4 324**	**127**	**135**	**3 148**	**3 310**	**3 936**	**119**	**125**	**3**	**3**	**2**	**57**	**50**
Grand total	**9 997**	**6 994**	**9 033**	**129**	**85**	**3 439**	**3 446**	**4 346**	**126**	**126**	**249**	**297**	**345**	**116**	**139**

Source: CFSAM, 2020/21.
Note: Totals computed from unrounded data.

Crop yields

The average sorghum yield in 2020 is estimated at 0.60 tonnes/hectare, similar to the average of the previous five years, but 12 percent below the yield obtained in 2019. In the semi-mechanized sector, the average yield of 0.5 tonnes/hectare, despite being 2 percent below the five-year average, was 32 percent higher than that of 2019. This year-on-year increase is mainly due to improved pest control and an adequate availability of most agricultural inputs. In Gedaref State, the main sorghum producing area, yields were 7 and 15 percent, respectively, above the previous year and the five-year average.

The average millet yield is estimated at 0.43 tonnes/hectare, 40 and 10 percent, respectively, down from last year and the five-year average. The decrease was mainly registered in the traditional rainfed sector, mainly due to heavy rains which created a conducive environment for the proliferation of weeds and disrupted harvesting operations.

The wheat crops, apart from a small rainfed area cultivated in the Jebel Marra area of South and Central Darfur states, are mainly grown under irrigation and, therefore, the average yields are quite stable across the years. However, malfunctioning of the irrigation is a risk with the potential of substantially reducing yields.

Cereal production estimates

The national production of sorghum and millet in 2020/21 is estimated at 7.07 million tonnes, 11 percent up from 2019 and 23 percent higher than the average of the past five years. The increase in total production is mainly due to the increase of both the planted and harvested areas.

Sorghum production is estimated at about 5.15 million tonnes, 39 percent higher than the level of the previous year[1] and 16 percent above than the five-year average.

The national millet production is estimated at 1.9 million tonnes, 28 percent down from 2019[2] and 46 percent higher than the five-year average.

Wheat production is forecast at 900 000 tonnes, about 24 percent up from last year and 50 percent above the five-year average.

[1] Compared to the early estimates provided in the 2019 CFSAM report, sorghum production in 2019 has been downward revised from 4.0 to 3.7 million tonnes, taking into account the results of crop cutting surveys.

[2] Compared to the early estimates provided in the 2019 CFSAM report, millet production in 2019 has been upward revised from 1.13 to 2.64 million tonnes, taking into account the results of crop cutting surveys.

Table 13: The Sudan - Cereal yields by State/Scheme/Sector (tonnes/hectares)

State/Scheme/ Sector	Sorghum					Millet					Wheat				
	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average
Irrigated															
Northern	1.8	2.38	1.67	70	93	-	-	-	-	-	2.99	3.10	3.10	100	104
River Nile	2.0	2.12	2.14	101	107	-	-	-	-	-	2.53	2.62	2.86	109	113
Khartoum	1.3	1.19	1.20	101	92	-	-	-	-	-	1.90	0.00	1.90	-	100
Aj Jazirah	2.3	2.38	2.26	95	98	-	-	-	-	-	2.31	2.14	2.62	122	113
Suki	2.3	2.81	1.79	64	78	-	-	-	-	-	-	-	-	-	-
Sennar	1.6	1.44	0.86	60	54	-	-	-	-	-	1.60	0.00	2.14	-	134
White Nile	1.9	1.89	1.93	102	102	-	-	-	-	-	2.22	2.38	2.14	90	97
Rahad	2.3	2.86	2.14	75	93	-	-	-	-	-	1.70	1.67	2.02	121	119
New Halfa	2.2	1.80	2.14	119	97	-	-	-	-	-	2.24	2.38	2.38	100	106
Gash	1.8	1.94	1.50	77	83	-	-	-	-	-	-	-	-	-	-
Kassala	1.7	1.59	-	-	-	-	-	-	-	-	-	-	-	-	-
Tokar	1.6	1.62	1.49	92	93	0.81	0.95	0.71	75	88	-	-	-	-	-
North Kordofan	2.1	0.95	1.71	180	107	-	-	-	-	-	-	-	-	-	-
Total	**2.08**	**2.14**	**1.89**	**88**	**91**	**0.81**	**0.95**	**0.71**	**75**	**88**	**2.44**	**2.40**	**2.61**	**109**	**107**
Semi-Mechanized															
Sennar	0.60	0.43	0.43	100	72	0.50	0.49	0.42	86	84	-	-	-	-	-
White Nile	0.51	0.52	0.64	123	125	0.36	0.49	0.43	88	119	-	-	-	-	-
Blue Nile	0.56	0.54	0.48	89	86	0.35	0.31	0.24	77	69	-	-	-	-	-
Gedaref	0.52	0.56	0.60	107	115	0.35	0.32	0.45	141	129	-	-	-	-	-
Kassala	0.43	0.51	0.64	125	149	-	-	-	-	-	-	-	-	-	-
North Kordofan	0.49	0.45	0.47	104	96	-	-	-	-	-	-	-	-	-	-
West Kordofan	0.51	0.64	0.43	67	84	-	-	-	-	-	-	-	-	-	-
South Kordofan	0.44	0.53	0.3	57	68	0.26	0.54	0.17	32	65	-	-	-	-	-
Total	**0.51**	**0.38**	**0.50**	**132**	**98**	**0.40**	**0.36**	**0.43**	**119**	**108**					
Traditional Rainfed															
River Nile	1.02	0.60	0.870	145	85	-	-	-	-	-	-	-	-	-	-
Khartoum	0.41	0.48	0.710	148	173	-	-	-	-	-	-	-	-	-	-
Aj Jazirah	0.51	0.64	0.640	100	125	0.58	0.60	0.640	107	110	-	-	-	-	-
Sennar	0.55	0.53	0.520	98	95	0.37	0.36	0.520	144	141	-	-	-	-	-
White Nile	0.34	0.43	0.710	165	209	0.31	0.42	0.420	100	135	-	-	-	-	-
Blue Nile	0.57	0.50	-	-	-	0.30	0.27	0.430	159	143	-	-	-	-	-
Kassala	0.51	0.53	0.190	36	37	0.23	0.34	0.310	91	125	-	-	-	-	-
Red Sea	0.53	0.64	0.450	70	85	0.38	0.30	0.240	80	63	-	-	-	-	-
North Kordofan	0.26	0.22	0.214	97	82	0.29	0.34	0.214	63	74	-	-	-	-	-
West Kordofan	0.36	0.34	0.440	129	122	0.17	0.43	0.440	102	259	-	-	-	-	-
South Kordofan	0.59	0.69	0.350	51	59	0.33	0.43	0.250	58	76	-	-	-	-	-
North Darfur	0.44	0.64	0.180	29	42	0.87	1.19	0.140	12	16	-	-	-	-	-
West Darfur	1.10	1.50	0.710	47	65	0.53	0.83	0.760	92	143	1.19	1.43	1.43	100	120
South Darfur	0.80	0.95	0.590	62	74	0.45	0.71	0.510	72	113	1.50	1.19	1.43	120	95
Central Darfur	1.10	1.50	0.910	61	83	0.95	1.31	0.790	60	83	-	-	-	-	-
East Darfur	0.39	0.64	0.660	103	169	0.41	0.60	0.480	80	117	-	-	-	-	-
Total	**0.57**	**0.56**	**0.55**	**98**	**96**	**0.48**	**0.72**	**0.43**	**60**	**90**	**1.34**	**1.36**	**1.43**	**105**	**106**
Grand total	**0.60**	**0.68**	**0.60**	**88**	**100**	**0.47**	**0.71**	**0.43**	**61**	**91**	**2.42**	**2.39**	**2.61**	**109**	**108**

Source: CFSAM, 2020/21.

Table 14: The Sudan – Cereal production by State/Scheme/Sector (000 tonnes)

State/Scheme/ Sector	Sorghum					Millet					Wheat				
	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average	5-yr average 2015/16-2019/20	2019/20	2020/21	2020/21 as % 2019/20	2020/21 as % 5-yr average
Irrigated															
Northern	2	2	7	350	350	-	-	-	-	-	130	172	155	90	119
River Nile	15	16	138	863	920	-	-	-	-	-	46	64	58	91	126
Khartoum	1	2	2	100	200	-	-	-	-	-	1	-	2	-	200
Aj Jazirah	302	285	299	105	99	-	-	-	-	-	322	340	506	149	157
Suki	27	26	19	73	70	-	-	-	-	-	-	-	-	-	-
Sennar	39	32	22	69	56	-	-	-	-	-	1	-	6	-	600
White Nile	72	81	76	94	106	-	-	-	-	-	41	78	95	122	232
Rahad	65	66	68	103	105	-	-	-	-	-	1	2	3	150	300
New Halfa	57	37	51	138	89	-	-	-	-	-	57	67	73	109	128
Gash	41	57	161	282	393	-	-	-	-	-	-	-	-	-	-
Kassala	7	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Tokar	10	17	13	76	130	6	4	5	125	83	-	-	-	-	-
North Kordofan	3	4	9	225	300	-	-	-	-	-	-	-	-	-	-
Total	**641**	**627**	**865**	**138**	**135**	**6**	**4**	**5**	**125**	**83**	**598**	**723**	**898**	**124**	**150**
Semi-Mechanized															
Sennar	368	183	336	184	91	31	8	30	375	97	-	-	-	-	-
White Nile	192	143	207	145	108	7	8	25	313	357	-	-	-	-	-
Blue Nile	244	104	225	216	92	15	32	4	13	27	-	-	-	-	-
Gedaref	898	438	766	175	85	26	32	122	381	469	-	-	-	-	-
Kassala	139	85	368	433	265	-	-	-	-	-	-	-	-	-	-
North Kordofan	6	7	8	114	133	-	-	-	-	-	-	-	-	-	-
West Kordofan	125	148	160	108	128	-	-	-	-	-	-	-	-	-	-
South Kordofan	233	152	125	82	54	3	8	1	13	33	-	-	-	-	-
Total	**2 205**	**1 260**	**2 195**	**174**	**100**	**82**	**88**	**182**	**207**	**222**	**-**	**-**	**-**	**-**	**-**
Traditional Rainfed															
River Nile	37	117	26	22	70	-	-	-	-	-	-	-	-	-	-
Khartoum	8	13	56	431	700	-	-	-	-	-	-	-	-	-	-
Aj Jazirah	126	87	252	290	200	6	16	11	69	183	-	-	-	-	-
Sennar	103	39	79	203	77	14	27	19	70	136	-	-	-	-	-
White Nile	48	61	104	170	217	4	7	58	829	1 450	-	-	-	-	-
Blue Nile	39	33	97	294	262	7	13	17	131	243	-	-	-	-	-
Kassala	42	8	14	175	33	1	2	3	150	300	-	-	-	-	-
Red Sea	5	4	3	75	60	2	1	1	100	50	-	-	-	-	-
North Kordofan	77	123	192	156	249	11	14	132	943	1 200	-	-	-	-	-
West Kordofan	61	112	194	173	318	78	95	244	257	313	-	-	-	-	-
South Kordofan	112	50	47	94	42	120	146	13	9	11	-	-	-	-	-
North Darfur	59	56	30	54	51	157	329	96	29	61	-	-	-	-	-
West Darfur	200	128	169	132	85	241	469	412	88	193	2	2	1	60	60
South Darfur	363	489	302	62	83	207	567	389	69	188	2	2	1	60	60
Central Darfur	153	201	139	69	91	296	734	160	22	548	-	-	-	-	-
East Darfur	166	294	389	132	234	88	175	176	101	200	-	-	-	-	-
Total	**1 599**	**1 815**	**2 093**	**115**	**131**	**1 232**	**2 595**	**1 731**	**67**	**141**	**4**	**4**	**2**	**60**	**60**
Grand total	**4 445**	**3 702**	**5 153**	**139**	**116**	**1 320**	**2 687**	**1 918**	**72**	**146**	**602**	**727**	**900**	**124**	**150**

Source: CFSAM, 2020/21.
Note: Totals computed from unrounded data.

Table 15: The Sudan – Cereal production by Sector (000 tonnes)

Sector	Sorghum			Millet			Wheat		
	Five-year average[1/]	2019/20	2020/21 (forecast)	Five-year average[1/]	2019/20	2020/21 (forecast)	Five-year average[1/]	2019/20	2020/21 (forecast)
Irrigated	641	627	865	6	4	5	598	723	898
Semi-mechanized rainfed	2 205	1 260	2 195	82	88	182	-	-	-
Traditional rainfed	1 599	1 815	2 093	1 232	2 595	1 731	4	4	2
Total	**4 445**	**3 702**	**5 153**	**1 320**	**2 687**	**1 918**	**602**	**727**	**900**

Source: CFSAM, 2020/21.
Note: Totals computed from unrounded data.
[1/] 2015/16-2019/20 average.

Table 16: The Sudan – Sorghum production by Sector[1/]

Sector	Five-year average[2/]			2019/20			2020/21 (forecast)		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Irrigated	340	641	2.08	294	627	2.14	547	865	1.89
Semi-mechanized rainfed	5 612	2 205	0.51	3 289	1 260	0.38	4 162	2 195	0.50
Traditional rainfed	4 045	1 599	0.57	3 411	1 815	0.56	4 324	2 093	0.55
Total	**9 997**	**4 445**	**0.60**	**6 994**	**3 702**	**0.68**	**9 033**	**5 153**	**0.60**

Source: CFSAM, 2020/21.
Note: Totals computed from unrounded data.
[1/] Area in 000 hectares, production in 000 tonnes and yields in tonnes/hectare.
[2/] 2015/16-2019/20 average.

Table 17: The Sudan – Millet production by Sector[1/]

Sector	Five-year average[2/]			2019/20			2020/21 (forecast)		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Irrigated	9	6	0.81	4	4	0.95	5	5	0.71
Semi-mechanized rainfed	282	82	0.40	132	88	0.36	405	182	0.43
Traditional rainfed	3 148	1 232	0.48	3 310	2 595	0.72	3 936	1 731	0.43
Total	**3 439**	**1 320**	**0.47**	**3 446**	**2 687**	**0.71**	**4 346**	**1 918**	**0.43**

Source: CFSAM, 2020/21.
Note: Totals computed from unrounded data.
[1/] Area in 000 hectares, production in 000 tonnes and yields in tonnes/hectare.
[2/] 2015/16-2019/20 average.

Table 18: The Sudan – Wheat production by Sector[1/]

Sector	Five-year average[2/]			2019/20			2020/21 (forecast)		
	Area	Production	Yield	Area	Production	Yield	Area	Production	Yield
Irrigated	246	598	2.44	294	723	2.40	344	898	2.61
Semi-mechanized rainfed	-	-	-	-	-	-	-	-	-
Traditional rainfed	3	4	1.34	3	4	1.36	2	2	1.43
Total	**249**	**602**	**2.42**	**297**	**727**	**2.39**	**345**	**900**	**2.61**

Source: CFSAM, 2020/21.
Note: Totals computed from unrounded data.
[1/] Area in 000 hectares, production in 000 tonnes and yields in tonnes/hectare.
[2/] 2015/16-2019/20 average.

Other crops

Sesame

Production of sesame in 2020/21 is estimated at 1.13 million tonnes, 6 percent lower than in 2019, but 49 percent higher than the five-year average. The year-on-year decrease is mainly due to floods and Sesame Gall Midge that affected crops especially in Gedaref, Kassala, Sennar and White Nile states.

Table 19: The Sudan - Sesame production 2020/21 compared to 2019/20 and five-year average

Sector	Five-year average				2019/20				2020/21 (forecast)			
	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield
Mechanized Rainfed												
Sennar	549	448	168	375	899	674	271	402	378	302	65	215
White Nile	201	151	44	292	253	189	59	311	175	152	32	210
Blue Nile	152	107	34	319	315	236	75	317	133	67	25	374
Gedaref	426	352	97	276	653	457	98	214	283	229	93	407
Kassala	100	73	18	251	252	202	43	213	147	21	1	48
North Kordofan	0	0	0	0	0	0	0	0	-	-	-	-
South Kordofan	257	183	48	264	396	238	51	215	357	304	79	260
Total	**1 685**	**1 315**	**410**	**312**	**2 768**	**1 997**	**597**	**299**	**1 473**	**1 075**	**295**	**275**
Traditional Rainfed												
Aj Jazirah	41	36	15	420	135	125	59	471	87	66	18	271
Sennar	9	5	2	397	0	0	0		13	11	3	265
White Nile	151	112	25	220	302	211	45	213	265	226	48	213
Blue Nile	84	70	22	308	0	0	0	0!	72	65	31	479
Kassala	8	7	2	232	42	34	8	232	-	-	-	-
North Kordofan	1 072	631	106	168	1 518	746	166	223	1 716	1 287	297	231
South Kordofan	191	127	37	289	361	217	65	300	189	135	44	325
West Kordofan	184	163	34	208	475	427	104	243	685	583	146	251
North Darfur	79	56	9	160	155	124	23	185	442	175	25	143
South Darfur	143	120	44	364	218	177	78	440	553	522	168	322
West Darfur	85	75	28	380	69	67	29	429	68	62	25	405
East Darfur	47	33	6	193	101	82	18	219	84	67	13	193
Central Darfur	62	52	21	405	69	36	17	476	106	74	32	430
Total	**2 155**	**1 488**	**351**	**236**	**3 445**	**2 247**	**612**	**272**	**4 197**	**3 207**	**837**	**261**
Grand total	**3 840**	**2 803**	**761**	**272**	**6 213**	**4 244**	**1 209**	**285**	**5 669**	**4 281**	**1 132**	**264**

Source: CFSAM, 2020/21.

[1/] Area in 000 hectares, production in 000 tonnes and yields in kg/hectare.

Groundnuts

The national production of groundnuts in 2020/21 is estimated at 2.4 million tonnes, about 15 percent lower than in 2019, but still about 18 percent higher than compared to the five-year average.

The year-on-year production decrease is mainly due to a drop in yields by 24 percent as a result of waterlogging and labour shortages which affected the control of weeds, which offset an 11 percent increase in harvested area.

Table 20: The Sudan - Groundnut production 2020/21 compared to 2019/20 and five-year average

Sector	Five-year average				2019/20				2020/21 (forecast)			
	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield
Irrigated												
Northern	-	-	-	-	-	-	-	-	0.6	0.6	0.9	1 429
Aj Jazirah	79	73	156	2 125	63	56	151	2 683	55.0	50.0	118.0	2 381
White Nile	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0
Blue Nile	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0
Suki	0	0	0	2 381	0	0	0	0	0.0	0.0	0.0	0
Sennar	0	0	0	1 190	0	0	0	0	0.0	0.0	0.0	0
Rahad	3	14	33	2 425	16	15	29	1 973	14.0	13.0	32.0	2 381
New Halfa	16	22	78	3 526	21	20	77	3 819	21.0	22.0	78.0	3 810
Gash	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0
Total	**98**	**109**	**267**	**2 445**	**100**	**91**	**257**	**2 820**	**91**	**84**	**229**	**2 723**
Rainfed												
White Nile	31	24	11	469	29	26	9	346	21	17	8	476
Blue Nile	1	1	0	433	0	0	0	0	0	0	0	0
Sennar	0	0	0	0	0	0	0	0	0	0	0	0
Gedaref	21	18	12	682	21	18	13	737	43	36	23	637
North Kordofan	78	60	23	385	100	80	34	426	140	112	51	189
South Kordofan	70	48	30	623	32	27	19	707	56	49	33	667
West Kordofan	800	646	429	663	979	881	730	829	1 129	959	731	762
North Darfur	248	182	68	375	336	235	105	446	377	282	105	372
South Darfur	628	532	434	816	727	618	496	803	840	771	431	559
West Darfur	170	154	166	1 078	145	138	138	1 002	113	101	104	1 027
Central Darfur	107	99	78	788	163	155	104	669	120	108	77	713
East Darfur	709	566	528	932	964	862	923	1 071	1 134	964	608	631
Total	**2 863**	**2 329**	**1 769**	**760**	**3 495**	**3 039**	**2 571**	**846**	**3 972**	**3 399**	**2 171**	**639**
Grand total	**2 962**	**2 438**	**2 037**	**835**	**3 595**	**3 130**	**2 828**	**903**	**4 062**	**3 483**	**2 400**	**689**

Source: CFSAM, 2020/21.

[1/] Area in 000 hectares, production in 000 tonnes and yields in kg/hectare.

Sunflower

Sunflower is grown under both irrigated and rainfed conditions in the semi-mechanized sector. Despite the significant increase in crop yield by 53 percent compared to the previous year, the estimated production in 2020/21 was 40 percent less than the output obtained in the previous year and the five-year average as both the planted area and the harvested area declined by about 60 percent compared to 2019 as a result of high production costs, floods and seed shortages.

Table 21: The Sudan - Sunflower production 2020/21 compared to 2019/20 and five-year average[1/]

Sector	Five-year average				2019/20				2020/21 (forecast)			
	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield
Irrigated												
River Nile	0	0	0	0	-	-	-	-	0.20	0.2	0.20	1 190
Aj Jazirah	-	-	-	-	0	0	0.0	428	5.00	4.00	5.00	1 190
White Nile	-	-	-	-	1	1	1.8	1 385	0.84	0.84	0.96	1 142
Blue Nile	-	-	-	-	-	-	-	-	-	-	-	-
Sennar	1	1	1	1 190	-	-	-	-	-	-	-	-
Suki	2	1	1	980	-	-	-	-	-	-	-	-
Rahad	4	4	5	1 417	3	3	4.0	1 587	4.20	3.78	5.00	1 322
New Halfa	3	3	4	1 689	0	0	0.0	1 538	0.42	0.42	1.00	2 380
Gash	0	0	0	0	-	-	-	-	-	-	-	-
North Kordofan	0	0	0	0	-	-	-	-	-	-	-	-
Total	**9**	**8**	**12**	**1 395**	**5**	**4**	**4**	**1 043**	**11**	**9**	**12**	**1 293**
Rainfed												
White Nile	-	-	-	-	-	-	-	-	1	1	1	571
Blue Nile	125	104	54	522	206	165	82	498	49	37	31	848
Sennar	13	10	8	813	14	6	5	850	1	1	1	1 143
Gedaref	49	43	30	706	39	32	14	444	39	32	18	557
Kassala	0	0	0	0	0	0	0	0	-	-	-	-
South Kordofan	0	0	0	0	0	0	0	0	-	-	-	-
Total	**189**	**158**	**93**	**590**	**259**	**202**	**101**	**500**	**90**	**71**	**51**	**714**
Grand total	**198**	**166**	**105**	**631**	**263**	**206**	**105**	**511**	**101**	**80**	**63**	**782**

Source: CFSAM, 2020/21.

[1/] Area in 000 hectares, production in 000 tonnes and yields in kg/hectare.

Sugar

Sugar is produced by the Kenana Sugar Company, the White Nile Sugar Company and the Sudanese Sugar Company, located in the cities of Guneid, New Halfa, Sennar and Asalaya. According to preliminary estimates, the area harvested at national level was 65 800 hectares, 3 percent less than in 2019, while sugarcane production was 4.7 million tonnes, 13 percent less than last season (Table 22).

Table 22: The Sudan - Sugar production 2016/17 to 2020/21[1/]

Company	Year	Area harvested	Sugarcane production	Sugar production	Sugar yields
Sudanese Sugar Company					
	2016/17	33.5	2 439	233	6.96
	2017/18	34.3	2 569	251	7.32
	2018/19	35.2	2 484	248	7.05
	2019/20	33.7	2 251	217	6.43
	2020/21	26.6	1 512	142	5.33
Kenana Sugar Company					
	2016/17	35.4	3 009	301	8.50
	2017/18	34.5	3 500	350	10.14
	2018/19	34.4	3 500	328	9.53
	2019/20	34.4	3 198	315	9.15
	2020/21	33.6	3 000	300	8.93
White Nile Sugar Company					
	2016/17	13.3	412	42	3.19
	2017/18	13.4	413	43	3.17
	2018/19	3.2	100	10	3.12
	2019/20	n.a	n.a	n.a	n.a
	2020/21	5.6	240	19	3.39
Total	**2016/17**	**82.2**	**5 860**	**576**	**7.01**
	2017/18	**82.2**	**6 482**	**644**	**7.83**
	2018/19	**72.8**	**6 084**	**586**	**8.04**
	2019/20	**68.1**	**5 449**	**532**	**7.81**
	2020/21	**65.8**	**4 752**	**461**	**7.01**

Source: Sugar producing companies.

[1/] Area in 000 hectares, production in 000 tonnes and yields in tonnes/hectare.

Cotton

The national production of cotton in season 2020/21 is estimated at 311 000 tonnes, 30 and 17 percent, respectively, lower compared the previous season and the five-year average. The production decline is mainly due to a 60 percent decrease of harvested area compared to 2019 in the irrigated sector, coupled to a marked increase in planted and harvested area in the rainfed sector, where yields are substantially lower.

Table 23: The Sudan - Cotton production 2020/21 compared to 2019/20 and five-year average[1/]

Sector	Five-year average				2019/20				2020/21 (forecast)			
	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield	Area planted	Area harvested	Production	Yield
Irrigated												
Aj Jazirah	43	39	147	3 750	63	56	186	3 330	-	-	-	-
Suki	10	9	23	2 510	9	9	15	1 701	9.66	8.82	15	1 700
Sennar	18	17	38	2 321	22	21	49	2 333	10.92	9.66	18	1 863
White Nile	4	3	4	1 160	3	3	3	1 190	3.00	3.00	2	595
Rahad	23	20	52	2 632	26	22	47	2 152	18.00	17.00	45	2 678
New Halfa	15	14	43	3 170	21	17	58	3 368	13.00	13.00	44	3 379
Tokar	1	1	1	1 100	2	1	1	1 190	-	-	-	-
Abu Habil	1	1	1	913	2	2	4	1 714	-	-	-	-
Total	**115**	**104**	**310**	**2 990**	**148**	**130**	**363**	**2 785**	**55**	**52**	**124**	**2 400**
Rainfed												
Sennar	3	1	1	1 190	11	2	3	1 786	14	12	18	1 476
White Nile	0	0	0	0	0	0	0	0	-	-	-	-
Blue Nile	12	10	18	1 742	34	30	50	1 653	60	45	105	2 336
Gedaref	34	28	46	1 640	47	35	25	717	67	63	63	998
Kassala	0	0	0	0	0	0	0	0	-	-	-	-
South Kordofan	0	0	0	0	0	0	0	0	-	-	-	-
Total	**48**	**39**	**65**	**1 657**	**91**	**67**	**78**	**1 168**	**141**	**121**	**187**	**1 545**
Grand total	**163**	**143**	**375**	**2 624**	**239**	**197**	**441**	**2 237**	**196**	**172**	**311**	**1 801**

Source: CFSAM, 2020/21.

[1/] Area in 000 hectares, production in 000 tonnes and yields in kg/hectare.

Areas affected by floods

Since August 2020, torrential rains triggering widespread flash floods, combined with the historical overflow of the Nile River and its tributaries have affected most states of the country, with the only exception of South Darfur, causing severe damages alongside riverbanks in northern, central and eastern regions of the country. The areas most affected have been Gedarif, Eastern Darfur, Blue Nile and Sennar states. In addition, flash floods also occurred in several areas of the country, including the Greater Kordofan and Darfur regions, damaging standing crops, seed stocks, tools, equipment, machinery, irrigation and other agricultural infrastructures. According to the available information from the states, the total cultivated area affected by the floods during the summer season is estimated at about 1.47 million hectares, accounting for 5.6 percent of the planted area. Livestock losses are estimated at 36 798 heads, with 1 000 heads of poultry also being lost. Several interventions were carried out by the Government and the humanitarian community to mitigate the impact of the floods, through humanitarian assistance and reconstruction and rehabilitation. These are listed in Table 24.

Table 24: The Sudan - Flood mitigation interventions

State/Scheme	Interventions by	
	Government	**Humanitarian organizations**
Tokar/Red Sea	Additional seed distributions	Food and shelter aid
Kassala	Damage assessment	About SDG 3.7 million distributed by FAO for 933 farmers in North Gash
Gedaref	Joint Damage Assessment by the Government and UN organization Rehabilitation of some agricultural roads	Joint Damage Assessment Promises of a contribution from the Arab Organization for Agricultural Development
Northern	Suction of floodwater from pits Repair of irrigation pumps	Humanitarian food and shelter aid
Central Darfur	Coordination of humanitarian organizations distributing agricultural inputs to flood-affected households	Distribution of tomato and onion seeds for the winter season
West Kordofan	-	Damage assessment by FAO
Blue Nile	Damage assessment	Humanitarian food and shelter aid

Source: CFSAM, 2020/21.

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CEREAL SUPPLY/DEMAND SITUATION

Crop and livestock markets

In general, prices of locally produced sorghum and millet show seasonal declines in October/November with the start of the main harvest and remain generally stable through March, before rising in August/September. However, prices of sorghum (*Feterita*) and millet have been steadily increasing in nominal terms from late 2017 to end-2020, irrespective of seasonality.

In November 2020, prices of sorghum and millet were about four times higher than at the same month of 2019. The surge was driven by the below average cereal output gathered in 2019 as well as concerns over the August floods on 2020 crops. The price increase was also exacerbated by the sharp depreciation of the local currency and the significant growth in inflation, which exerted upward pressure on production costs.

As illustrated in Figure 5, nominal wholesale prices of sorghum reached record highs in most markets in November 2020, ranging from SDG 6 200 to SDG 7 700/90 kg sack. In the observed markets, the year-on-year increase in prices was on average 320 percent. Similarly, wholesale prices of millet, mainly grown and consumed in Darfur Region, followed a sustained increasing trend during 2020 (Figure 6). In November 2020, prices were about SDG 12 200/90 kg sack in North Darfur State producing area, corresponding to an annual increase of 370 percent.

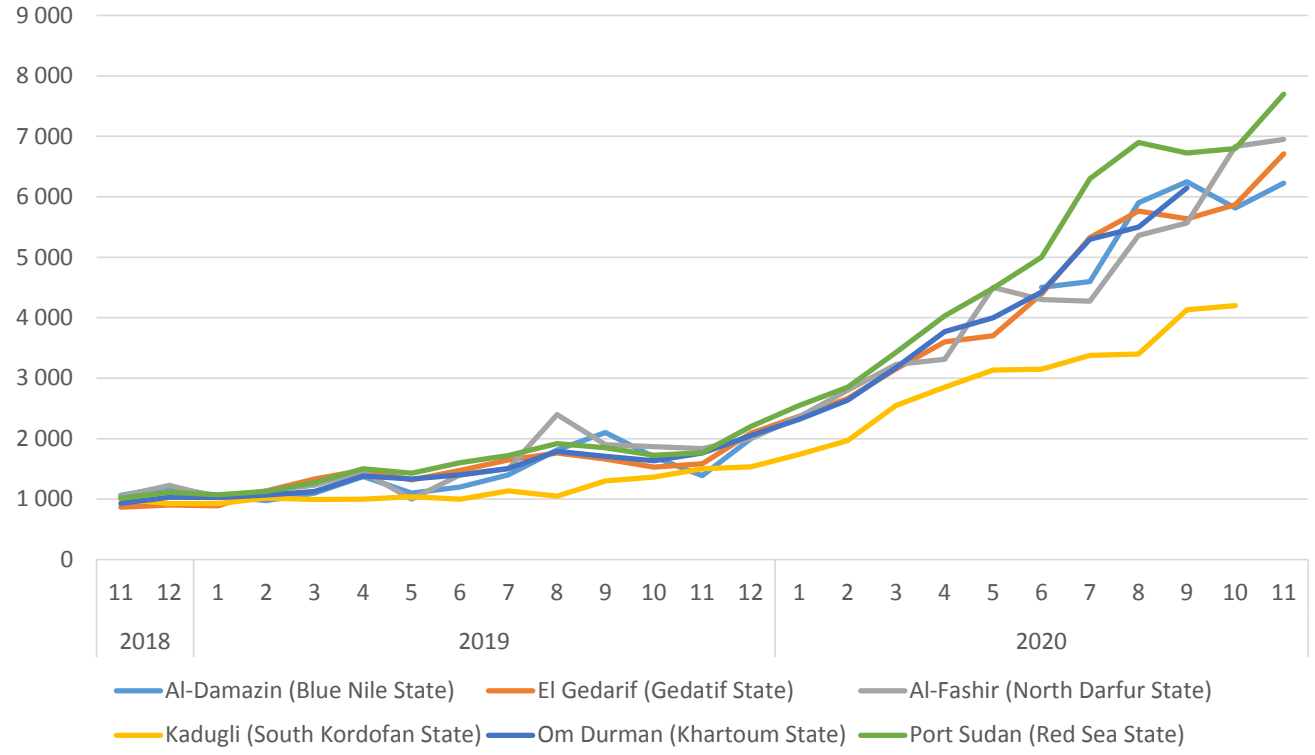
Prices of wheat grain, mainly imported and consumed in urban areas, continued to increase in 2020, supported by lower imports between January and September 2020 compared to the same period in 2019 (Figure 7). The upsurge was compounded by the sustained currency depreciation, which made imports more expensive. As the country mostly imports wheat grain, rising costs of milling and producing wheat flour contributed to the increase in bread prices. In November 2020, wheat grain was traded at about SDG 10 200/90 kg sack on average, about 240 percent higher year on year.

In El Gedaref market, located in the main sesame producing area, wholesale prices of sesame increased from SDG 4 260/kantar (equivalent to 143 kg) in November 2019 to SDG 15 320/kantar in November 2020, in spite of a record-high production obtained in 2019. The sustained increase in sesame exports, owing to strong demand from China (mainland), lowered domestic availabilities and significantly contributed to an upward pressure on domestic prices.

Prices of livestock also followed an increasing trend during 2020 and they were well above their values a year earlier. In November 2020, prices of calves, goats and sheep in El Obeid market in North Kordofan State were more than threefold compared to a year earlier.

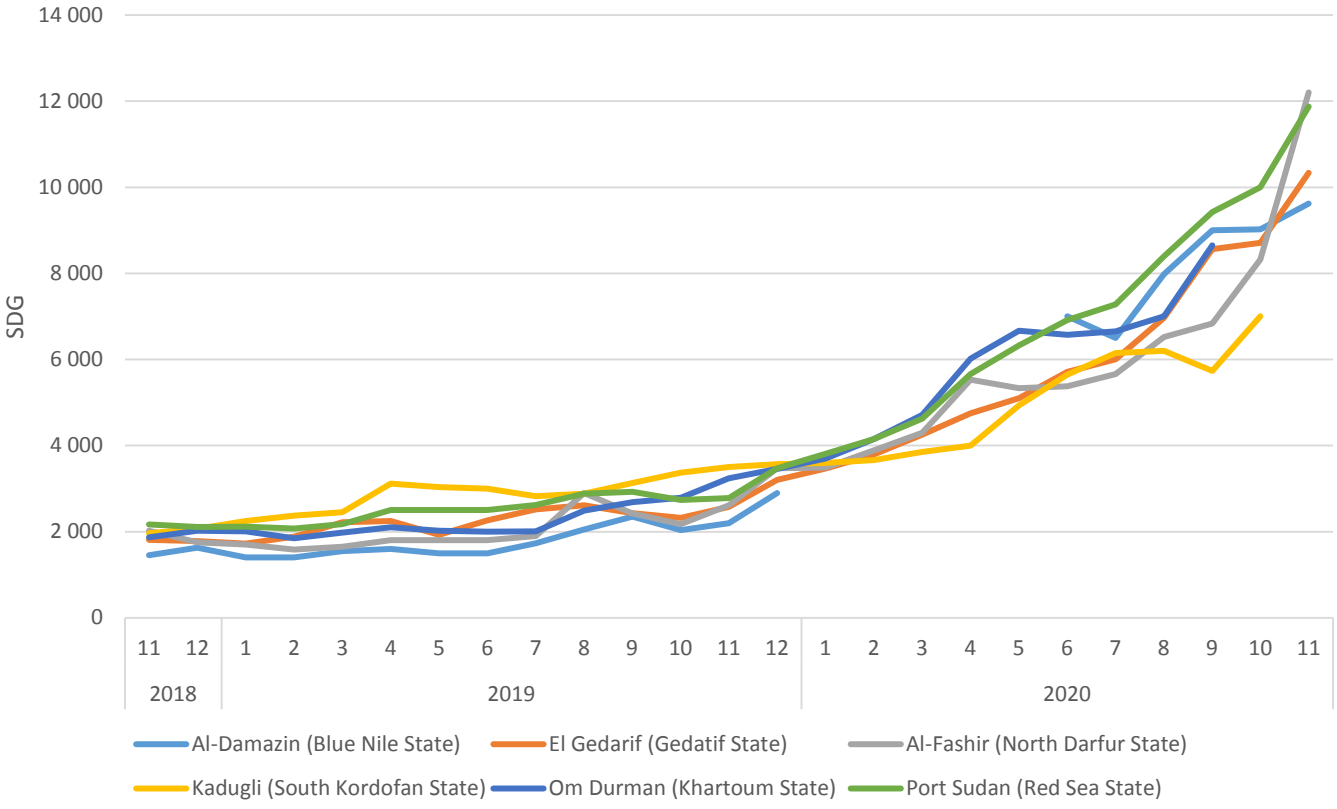
The terms of trade for pastoralists, calculated as prices of 1 kg of sorghum obtained selling an animal, generally decreased in 2020 (Figure 8). The decline mainly reflects the steeper increase of sorghum prices compared to livestock prices in 2020 due to tight domestic availabilities of the grain on account of the below-average output in 2019. By contrast, abundant rains in 2020 increased the availability of pastures and water for livestock, lowering costs of animal husbandry.

Figure 5: The Sudan - Wholesale prices of sorghum (*Feterita*) in selected markets (states)



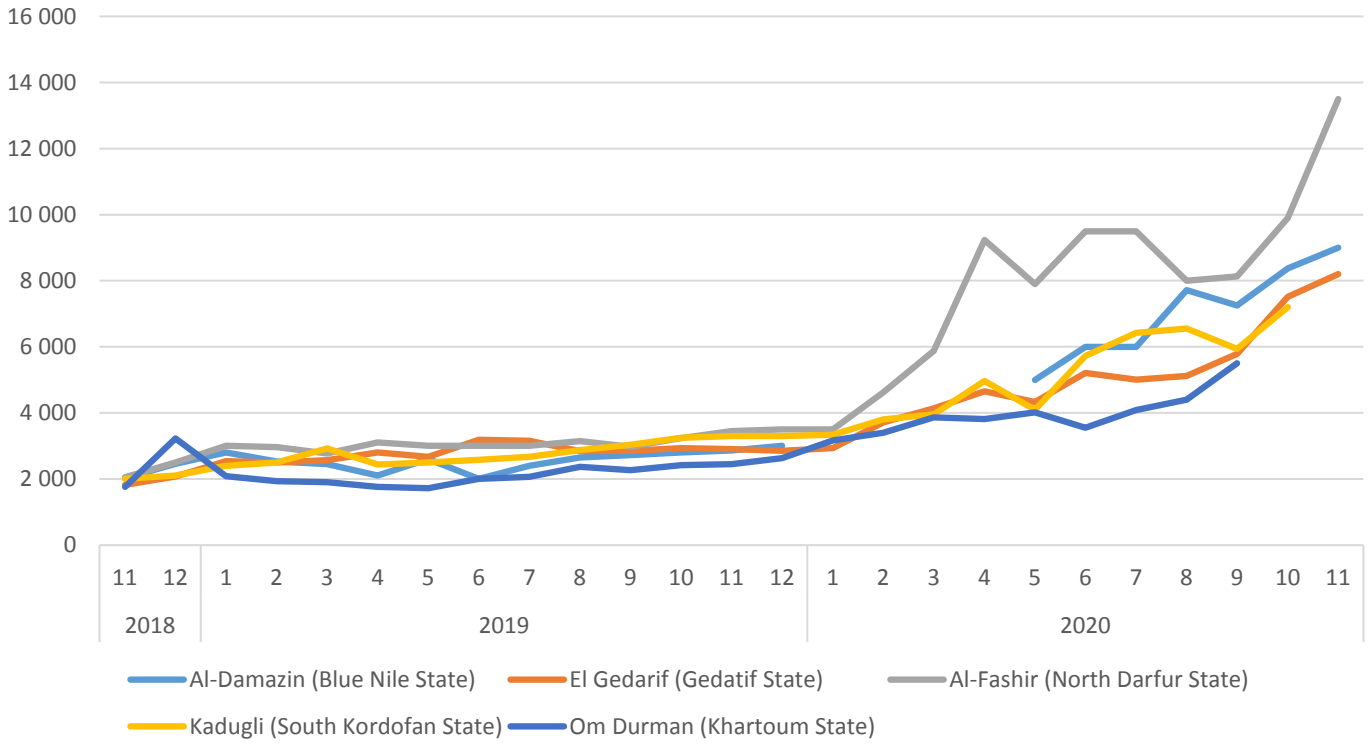
Source: Food and Agriculture Real Time Messaging and Reporting System.

Figure 6: The Sudan - Wholesale prices of millet in selected markets (states)



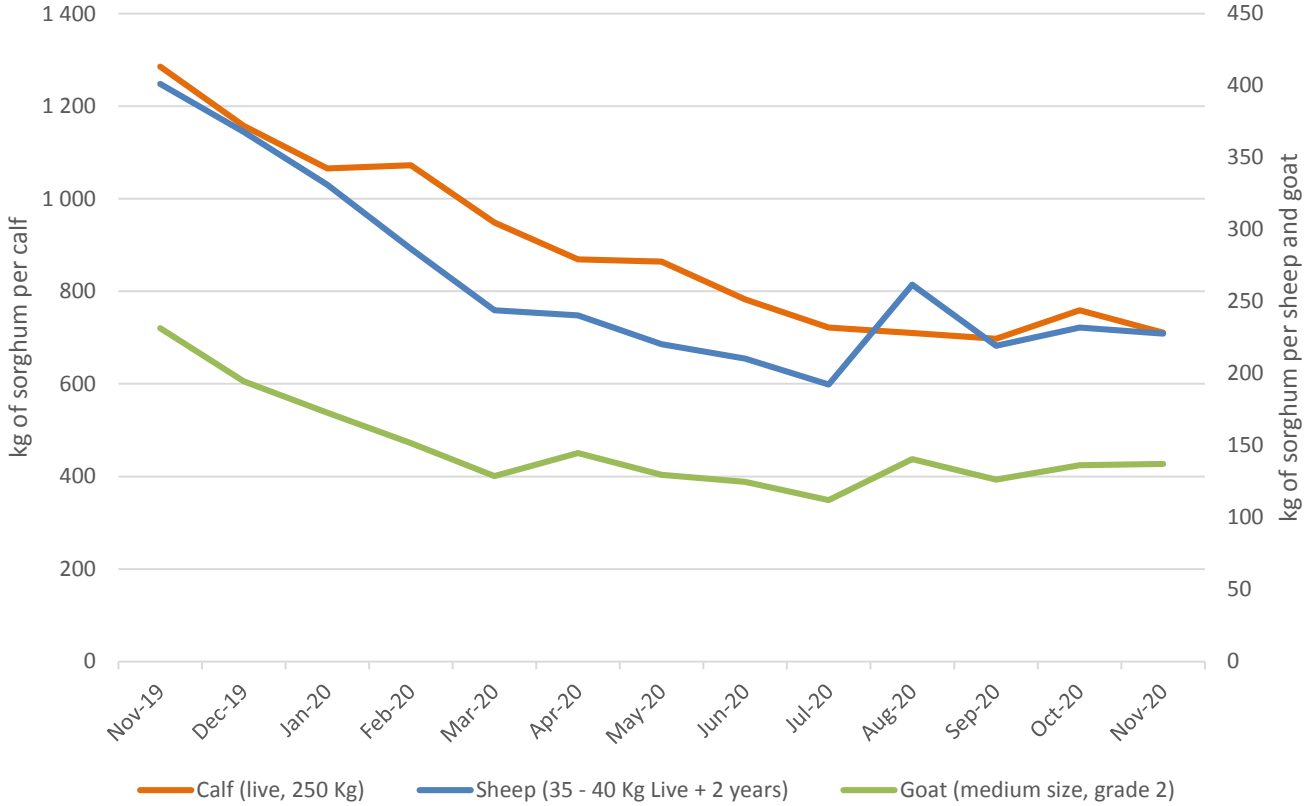
Source: Food and Agriculture Real Time Messaging and Reporting System.

Figure 7: The Sudan - Wholesale prices of wheat grain in selected markets (states)



Source: Food and Agriculture Real Time Messaging and Reporting System.

Figure 8: The Sudan – Terms of trade in El Obeid market (North Kordofan State)



Source: Food and Agriculture Real Time Messaging and Reporting System.

Cereal supply/demand balance (January-December 2021)

The national cereal supply/demand balance for marketing year January-December 2021 is summarized in Table 25, with a breakdown by sorghum, millet, maize, wheat and rice. The balance is based on the Mission's production estimates (including the forecast for the winter wheat crop to be harvested in March 2021) and the latest information on consumption, feed use, trade and stocks availability. The following assumptions were used:

- In Total cereal production (sorghum, millet, maize, wheat and rice) is estimated at slightly more than 8 million tonnes, including a forecast of 900 000 tonnes of wheat to be harvested in March 2021.
- Opening stocks of cereals held by the Strategic Reserve Corporation (SRC) were reported to be zero.
- It is expected that the building up of sorghum and millet stocks will start by the end of the harvest season in March, while stocking of wheat is expected to start at harvest time in March and April.
- The amounts of grain stored by private and community underground stores are not included in the opening stocks due to lack of information.
- Food use is estimated at 7.0 million tonnes, using the estimated population figure of 45.1 million in 2021. Per capita average consumption is set at 152 kg of cereals/year, which includes 75 kg of sorghum, 58 kg of wheat (with a 5 percent increase in Khartoum to reflect the growing demand by the urban population), 16 kg of millet, 2 kg of rice and 1 kg of maize.
- Feed use is estimated at 290 000 tonnes. Based on discussions with farmers and extension officers, it is estimated that about 5 percent of sorghum and 2 percent of millet is going to be used as feed for livestock and poultry.
- Seed requirements for 2021 planting are estimated at about 122 000 tonnes on the basis of average planted areas during the latest three years and the recommended seed rate in the country. The following seed rates have been used: 7.5 kg/hectare for sorghum, 4 kg/hectare for millet, 20 kg/hectare for

Table 25: The Sudan - National cereal supply/demand balance, January-December 2021 (000 tonnes)

	Sorghum	Millet	Maize	Wheat	Rice	Total
Availability	**5 153**	**1 918**	**42**	**900**	**35**	**8 048**
Opening stocks	0	0	0	0	0	0
Production	5 153	1 918	42	900	35	8 048
Total utilization	**5 153**	**1 918**	**52**	**3 513**	**95**	**10 731**
Food use	3 385	722	45	2 748	90	6 990
Feed use	250	38	2	0	0	290
Seed requirements	71	17	1	32	1	122
Post-harvest losses and other uses	599	190	2	63	2	857
Closing stocks	848	951	2	687	2	2 490
Estimated import requirements	**0**	**0**	**10**	**2 630**	**60**	**2 700**

Source: CFSAM, 2020/21.

maize, 120 kg/hectare for wheat and 75 kg/ hectare for rice.

- Post-harvest losses and other uses are estimated at 857 000 tonnes, with rates ranging from 12 percent for sorghum, 10 present for millet and 7 percent for wheat, rice and maize.

- Closing stocks of cereals are estimated at approximately 2.5 million tonnes, equivalent to about four months of cereal food use.

The structural deficits between production and consumption for wheat, maize and rice are expected to be covered by commercial imports. However, the weakening local currency could continue exerting an upward pressure on prices of imported goods, which could have a detrimental impact on the country's ability to import. Therefore, a close monitoring of changes in the value of the local currency and its impact on wheat imports is required to guarantee adequate food availability in the country.

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RECOMMENDATIONS

The following recommendations are made with the aim to strengthen domestic production, improve food security and enhance market functioning:

- Closely monitor the current season, with follow-up activities after this assessment, including the annual surveys for validating the figures (crop cutting surveys).

- Closely monitor the food security situation, as high inflation rates are expected to result in high cost of production of agricultural products and high food prices.

- Improve rehabilitation and maintenance of irrigation infrastructure in the national schemes, maintain and increase capacities of the drainage system in the irrigated sector.

- Implement a national programme to expand production of improved seeds, increase the availability of certified seeds, with timely delivery to farmers.

- Encourage the mechanization of agricultural operations through an extensive and accessible financing programme.

- Improve the treatment of Sesame Gall Midge to eliminate it completely.

- Expand water harvesting technology to take advantage of heavy rains in agriculture and livestock rearing.

- Limit the expansion of the cropping areas at the expense of pastures and forests, replacing extensive farming with intensive agricultural practices.

- Introduce pre- and post-harvest preventive measures to reduce losses of the main food crops.

- Provide capacity building programmes for farmers and agricultural institutions such as post-harvest management to enhance productivity and resilience to shocks.

- Promote investments in agricultural assets and farm machinery allowing smallholders to use alternative collaterals, including parts of forward contracts, to access simplified credit lines provided by financial institutions.

- Adjust Salam prices during the season according to variations in production costs.

- Promote activities to add value to the country's exportable agricultural commodities (livestock,

cotton, Gum Arabic, sesame and groundnuts) instead of exporting them as raw materials.

- Carry out a new agriculture and livestock census to provide updated data and information on the agricultural sector.

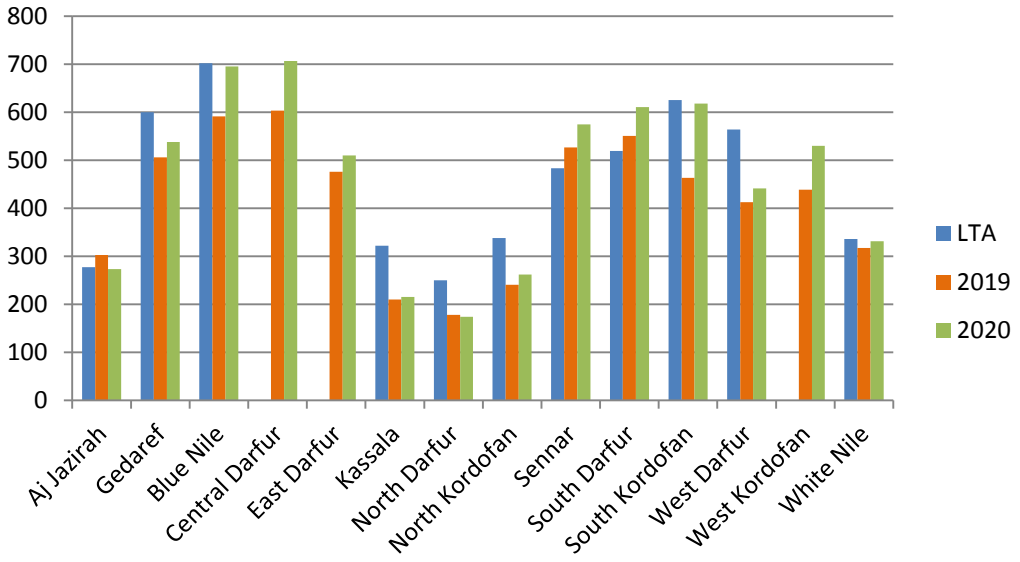
- Improve the capacity of the Central Veterinary Research Laboratory in Soba to bring the production of vaccines to the full national requirement and reinforce decentralized veterinary services to ensure that vaccination campaigns are conducted in the most effective and efficient way.

- Improve the effectiveness of the National Plant Protection Department in the identification and treatment of pests and conduct capacity building programmes to state ministries on these issues.

ANNEXES

ANNEX 1

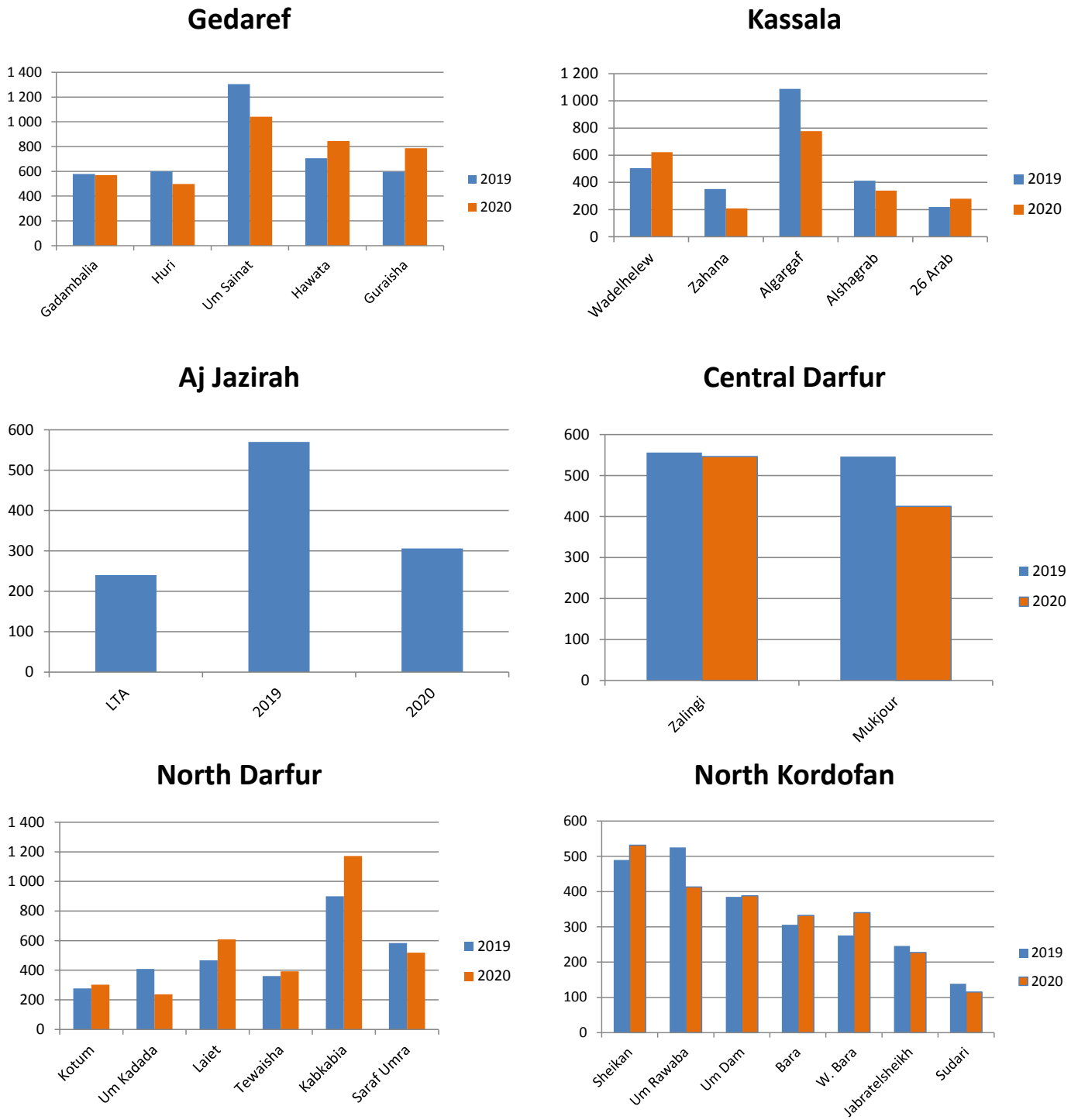
Figure A1: The Sudan - Cumulative seasonal rainfall comparison in selected states (ground weather station data)



Source: The Sudan Meteorological Authority.

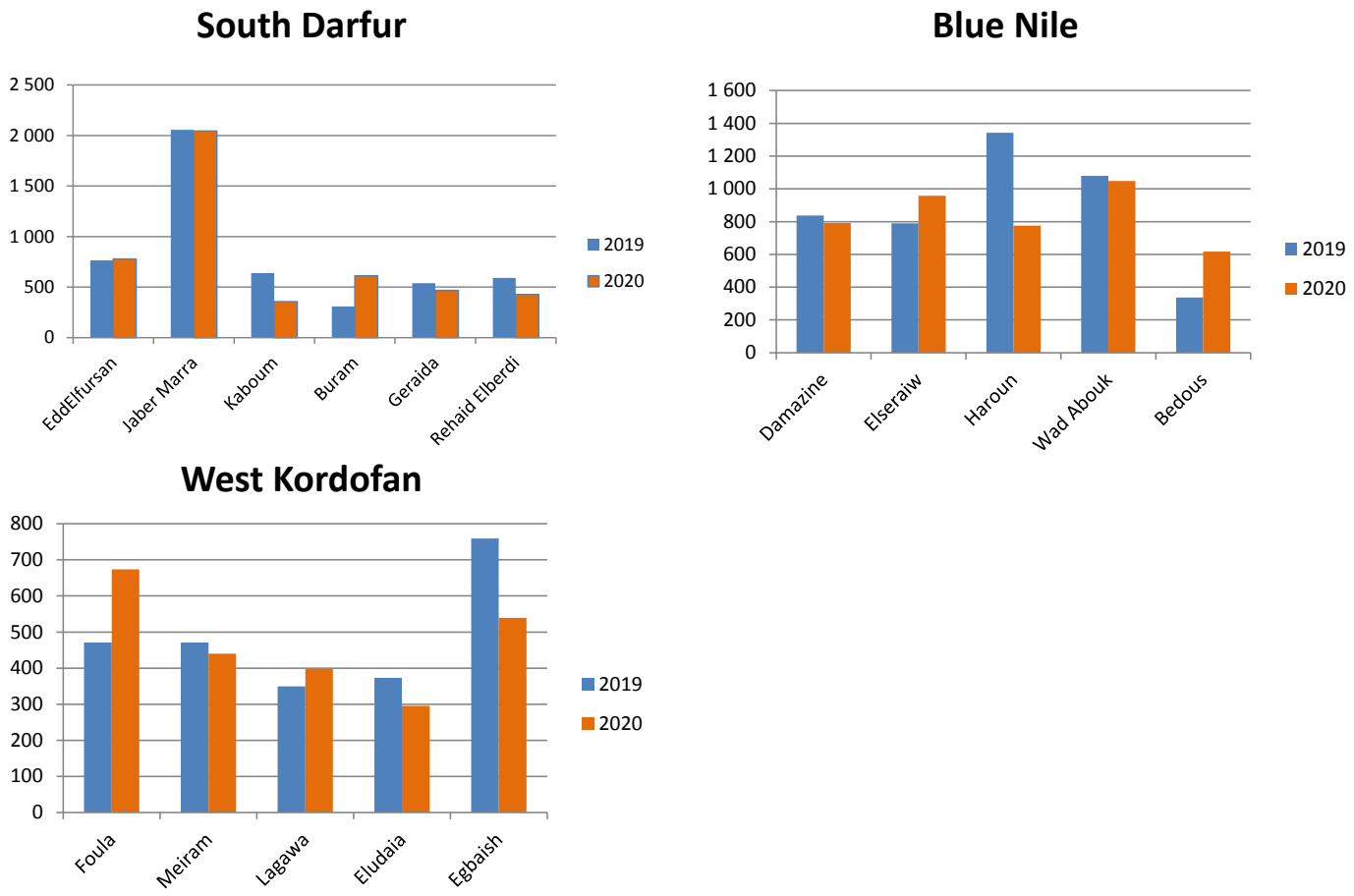
ANNEX 2

Figure A2a: The Sudan - Cumulative rainfall by State (main stations), 2020 compared with 2019



Source: The Sudan Meteorological Authority.

Figure A2b: Cumulative rainfall by State (main stations), 2020 compared with 2019



Source: The Sudan Meteorological Authority.

ANNEX 3

CHECKLIST for CFSAM, December 2020

(CFSAM for 18 states 2020/21 - Data needed from official sources, NGOs and farmers)

1. Location

Region/district	Informant
Village/locality	Position/post/occupation
Organization	Area-hectares Number of households Soils: Sandy, loamy, clay, rocky, mixed

2. Type of crop production

Rainfed ☐	Irrigated ☐	Supplementary irrigation ☐

3. Growing conditions

3.1 Rains (if rainfall data available copy over sheet- by dekad (10-day total) attach report

Start		**Dry spells**		**Rainfall amount compared to normal**	**Rainfall amount compared to previous year**
Early ☐ Normal ☐ Late ☐ Flood/water logging	Date	Month	Number of weeks	Below average ☐ Average ☐ Above average ☐	Better ☐ Same ☐ Lower ☐

3.2 Areas affected by flooding for the season 2020/21, according to crops

Crop	**Cultivated area (hectares)**	**Total area affected by the flood**	**Area that returned to the production cycle**	**Area that was completely out of the production cycle**	**Areas that have been replanted with the same crop**	**Areas that were replanted with other crops**

Drowning timing (day/month):

.....

.....

The impact of flooding on the horticultural sector

.....

.....

The impact of flooding on livestock

.....

.....

3.3 Irrigation

Type	**Compared to previous year**	**Area that was completely out of the production cycle**
Pump ☐ Gravity ☐ Other ☐ (specify)	Amount ☐ Regularity ☐ Timing ☐ Cost ☐	Lower ☐ Same ☐ Better ☐ Lower ☐ Same ☐ Better ☐ Lower ☐ Same ☐ Better ☐ Lower ☐ Same ☐ Better ☐

4.A. Agricultural inputs availability

	Sufficient	**Insufficient**	**Percent of increase or decrease from last year**	**Remarks** (Explain reasons, main source and effect if insufficient)
Tractors available Agric. Machinery availability (combines +)				
Fuel availability Gasoline Fuel cost				
Spare parts availability				
Agricultural tools availability				
Manure availability: *Main source:* *Main Types:*				
Chemicals availability: *Main source:* *Main Types:*				
Herbicides availability: *Main source:* *Main Types:* Pesticides availability: *Main source:* *Main Types:*				
Seeds availability: *Main source:* *Main Types:* *Quality:* *Timeliness:*				
Empty sacks availability:				
Labour availability:				
Credit/grants availability: *Main source:*				

4.B. Agricultural inputs costs

	Current costs	**Cost 12 months earlier**	**Trend: increasing, stable or declining**	**Remarks** (reasons for price trend)
Tractors available Agric. Machinery: *Main Types:*				
Fuel: Gasoline Fuel cost				
Spare parts availability				
Agricultural tools availability				
Manure availability: *Main Types:*				
Chemicals: Fertilizers: *Main Types:*				
Herbicides: *Main Types:* Pesticides: *Main Types:*				
Seeds: *Main Types:*				
Empty sacks availability:				
Labour:				
Credit/grants: *Cost-interest:*				

5. What are the main crops grown

Agricultural activities by crop	**Sorghum**		**Millet**		**Sunflower**		**Cotton**		**Sesame**		**Groundnuts**	
	2020	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**	**2020**	**2019**
% of own seeds												
% market seeds												
% improved seeds												
Digging/Ploughing dates												
Sowing date Sowing rates												
Cultivation (hand, animal/tractor)												
Replanting times Replanting dates reason												
Number of weeding												
Spraying: Pesticides Herbicides												

6. Area and crops status

Crop		Sorghum	Millet	Sunflower	Cotton	Sesame	Groundnuts
Irrigated area planted	2020						
	2019						
Irrigated area harvested (feddans)	2020						
	2019						
Irrigated average yield (kg/feddan)	2020						
	2019						
Mechanized area planted	2020						
	2019						
Mechanized area harvested (feddans)	2020						
	2019						
Mechanized average yield (kg/feddan)	2020						
	2019						
Traditional area planted	2020						
	2019						
Traditional area harvested (feddans)	2020						
	2019						
Traditional average yield	2020						
	2019						
Crop status compared to last year **Mechanized** average yield (kg/feddan)	Better						
	Same						
	Worse						

7. Area and crops status

Crop	Targeted area (feddans)	Area prepared (feddans)	Area sown so far	Area expected to be sown till end of the season	Area expected to be harvested	Expected yield (kg/feddan)

8. Crop pests and diseases

	None	Crop affected	Control		Level of damage		
			Yes' how?	No	Mild	Average	Serious
Desert Locust							
Quelea Quelea Migratory							
Armyworms							
Local birds							
Grasshoppers							
Tree Locust							
Rats							
Powder mildew							
Stalk borer							
Sorghum bugs							
Sorghum midge							
Smut							
Sesame Gall Midge							
Other							

9. Household livestock (Condition: 1 = very poor; 5 = very good. Info from owner or key informants)
Mostly transhumant ☐ / Mostly sedentary ☐

	PET Body Condition (1-5) now	PET Body Condition previous year	Current diseases	Diseases previous year
Cattle				
Sheep				
Goats				
Poultry				
Camels				
Remarks				

10. Pasture and water for livestock (Condition: 1 = very poor; 5 = very good. Info from owner or key informants)

	Condition (1-5)	Condition previous year	Remarks-Movement (distances, frequency, timing vs normal)
Pasture			
Water			

10.1 Crops Prices (Info from farmers, traders, district/community-level key informants)
Market location:

Crop	**Price (SDG/sack)**		
	Now	Last year	Trend
Sorghum - *Feterita*			
Sorghum - white			
Millet			
Wheat			
Groundnuts			
Sesame (Kantar)			

10.2 Livestock Prices (Info from market observations, traders, district/community-level key informants in areas where livestock plays a major part in the local economy)
Market location:

Type	**Price (SDG/head) – Average weight**				
	Now	3 months ago	6 months ago	Last year	Trend
Calf					
Bull					
Milking Cow					
Sheep					
Goat					
Camel					

11. Public and commercial stocks of cereals (Information from storekeepers or district officers of the relevant national agency, traders and grain mills)
Area/location:

	Current	**One year ago**	**Storage type**	**Percent of storage losses expected**
Government stocks				
Commercial stocks				
Current rate of off-take per month:			Current rate of replenishment:	

12. Impact of COVID-19
12.1 On crop production:
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12.2 On livestock production:
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12.3 On horticultural production:
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General remarks:
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CFSAM for 18 states 2020/21

State level Report Format

State NAME	
DATE OF ASSESSMENT STARTED AND COMPLETED	

TEAM MEMBERS

NAME	AGENCY	POSITION

LIST OF LOCALITIES VISITED

NAME	SHARE OF *SUMMER CROPS* (percent)

1. CROP REPORT

In assessing summer crops, consideration should be given to both food and cash crops, including roots and tubers, coffee, chat and vegetables, where appropriate.

1.1 Weather conditions

Give details of weather conditions including the onset, quantity, distribution and duration. Explain if there were any adverse weather conditions such as frosts, hailstorms, floods, dry spells, etc**.**

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1.2 Planted area and timeliness of planting

How does the area planted for summer crops compare with normal (refer the checklist)? Was planting generally undertaken on time? If there were major declines in planted area or significant delays in planting, indicate the localities which were most affected. Indicate the extent as well as the main reasons of the decline and the delay. Explain at what **phonological stages** are the crops.

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2. LIVESTOCK CONDITIONS

Comment on the current availability and access of pasture and drinking water for livestock. How does it compare to the normal for this time of the year? Mention the areas most affected by any shortages of pasture and drinking water and its extent. Give an overall assessment of the current livestock quality, numbers and health situation. Highlight any abnormality (diseases outbreaks, out migration, influx of livestock from neighbouring areas, animal mortality, change in quality and herd size, etc.) and identify the affected localities.

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3. MARKET CONDITION

How do current prices of staple foods compare to the usual prices at this time of the year? Are supplies unusually high or low? In which localities? Are there any factors that might restrict people's physical access to food, livestock or labour markets? Out of the normal grain, livestock, labour or other markets that people go to are any of them inaccessible by some members of the community? Explain. Provide an assessment of market conditions focusing on any major irregularities in price, supply and demand of *food, livestock, waged labour and petty commodity markets.* Identify affected localities.

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4. IMPACT OF COVID-19 ON

4.1 Crop production, main during the preparation for the summer and winter season, and at the harvest time of summer crops

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4.2 Livestock production, namely movement, health, access to pasture and water points, and services provided

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4.3 Horticulture

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5. ADDITIONAL NOTES

In the space provided below make any additional comments, which you feel are relevant but have not been included in the report above, e.g. pests and diseases, labour availability and cost.

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6. COMMENTS AND RECOMMENDATION ON THE APPROPRIATE TIME OF ASSESSMENT

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This report was prepared by Azhari Farah, Alessandro Costantino and Jung-eun Sohn (FAO) under the responsibility of the FAO Secretariat with information from official and other sources. Since conditions may change rapidly, please contact the undersigned for further information, if required:

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