Food and Agriculture Organization
of the United Nations

SPECIAL REPORT

2021 FAO CROP AND FOOD SUPPLY ASSESSMENT MISSION TO THE SYRIAN ARAB REPUBLIC

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ACRONYMS AND ABBREVIATIONS

AANES	Autonomous Administration of North and East Syria
ACB	Agricultural Cooperative Bank
AEZs	agro-ecological zones
AI	artificial insemination
ASI	Agricultural Stress Index
bbl/d	barrels per day
CFSAM	Crop and Food Supply Assessment Mission
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station data
EIU	Economist Intelligence Unit
ESA	European Space Agency
ESCWA	Economic and Social Commission for Western Asia
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Data programme of FAO Statistics Division
FAW	Fall Armyworm
FGDs	focus group discussions
FMD	foot-and-mouth disease
GDP	Gross domestic product
GIEWS	Global Information and Early Warning System on Food and Agriculture
GOF	General Organization for Feed
GORS	General Organization for Remote Sensing
GOSM	General Organization for Seed Multiplication
GOT	General Organization of Tobacco
Hoboob	General Establishment for Cereal Trade and Processing
IDPs	Internally displaced persons
IFAD	International Fund for Agricultural Development
kg	kilogramme
MAAR	Ministry of Agriculture and Agrarian Reform
MITCP	Ministry of Internal Trade and Consumer Protection
mm	millimetres
MWR	Ministry of Water Resources
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OHCHR	United Nations Office of the High Commissioner for Human Rights
PPR	Peste des petits ruminants

RAATA	Ras Al Ain and Tell Abiad
SCB	Syrian Central Bank
SDF	Syrian Democratic Forces
SYP	Syrian pound
UN	United Nations
UNHCR	United Nations High Commissioner for Refugees
USD	United States dollar
WFP	World Food Programme
WHO	World Health Organization

HIGHLIGHTS

- **Socio-economic background:** Although much of the country is now stable and only pockets of active fighting remain contained, the economic conditions are not considered favourable. Already weakened by 10 years of conflict, the economy suffered further setbacks from the COVID-19 pandemic and spill-over effects from the economic crisis in Lebanon, long a lifeline of the Syrian economy. High inflation rates, weakening currency and shortages of basic products, including fuel, prevail. International sanctions have generally affected livelihoods of millions of Syrians, directly or indirectly. According to the World Food Programme (WFP), more than 12.4 million people (60 percent of the population) were food insecure in 2020, 5.4 million more than in 2019.[i] The food security situation has continued to worsen in 2021.
- **Crop production:** Insufficient and poorly distributed rainfall in the 2020/21 agricultural season, together with several heatwaves, the high cost of inputs, limited availability of irrigation water and high cost of fuel for pumping, resulted in a contraction of the harvestable cereal area. The harvested wheat area is estimated at 787 000 hectares, slightly over half of the area harvested in 2019. The harvested barley area is estimated at 352 000 hectares, about 75 percent less than last year as large swathes of land were not deemed worth to be harvested. Wheat production in 2021 is estimated at around 1.05 million tonnes, down from 2.8 million in 2020, and only one quarter of the pre-crisis average of 4.1 million tonnes (during the period 2002-2011). At 268 000 tonnes, barley production is about 10 percent of the bumper harvests in 2019 and 2020.


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- **Main agricultural constraints for crop production:** Farmers continue flagging concerns about high production and transportation costs as well as lack of quality inputs. The agricultural machinery fleet is old, with no significant investment. Some progress has been made on the rehabilitation of irrigation structures, although illegal and uncontrolled drilling for groundwater over the past years is likely to have lowered the water table. A significant proportion of previously irrigated lands remain unwatered due to lack of equipment, maintenance or fuel. High rates of wastage were reported in fruit and vegetable production, due to low consumer purchasing power, the inability to export and a shortage of processing factories. Unreliable supply of electricity is also resulting in an increased food waste at the household level.
- **Livestock:** Livestock numbers appeared to have stabilized after an initial sharp decline early in the conflict. However, current high feed prices and lack of access to pasture are likely to result

[i] Carried out in late 2020, the 2020 Food Security and Livelihoods Assessment by WFP and partners, remains the latest nationwide food security assessment.

in extensive destocking. Prices of live animals already decreased compared to last year, as farmers have sold part of their herds to gain liquidity to purchase feed and other inputs for the remaining animals. Prices of dairy products and eggs increased due mainly to high feed and fuel costs. However, as the rate of price increases is less than that of production costs, producers are incurring financial losses. Although no significant outbreaks of animal diseases were reported, animals have a weak nutritional status and are generally susceptible to diseases.

- **Future trends:** Farmers lack liquidity and access to credit, while the prices of inputs are increasing. Prices of subsidized inputs, including fuel and fertilizers, increased in 2020/21, and the provision of fertilizers at subsidized prices ceased in June 2021. Seeds are likely to be difficult to source due to the drastically reduced 2021 harvest, and seed quality is expected to be poor, with low germination rates. However, farmers lacking feasible economic livelihood alternatives continue to cultivate their lands, often using less intensive production methods and lower amounts of inputs.

- In response to the challenges faced by farmers in the 2020/21 season, immediate action is required to support the agricultural sector and prevent further erosion of productive assets. Past crop assessment missions advocated for a transition away from emergency and basic livelihood support to the recovery and reconstruction of the agricultural sector. This year, however, the urgent delivery of emergency support is critical as the upcoming season is likely to be affected by below-average precipitation and inadequate availability of quality seeds. The aim of emergency support would be to mitigate shortages and improve access to inputs, ensuring sufficient supplies of diesel at official rates for farming operations, and to avert destocking of animals due to high feed costs.

OVERVIEW

With the exception of 2015, the annual Crop and Food Security Assessment Mission carried out jointly by FAO and WFP in the Syrian Arab Republic was conducted every year between 2013 and 2019. COVID-19-related restrictions on international travel prevented the full-fledged joint mission from taking place in 2020 and 2021.

However, erratic weather conditions across most of the Syrian regions, especially in the main cereal producing areas of the country in 2021 raised the need for an assessment based on well-established and recognized criteria to produce crop estimates comparable with previous assessments. In response to the request by the Government of the Syrian Arab Republic to conduct an analysis of the agricultural production in the 2020/21 crop season, in light of critical weather conditions, difficult economic environment exacerbated by other challenges, the FAO carried out an independent Crop and Food Supply Assessment Mission (CFSAM) to estimate the 2021 cereal production, to assess the overall situation of the agricultural sector and to gauge prospects for the upcoming 2021/22 season. Given the travel restrictions, the mission relied on the network of resilience officers employed by the FAO Country Office that have detailed knowledge of local agricultural conditions and agro-ecological zones based across the different governorates. The field information collection took place between June and July 2021. Information was also provided by the Ministry of Agriculture and Agrarian Reform (MAAR) and several other relevant ministries and state bodies as well as by provincial departments of agriculture.

His Excellency, the Minister of Agriculture and Agrarian Reform, was briefed on the methodology used and the main findings before the finalization of the report.


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Assessment methodology

The local staff visited and gathered information from all 14 governorates[ii] (Aleppo, Hasakeh, Hama, Homs, Deir-ez-Zor, Latakia, Tartous, Damascus, Rural Damascus, Dara'a, Raqqa, Idleb, Quneitra and Sweida). Excluding Damascus, which is largely urban and where the national team conducted meetings with respective national authorities, local personnel held meetings with technical staff of the agriculture directorates, farmers, livestock herders and breeders, traders, farmers' cooperatives machinery owners and other key informants in all visited governorates. Where possible, they visited food and livestock markets to assess local supply and price trends. The local mission staff also inspected standing crops to assess likely yields. Harvested crops that had not yet been threshed were inspected. From these, the size of ear, the weight and number of grains per ear and the general condition of the grain, provided further indications of yield levels which could then be cross-referenced with the farmers' yield estimates. Hoboob provided an overview of its operations.

[ii] In addition to agricultural directorates in 14 governorates, Al-Ghab plain, a fertile depression lying in both Hama and Idleb governorates, has its own agricultural authority. Where possible, data for Al-Ghab are presented separately.

Estimates of cereal areas, both planted and harvested, were provided by MAAR and these figures were corroborated by the agricultural directorates in all governorates. Yield estimates were also provided by MAAR as well as the agricultural directorates, and were critically reviewed in light of field observations, crop inspections and other available information. During the interviews with farmers, additional information was gathered about planting time, seed rates, availability and use of inputs (certified seeds, fertilizers, fuel and other inputs), use of machinery for farm operations, labour supply and availability and reliability of irrigation. Other information used included rainfall records and decadal satellite imagery showing rainfall patterns, rainfall anomalies from the long-term average, soil moisture stress and Agricultural Stress Index (ASI). The information was then crosschecked with other sources and summarized in this report which estimates cereal production and assesses the country's overall situation of the agricultural sector as well as prospects for the upcoming season. Where deemed necessary, yield estimates were modified by the local team in consultation with the Global Information and Early Warning System on Food and Agriculture (GIEWS) Team in Rome.

The local staff also conducted 24 focus group discussions (FGDs) with randomly selected people residing in the areas the mission visited across governorates. The FGDs were conducted. This report includes the results of a household survey analysis conducted in 256 farmer households in 13 governorates (all but Damascus) to complement and enrich the information sources.[iii] Summary results of this survey are presented in each relevant section in a text box.

Simultaneously, while the local FAO team collected information in the country, personnel from the FAO Country Office in Damascus held meetings with a number of line ministries and agencies involved in aspects of agriculture and livelihood activities. These included MAAR, the Ministry of Water Resources (MWR), the General Establishment for Cereal Trade and Processing (Hoboob) - the state's wheat-purchasing authority, General Organization for Feed (GOF), General Organization for Seed Multiplication (GOSM) and the Agricultural Cooperative Bank (ACB).

[iii] In most governorates at least 20 farming households were surveyed. Given similarities between Latakia and Tartous in terms of national and economic conditions, a smaller number of farming households was surveyed in Latakia. As of September 2021, a detailed survey reaching out to 4 000 farmers is being completed.

BACKGROUND AND SOCIO-ECONOMIC CONTEXT

Security conditions

The Syrian Arab Republic is now in its 11th year of civil conflict. The estimates of the number of conflict-related casualties vary between 370 000 and 570 000. The United Nations Office of the High Commissioner for Human Rights (OHCHR) identified over 350 000 individuals killed in the conflict in the Syrian Arab Republic between March 2011 to March 2021, recognizing the actual number of casualties is higher (OHCHR, 2021). Control of different territories of the country has fluctuated since 2011. As of mid-2021, Syrian government forces were in control of southern, central and western parts of the country, corresponding to about two-thirds of the country's area.

Overall, the security situation across the country has improved and, in many governorates, it is the best it has been since the onset of the crisis. Fragile security conditions remain in Hasakeh, while pockets of active conflict still prevail in Idleb.[iv] Beginning in June 2021, communities across northwest of the country and in the Ras Al Ain and Tell Abiad (RAATA) areas are witnessing the largest escalation of hostilities since the March 2020 ceasefire (OCHA, 2021a). Improvements compared to the previous year were noted in Deir-ez-Zor, Al-Ghab, Hama (except for areas adjacent to the "*Badia*" and Idleb borders) and Rural Damascus, in particular in the Douma area. Stable security conditions compared to the previous year were reported in Aleppo, Sweida, Tartous, Latakia (except for northern areas), and Homs (except for Palmyra which remains partially mined), (OCHA, 2021b).

In general, except for impeding free movement of people and goods, including production inputs and agricultural products, and complicating economic activities, volatile security conditions have not affected agricultural activities in particular, aside from localized areas which farmers were not able to reach for fear of the presence of war remnants (mines) despite ongoing demining efforts.

The United Nations High Commissioner for Refugees (UNHCR) estimates that since 2011, some 12 million people (out of a pre-crisis population of about 22 million) were displaced from their homes. Of these, about 7 million moved from insecure to secure areas within the country as Internally displaced persons (IDPs) and about 5 million left the country as refugees. As of May 2021, about 6.8 million people, remain displaced within the country, many of them repeatedly. Out of those, as of July 2021, 2.8 million were displaced in the northwest of the country, including 1.7 million residing in IDP sites.

As of early September 2021, over 5.6 million Syrian refugees were registered in Egypt, Iraq, Jordan,

[iv] In northwestern Idleb Governorate, increased hostilities killed dozens and displaced over 30 000 people, signifying the largest escalation since March 2020 (REACH, September 2021).

Lebanon and Turkey. Over 65 percent of registered refugees reside in Turkey, 15 percent in Lebanon and 12 percent in Jordan. The number of registered refugees has been stable since early 2018. In addition, a large number of Syrians live abroad without seeking refugee registration.

Economic environment

The country's economy and infrastructure have suffered hugely from the impact of the crisis. Large share of general infrastructure, including roads, was damaged or destroyed early in the conflict, businesses closed down and the labour force was depleted as large segments of the population were internally displaced or sought refuge outside the country. Although security conditions improved in recent years and the size of areas suffering from active fighting declined significantly compared to the previous years, over a decade of clashes left the entire country in deep socio-economic crisis with limited prospects for significant improvement in the short term. An already feeble economic environment distressed by the impact of the long-term conflict deteriorated in autumn 2019 following the onset of the financial and economic crisis in Lebanon and, again early in 2020 as the COVID-19 pandemic and measures introduced to contain the spread of the disease, worsened bleak economic prospects.

According to the Syrian Central Bank (SCB), (Trading Economics, 2021), in the first years of the conflict in 2012 and 2013, the economy contracted by over 25 percent year on year and the decline continued until 2018 when the Gross domestic product (GDP) growth registered its first positive growth rate of 2.7 percent as the recovery began. In 2019, the SCB estimated the economic growth at close to 5 percent year on year, similar to the level recorded in 2011, just before the start of the conflict. The economic growth recorded in 2019 brought hope that with the government's progress over the previous two years in regaining control of the areas that were previously out of its control were signs that the economy was beginning to stabilize albeit at a low level, and in certain areas there were signs of economic recovery. However, after two years of growth in 2018 and 2019, the economy contracted by 10.5 percent in 2020 as the financial crisis in Lebanon, the lifeline of the Syrian economy, and the global COVID-19 pandemic unfolded. A milder contraction of about 3 percent is forecast for 2021.[v]

In the meantime, economic losses have been mounting. In early 2019, estimates of the cost of rebuilding the country ranged from USD 250 billion to USD 400 billion, depending on the method used and the baseline (Malcolm H. Kerr, 2019). In a study published by ESCWA in 2020, damage to physical capital by the end of the eighth year of conflict was estimated at USD 117.7 billion. When added to the estimated GDP losses of USD 324.5 billion, total economic losses amounted to USD 442.2 billion. Real GDP by the end of 2018 was 46 percent of its 2010 level (ESCWA, 2020). The World Bank estimated cumulative GDP losses from 2011 to 2016 at USD 226 billion and warned that the longer the conflict lasts, the more difficult recovery will be as losses become more persistent over time.

The current economic environment is characterized by declining economic activity and shortages of foreign currency, making the financial sector non-efficient. Attempts to bring the economy around continue to be hampered by low investments and lack of access to credit, in particular as neighbouring Lebanon, which in the past acted as a lifeline for many Syrian businesses as well as large segments of general population which kept savings in United States dollars (USD) in Lebanese banks, continues to battle its economic woes. It is estimated that about USD 42 billion of Syrian deposits are trapped in the Lebanese financial system.[vi]

Businesses, many of which in the past maintained bank accounts in Lebanon and now cannot access their funds, face increasing difficulties in purchasing inputs (large share of which is imported) and maintaining production as costs soar. Unemployment rates run as high as 60 percent (up from about 50 percent reported in the 2019 edition of this report), and no significant improvements are expected as investments in a productive sector are lacking. Although civil servants remain employed and paid, high inflation rates and currency devaluation rapidly

[v] Economist Intelligence Unit Country Report, 3rd Quarter of 2021 (from 2020 onwards).

[vi] Economist Intelligence Unit Country Report, 3rd Quarter of 2021.

eroded the purchasing power of their low salaries and are not deemed sufficient to cover the cost of living.

Inflation is driven by currency devaluation (described under separate heading below), supply chain disruptions and reported reductions in fuel and wheat imports to the country which resulted in shortages of basic goods, including fuel and bread. Rapid inflation has eroded the already weak purchasing power. The Consumer Price Inflation in 2020 averaged over 110 percent. Although for 2021 the Economist Intelligence Unit (EIU) forecasts a slight easing, high levels of 80 to 90 percent are expected to prevail.

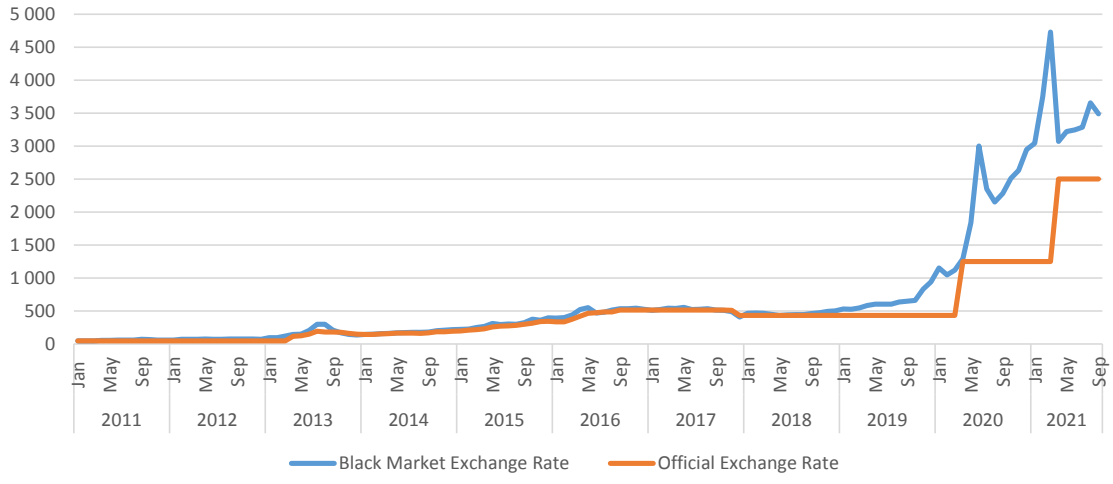
Syrian pound exchange rate

Before the onset of the conflict in 2011, the official exchange rate between the Syrian pound (SYP) and the United States dollar was fixed at SYP 46/USD. While gradually devaluing between 2011 and 2017, the official exchange rate remained around SYP 434 since late 2017 until June 2020. Lack of hard currency, high inflation rates and debt monetization (borrowing money from the SCB to finance public spending) all fuelled rapid depreciation on the parallel market, leading to eventual official devaluation. The first devaluation in June 2020 weakened the official exchange rate to SYP 1 256/USD. The second round of devaluation in April 2021 put the fixed exchange rate at SYP 2 500/USD, a devaluation of over 70 percent, in an effort to narrow the difference between official and parallel exchange rates. The United Nations (UN) operational rate is equivalent to the official exchange rate.

Meanwhile, the informal (parallel) market exchange rate skyrocketed. While ever since the onset of the conflict there has been some difference between the official and black-market exchange rate, these differences became much bigger in 2019 (Figure 1). On the parallel market, on 11 March 2021, USD 1 was traded for SYP 4 850. Following the devaluation in April 2021, the Syrian pound appreciated to SYP 2 950/USD on 24 April 2021 as strict capital controls and restrictions on the movement of cash were introduced. It has depreciated since then, but not to its March 2021 levels. In August 2021, the informal SYP/USD exchange rate depreciated by 4 percent month on month, reaching SYP 3 358/USD. Compared to a year ago, the Syrian pound weakened by 36 percent. The increasing trend in the informal market exchange rate has been recorded across all governorates, although there are some differences in the rates of increases. In August 2021, the highest informal exchange rate was reported in Damascus, Hama and Homs at SYP 3 412/USD while the lowest rate was reported in Idleb at SYP 3 284/USD (WFP/VAM, 2021).

Additional rounds of currency devaluations are likely, particularly if the gap between the official and parallel

Figure 1: Syrian Arab Republic - Comparing official and informal exchange rates (SYP/USD)



Sources: The Central Bank of Syria and Syrian Pound Today, 2021.

exchange rate broadens. After the official currency devaluation in 2020 and 2021, the import bill increased widening the current account deficit. The 2021 budget includes SYP 8.5 trillion (corresponding to USD 3.4 billion using the official exchange rate) of expenditure, mostly current.[vii] Although in nominal terms expenditure allocations more than doubled compared to 2020, in real terms they actually declined reflecting significant currency devaluation. Due to the sharp depreciation of the Syrian pound and the accelerated slowdown in economic activity, the 2021 budget is not only a 27 percent decrease compared to last year in inflation-adjusted (real) United States dollar terms but is also the smallest budget since 2011 (Atlantic Council, 2020).

Factors behind the continued devaluation of the SYP vs. USD include low USD in-country reserves and increased sanctions on the Syrian Arab Republic's key trading partners, thereby alimenting volatility and uncertainty on the country's financial market. As the Lebanon economic and financial crisis has been unfolding since October 2019, economic conditions in the Syrian Arab Republic further deteriorated. The weakening exchange rate has had a direct effect on the price of imported goods ranging from food, medicine to fuel and agricultural inputs, consequently increasing the cost of production also of local goods.

In June 2021, the government issued a new list of essential import commodities for which importers will be able to pay using the official exchange rate. The list includes sugar, rice, maize, yerba mate, medicines, fodder, infant formula, seeds, fertilizers and eggs (The Syria Report, 2021a). On 16 August 2021, the CBS requested that the Ministry of Economy and Foreign Trade carry out a six-month suspension of imports of a list of specific production, including metal pipes, ceramics, cashew nuts, cheddar cheese and mobile phones to save foreign currency for necessary imports as part of a trade rationalization scheme to safeguard available foreign exchange reserves for essential imports, including wheat and fuel (Bloomberg, 2021a).

Food prices

Already in 2010 over 50 percent of Syrians was reported to be living in urban areas making markets essential in providing population with food. The conflict, the resulting international sanctions and more frequent erratic weather patterns experienced in recent years, have meant that ever more Syrians are depending on markets to meet their food needs. In 2017, an assessment conducted by the Central Bureau of Statistics and WFP found that 80 percent of Syrians reported to be depending on markets for their main source of food.

Food prices have drastically increased as a result of the conflict. Early in the conflict, between 2013 and 2016, disrupted trade routes, security conditions, reduced number of traders, high inflation rates and the heavily devalued national currency, affected price levels and contributed to supply chain bottlenecks. Although many economic woes remained, improved security within the country, greater political stability and the re-opening of supply routes are largely thought to have led to the recovery of trade flows across the country and to the reduction in food prices between 2017 and mid-2018. Approximately in the second half of 2018 as Syrian pound started its rapid weakening on the parallel market, food, fuel and other prices stated increasing as well. Wheat flour was reported to cost SYP 35/kg in March 2011, by December 2016 it was at SYP 376/kg and by June 2021 at SYP 1 868/kg, an increase of more than 53 times when compared to March 2011.

Although consumers experienced high food prices in the past, markets, with the exceptions in hard-to-reach areas, remained relatively well supplied. Starting from 2020, there have been severe shortages of essential items, including bread at subsidized prices, medicines and fuel, resulting in rationing. In late October 2020, the Ministry of Internal Trade and Consumer Protection (MITCP) doubled the price of a subsidized pack of bread to SYP 100, while reducing the weight of each pack from about 1.3 kg to 1 kg and imposing limits on the number of packs to be purchased

[vii] Economist Intelligence Unit Country Report, 3rd Quarter of 2021.

by each family. Subsidized bread remained four times less expensive than that available in the free market. Food prices in May were 69 percent higher than six months earlier and had increased by 197 percent year on year, WFP (July 2021). The price of subsidized bread was revised again in July 2021, increasing to SYP 200/pack (France 24, 2021a). On 15 August 2021, the MITCP announced subsidized bread distributions through smart cards and restricted delivery to weekly quotas by family size. The national average price of subsidized bread in August 2021 reached SYP 237/bundle (up 14 percent month on month and 359 percent year on year), while the price of commercial bread increased by four percent month on month and by 88 percent year on year, reaching SYP 1 870/bundle (WFP/VAM, 2021).

In August 2021, the national average price of a standard reference food basket increased by 4 percent compared to July 2021, reaching SYP 173 634. The national average food basket price was 28 percent higher than that of February 2021 and 107 percent higher compared to August 2020. This increase is mainly attributed to the ongoing fuel shortage countrywide and the increase in the informal price of diesel between July and August 2021 (WFP/VAM, 2021).

In July 2021, the government raised the salaries of civil servants and military workers by 50 percent, as well as pensions for retirees by 40 percent, effective August 2021. The decree also set the minimum monthly income at SYP 71 515, equivalent to USD 28 at the official rate and about USD 22 at unofficial rates. The last salary increase in the country was announced in November 2019 (Bloomberg, 2021b).

As of 2020, WFP estimated that about 12.4 million people (60 percent of the overall population) were food insecure, 5.4 million more than at the end of 2019, mostly due to constrained livelihood opportunities and the rapidly worsening economy.

Fuel

In 2010, the Syrian Arab Republic produced 385 000 barrels of crude oil per day. The EIU estimates that in 2020 about 30 000 barrels/day (bbl/d) were produced, a marginal increase from 25 000 bbl/d produced in 2019. Responding to changing economic realities, in 2013 the government allowed fuel imports by private businesses. As precise estimates of national consumption needs given the economic slowdown are not available and likely declined from the figure estimated in 2019 at 225 000 bbl/d (out of which 125 000 bbl/d were estimated to be consumed in government-held areas)[viii], a large gap between domestic needs and production remains uncovered. The shortfall was largely covered by imports of the Islamic Republic of Iran, albeit the re-imposition of international sanctions on Iranian energy and shipping assets in November 2018, Iranian oil tankers have no longer been able to buy insurance on the international market, hereby disrupting the Syrian Arab Republic's oil supply from one day to the next. Between mid-March 2021 and mid-June 2021, it is reported that 5 million barrels of crude oil were imported from the Islamic Republic of Iran (Atalayar, 2021), which, assuming the estimates above are correct, would cover between 40 to 70 days of consumption needs in the government held areas. As of 2021, some fuel, estimated at three tankers per month, are being shipped from the Islamic Republic of Iran to the Syrian Arab Republic (Oilprice, 2021).

Diesel is primarily used for powering industrial engines and power generation, including irrigation pumps as well as agricultural machinery and most mass transit and freight vehicles. At the beginning of 2008, 1 litre of diesel was sold for SYP 7, and 1 litre of petrol (gasoline) for SYP 36. The implementation of the plans to remove the expensive fuel subsidy programme which costs about SYP 350 billion (at the time corresponding to USD 7 billion), 19 percent of the GDP (The New Humanitarian, 2007), started in 2008. In April 2008, gasoline prices increased to SYP 40/litre (Reuters, 2008) and diesel

[viii] Some reports (e.g., https://atalayar.com/en/content/iran-provides-three-million-barrels-oil-syria) estimate the consumption in government-held areas at 70 000 bbl/d (https://atalayar.com/en/content/iran-provides-three-million-barrels-oil-syria).

to SYP 25/litre. Diesel price underwent additional adjustments fluctuating between SYP 15 and SYP 20/litre.

In early years of the conflict, subsidized fuel prices underwent several adjustments, increasing from SYP 100/litre of gasoline, and SYP 62/litre of diesel in January 2014 (WFP/Logistics Cluster, 2015), to SYP 225/litre of gasoline (90 octane) and SYP 180/litre of diesel in June 2016. Between 2016 and September 2020, the government maintained the price of subsidized lower grade petrol at SYP 225/litre and the higher-grade 90 octane gasoline at SYP 375/litre to ensure its accessibility across the country, although in 2019 rationing of subsidized petrol started. While limiting access to 20 litres/vehicle every five days slowed down fuel consumption, it led to queues across the country in March and April 2019 and encouraged the informal market for petrol to flourish. On the informal markets, prices in some parts of the country reached SYP 1 200/litre compared to the subsidized price of SYP 225/litre. Between spring 2019 and September 2020, the government was limiting the provision of subsidized petrol to 100 litres/vehicle/month at SYP 225/litre. Any extra petrol requirement was bought from the 90 octane (SYP 375/litre) or the 95 octane gasoline (SYP 600/litre), the latter is imported from Lebanon.

In October 2020, the price of premium gasoline (supported via smart cards) was raised from SYP 250 to SYP 450/litre. The unsubsidized price went from SYP 450 to SYP 650/litre, while the price of gasoline (95 octane) increased from SYP 850 to SYP 1 050/litre. In January 2021, the MITCP set the price of lower grade at SYP 475/litre and the price of unsubsidized 95 octane gasoline at SYP 675/litre, up from SYP 650 (The Medialine, 2021). In March 2021, the price per litre of subsidized petrol increased further from SYP 475 to SYP 750 (officially USD 0.60, or USD 0.17 at unofficial exchange rates). Motorists are allocated 75 litres of subsidized petrol per vehicle per month and pay unsubsidized rates, which also increased from SYP 1 300 to SYP 2 000 a litre for the rest. Price of gas canisters used for cooking increased from SYP 2 700 to SYP 3 850 (France 24, 2021b). Official prices were adjusted again in July 2021, a third increase for 95 octane gasoline, increasing from SYP 2 500 to SYP 3 000 and the price of diesel from SYP 187 to SYP 500. As of August 2021, the national average price of 1 litre of diesel for transportation purposes on the parallel market was SYP 2 300 and for heating SYP 2 480. The informal national average price of 1 butane gas cylinder (25 000 litres) increased by 31 percent in August compared to July 2021, reaching SYP 49 612/refill (WFP/VAM, 2021).

International sanctions

International sanctions imposed on the Syrian Arab Republic by a number of countries and regulatory entities include trade restrictions, travel bans, asset freezes of certain officials, as well as a ban on investments (EU/EUR-Lex, 2017). Trade restrictions in particular target dual-use items, e.g., fertilizers or chemical components used in the production of fertilizers, key equipment and technology for the oil and gas industry as well as certain telecom equipment and luxury goods. While trade is sanctioned in only a limited number of goods, a ban on imports of crude oil and petroleum products from the Syrian Arab Republic has curtailed export earnings, resulting in shortages on the domestic market and well declined imports of crucial agricultural inputs which in turn constrained agricultural output.

COVID-19 in the country

According to official figures reported to the World Health Organization (WHO), the COVID-19 spread in the country has been rather contained. Between the beginning of the pandemic in March 2020 and late September 2021, slightly more than 32 000 cases were identified, with over 2 100 victims (The New Humanitarian, 2007). However, testing capacity is very limited, and actual occurrence is likely to be higher. In the August 2021 Situation report, the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) reported that COVID-19 cases have increased across northwest Syrian Arab Republic since mid-August, with more than 1 000 daily cases recorded in the past few weeks, and over 43 500 cases confirmed as of early September 2021 in northwest parts of the country and RAATA. Almost 13 000 new cases alone were identified in August 2021 compared to about 770 cases in July 2021 (Reuters, 2008).

As of August 2021, the speed of the vaccination campaign remains slow, obstructed by damages to the health system and health-related infrastructure, as well as shortages in electricity supply hindering refrigeration of the vaccines in the supply chain. After the initial shipment of 100 000 Sputnik V doses for priority vaccination (mostly health care workers), COVAX Facility, which aims to vaccinate 20 percent of the population, provided the first shipment in April 2021 (about 257 000 doses) and the second one in August 2021 (about 175 000 doses). According to WHO, 79 percent of COVAX vaccines will be administered by the national immunization programme in government-controlled areas and northeast Syrian Arab Republic and approximately 21 percent in northwest Syrian Arab Republic through Gaziantep (WFP/Logistics Cluster, 2015). As of end-August 2021, slightly over 400 000 doses were administered.

Agriculture

Like all sectors of the economy, despite being one of the most resilient pillars, agriculture has suffered serious setbacks since the beginning of the current crisis in 2011. In 2010, agriculture accounted for 18 percent of the country's GDP and 23 percent of its exports, and it involved 17 percent of its labour force in production alone. Some 46 percent of Syrians (10 million, including children and others not actually working in agriculture) were rural dwellers and, of those, about 80 percent were sustained by income from agricultural work.

The Syrian Arab Republic is divided into the following five agro-ecological zones (AEZs) based on the level of annual precipitation received, as shown in Map 1:

Zone 1: Annual average rainfall of over 350 mm, covering 14.6 percent (2 698 000 hectares) of the country's area, is divided into two regions:

- Areas with an annual average rainfall over 600 mm where rainfed crops can be grown successfully.
- Areas with an annual average rainfall between 350 to 600 mm, but not less than 300 mm during two-thirds of the monitored years, suitable to grow two successful crops every three years. The main crops are wheat, legumes and summer crops such as melon and watermelon.

Zone 2: Annual rainfall of 250 to 350 mm in not less than two-thirds of the monitored years, covering 13.4 percent (2 473 000 hectares) of the country's area, suitable to grow two barley crops every three years. In addition, wheat, legumes and summer crops are grown.

Zone 3: Annual rainfall of 250 to 350 mm with not less than 250 mm during half of the monitored years, covering 7.1 percent (1 306 000 hectares) of the country's area, suitable to grow one or two crops every three years. The main crop is barley and to a lesser extend legumes.

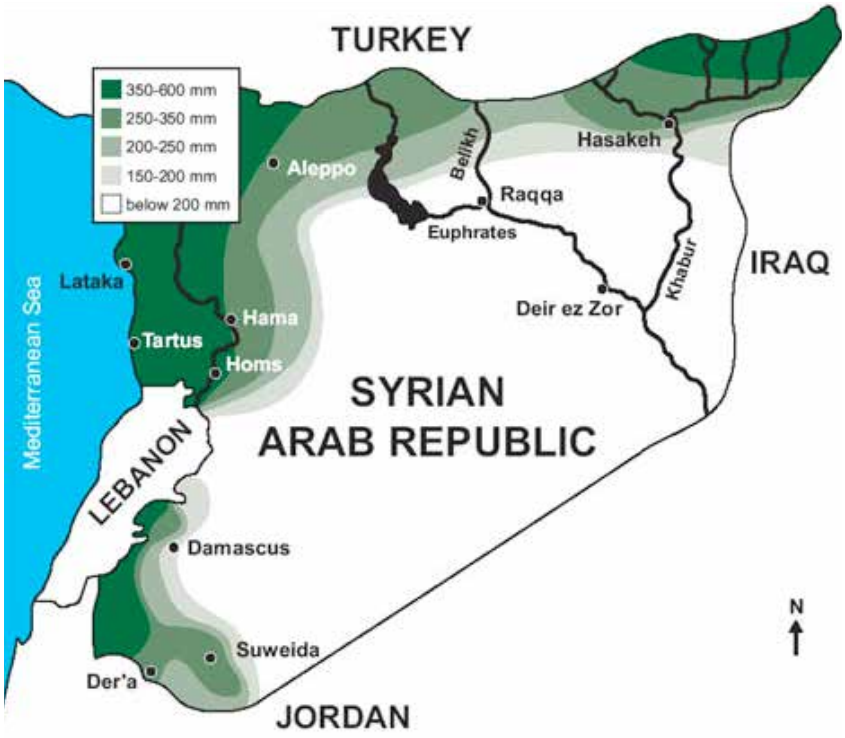
Zone 4: A marginal zone between the arable zones and the desert zone with an annual rainfall between 200 and 250 mm and not less than 200 mm during half of the monitored years covering 9.8 percent (1 823 000 hectares) of the total area, suitable only for barley or for permanent grazing.

Zone 5: Desert and steppe zone, covering 55.1 percent (10 218 000 hectares), not suitable for rainfed cropping. Some areas in this zone adjacent to rivers allow for irrigated agriculture, but most of this zone provides only sparse natural rangeland. With decreasing rainfall towards the interior of the country, the zone becomes desert.

Much of the most fertile crop land lies in the northeast, north and central parts of the country, including notably the governorates of Hasakeh, Raqqa, Aleppo, Hama, Homs and Rural Damascus. Key crops in the western governorates of Latakia, Tartous and Idleb are citrus fruits, apples, olives and vegetables. While the "*Badia*" Region, a stretch of semi-arid land covering around 55 percent of the country, is primarily used for livestock grazing.

From the 1960s until the mid-2000s, the state played a vital role in the production of strategic crops such as wheat, sugar beet, cotton and tobacco, and livestock products, including milk, meat, poultry and eggs, these being produced on a small number of large state-owned and state-run farms. Strategic crops were also produced by private farms according to the prevailing agricultural plan. The state also provided farmers with agricultural production inputs of guaranteed quality at subsidized prices. Over the years, however, the state withdrew gradually from its productive role. By 2004/05, the state had relinquished its management of most of its farms and had allocated parcels of ex-state farmland to

Map 1: Syrian Arab Republic - Agro-ecological zones (AEZs)



Source: FAO, 2003. http://www.fao.org/3/Y4732E/y4732e06.htm.

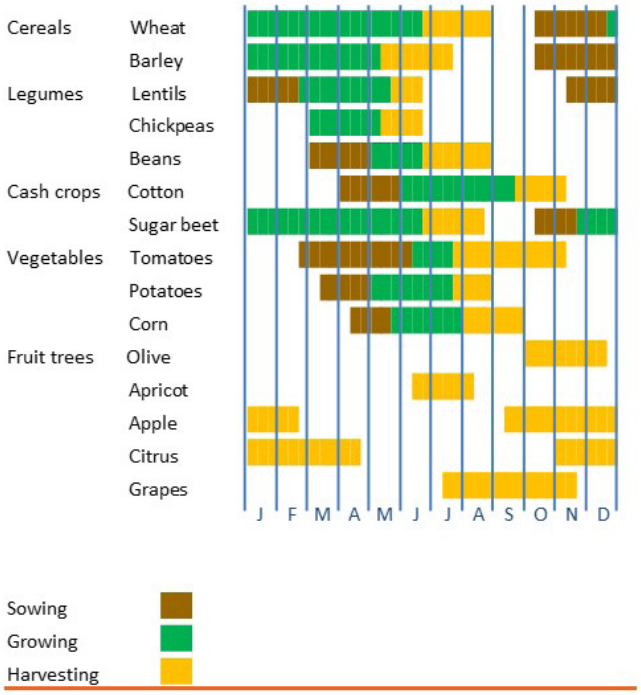
the workers for their use according to a set of social and technical criteria. However, the legal title to the land of the ex-state farms remains with the state. The government, in cooperation with agricultural departments in governorates, continues to plan planted areas of strategic crops based on the perceived water availability.

Prior to 2011, the country was a significant exporter of agricultural produce, including cotton, sugar, tomatoes, potatoes, oranges, apples, olive oil, sheep, cattle, poultry meat and hens' eggs. It also exported part of its production of durum wheat and, in return, imported soft wheat to secure bread flour. In 2010, for instance, the Syrian Arab Republic exported 627 000 tonnes of tomatoes, more than 100 000 tonnes of potatoes and more than 150 000 tonnes of refined sugar. Permanent crops (olives, fruit trees, etc.) accounted for about 5.7 percent of the country's agricultural land.

Although there are now some indications of recovery following the return of many of the IDPs to their land, the continuing crisis or its aftermath have devastated the previously flourishing agricultural sector by the loss of cultivated land, the movement of farmers away from insecure areas, the destruction of farm machinery and irrigation structures, high costs of farm inputs and fuel, a severely damaged infrastructure and compromised power supplies. In the 2018/19 season, MAAR estimated that over 286 000 IDP households returned from displacement to the land and resumed farming activities. In the 2019/20 season, less than 15 000 IDP households returned.

Figure 2 shows the calendar for the main crops. Wheat and barley are the most important winter grains.

Figure 2: Syrian Arab Republic - Crop calendar



Source: MAAR, 2021.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CEREAL PRODUCTION

Although cereals are produced across the country, the eastern governorates, including Hasakeh as well as parts of Raqqa, Aleppo and Deir-ez-Zor, cumulatively provide about 80 percent of the annual wheat and barley production. Wheat trade flows traditionally go from wheat-surplus northeast and northern parts of the country towards wheat-deficit west and southern governorates. Up to 2007, the country was a net wheat exporter, but turned into an importer following the drought in 2008. Wheat is imported mainly through seaports in Latakia and Tartous as well as via the Beirut-Damascus road axis. In the past years, the main import origin of wheat grains has been the Russian Federation. Wheat flour is also imported by private traders and by international humanitarian agencies through their food assistance programmes. Wheat is also being traded into the northern part of the country, namely Idleb, northern Aleppo and Raqqa, from Turkey, some of which is also sold outside the northern governorates.

Before the start of the 2020/21 crop season, MAAR declared the season to be the "Wheat Year" and encouraged the broad cultivation of wheat (both rainfed and irrigated) to boost production and reduce import requirements. In some areas, specific actions were taken to support production, such as rehabilitation of irrigation infrastructure and groundwater wells. Despite some differences across the country, the area planted with wheat increased at the expense of barley and vegetable areas. However, the ambition to increase domestic production was marred by the limited number of inputs at guaranteed prices which had to be complemented by buying expensive alternatives on the markets, as well as erratic weather conditions which affected harvestable production.

Cereal area in 2020/21

Sowing of the 2021 wheat and barley crop, for harvest from mid-May (barley) and June (wheat), started in mid-October 2020 and was generally completed by

December 2020. Barley, sown from mid-October, was largely sown on time except in Dara'a where farmers reported delays in plating of up to 15 days caused by lack of rain at the beginning of the season, and an interruption in precipitation after barley was planted in November, leading to the desiccation of seedlings, forcing a number of farmers to re-sow.

Delays in wheat planting, caused by the late onset of autumn rains, were reported in Deir-ez-Zor, Homs, Hama, Sweida, Rural Damascus and, to a lesser extent, in Latakia and Tartous. Other governorates did not report significant delays in sowing due to weather-related reasons and, despite above-average temperatures at germination stage, no replanting was reported.

On the other hand, delays in sowing caused by the late delivery of the seeds and lack of fuel were common. In some governorates, including Rural Damascus, farmers mentioned lack of fuel needed for mechanized operations such as ploughing and sowing as the reason for delayed plantings. Shortage of machinery and aging fleet requiring more frequent maintenance (discussed under Mechanization) delayed plantings in Sweida. Setbacks in seed

provision by GOSM (such as in Rural Damascus) and donors (in Deir-ez-Zor) were also reported to defer planting. In Deir-ez-Zor, farmers reported that planting of about two-thirds of wheat areas was delayed until the last week of December/early January due to the late delivery of wheat seeds and other inputs by donors. In Dara'a, sowing of rainfed and irrigated wheat crops started at the beginning of December and at the beginning of January, respectively, mostly due to delays in seed delivery. Although such a long delay in input distribution is rare, hold ups in input delivery by implementing partners are frequent. However, planting took place within the appropriate window in most cases. Due to weather developments (discussed under Weather), wheat harvesting started in the second half of May, about two weeks earlier than usual.

As the security situation across much of the country remained stable in 2020 and was encouraged by a favourable 2019/20 season, the cumulative area planted to wheat and barley in 2020/21 marginally increased (by 2 percent) compared with the previous year. Likely responding to "Wheat Year" declaration by MAAR, area planted with wheat increased by 11 percent,[ix] while barley area decreased by 6 percent. However, the poor performance of 2020/21 rainfall resulted in a much lower share of the planted area being harvested. In 2021, only 52 percent of the wheat planted area was harvested, while in 2020 almost all planted area was harvested due to favourable rainfall. Consequently, the 2021 wheat harvested area was slightly over one-half of that of 2020. Similarly, only 25 percent of the barley planted area was harvested in 2021, compared with 94 percent in 2020; resulting in a 75 percent decrease in harvested area in 2021. Barley is usually planted as rainfed and thus faring worse when rainfall is very erratic. Cereal areas are shown in Tables 1 and 2.

Table 1: Syrian Arab Republic - Wheat areas, 2019/20 and 2020/21 ('000 hectares)

Governorate	Irrigated				Rainfed				Total			
	Planted		Harvested		Planted		Harvested		Planted		Harvested	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Rural Damascus	15.0	19.0	14.0	18.0	2.0	2.0	1.0	0.0	17.0	21.0	15.0	18.0
Dara'a	9.0	11.0	9.0	11.0	69.0	76.0	62.0	33.0	78.0	87.0	71.0	43.0
Sweida	0.4	1.0	0.4	1.0	31.0	40.0	31.0	9.0	32.0	41.0	32.0	10.0
Quneitra	1.0	2.0	0.5	1.0	6.0	6.0	2.0	5.0	7.0	8.0	3.0	6.0
Homs	8.0	18.0	8.0	18.0	28.0	24.0	27.0	23.0	37.0	42.0	36.0	41.0
Hama	24.0	23.0	20.0	21.0	13.0	25.0	12.0	13.0	37.0	48.0	32.0	34.0
Al-Ghab	40.0	45.0	40.0	43.0	2.0	1.0	2.0	1.0	41.0	46.0	41.0	45.0
Tartous	4.0	4.0	4.0	4.0	8.0	12.0	8.0	12.0	12.0	17.0	12.0	17.0
Latakia	-	-	-	-	2.0	5.0	2.0	5.0	2.0	5.0	2.0	5.0
Idleb	15.0	25.0	14.0	23.0	30.0	37.0	24.0	11.0	45.0	62.0	38.0	21.0
Aleppo	112.0	158.0	112.0	132.0	163.0	192.0	162.0	103.0	275.0	351.0	275.0	235.0
Raqqa	160.0	160.0	169.0	160.0	76.0	70.0	76.0	0.0	236.0	230.0	136.0	160.0
Hasakeh	121.0	125.0	121.0	125.0	341.0	389.0	341.0	0.0	462.0	514.0	462.0	125.0
Deir-ez-Zor	70.0	30.0	70.0	30.0	-	-	-	-	70.0	30.0	70.0	30.0
TOTAL	**580.0**	**620.0**	**572.0**	**548.0**	**771.0**	**881.0**	**752.0**	**214.0**	**1 351.0**	**1 500.0**	**1 324.0**	**787.0**

Sources: MAAR and CFSAM, 2021.
Note: Totals computed from unrounded data.

[ix] For example, in Kherbet Ghazala village in Dara'a, the area cultivated by irrigated and rainfed wheat increased from 320 hectares and 1 901 hectares, respectively, in the last year to 470 hectares and 2 225 hectares in the current season.

Table 2: Syrian Arab Republic - Barley areas, 2019/20 and 2020/21 ('000 hectares)

Governorate	Irrigated				Rainfed				Total			
	Planted		Harvested		Planted		Harvested		Planted		Harvested	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Rural Damascus	2.0	3.0	2.0	3.0	9.0	10.0	6.0	9.0	11.0	13.0	8.0	12.0
Dara'a	-	-	-	-	28.0	11.0	23.0	3.0	28.0	11.0	23.0	6.0
Sweida	-	-	-	-	19.0	22.0	18.0	7.0	19.0	22.0	19.0	7.0
Quneitra	-	-	-	-	3.0	3.0	1.0	3.0	3.0	3.0	1.0	3.0
Homs	0.4	0.4	0.4	0.4	39.0	37.0	15.0	9.0	40.0	38.0	15.0	9.0
Hama	9.0	7.0	9.0	6.0	126.0	115.0	94.0	75.0	135.0	122.0	102.0	81.0
Al-Ghab	1.0	0.6	1.0	0.6	0.2	0.1	0.2	0.1	2.0	0.7	2.0	0.6
Tartous	0.0	-	0.0	-	0.5	0.7	0.5	0.6	0.6	0.7	0.6	0.7
Latakia	-	-	-	-	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Idleb	-	-	-	-	55.0	72.0	41.0	18.0	55.0	72.0	41.0	20.0
Aleppo	3.0	1.0	3.0	1.0	389.0	346.0	375.0	186.0	384.0	347.0	377.0	187.0
Raqqa	10.0	8.0	10.0	8.0	320.0	300.0	320.0	0.0	330.0	308.0	330.0	8.0
Hasakeh	19.0	20.0	19.0	20.0	434.0	425.0	434.0	0.0	453.0	445.0	453.0	20.0
Deir-ez-Zor	15.0	0.7	15.0	0.3	-	-	-	-	41.0	0.7	41.0	0.3
TOTAL	**60.0**	**41.0**	**60.0**	**39.0**	**1 113.0**	**1 442.0**	**1 354.0**	**313.0**	**1 503.0**	**1 383.0**	**1 414.0**	**352.0**

Sources: MAAR and CFSAM, 2021.
Note: Totals computed from unrounded data.

Field fires

Fires in cereal crops are not uncommon in the country and most are accidental. In 2019, when high temperatures and strong winds in May and early June made fires much more frequent and extensive, MAAR estimated that about 85 000 hectares of crops were burnt, mostly wheat and barley. Hasakeh reported the loss to fire of 14 000 hectares of barley and 11 000 hectares of wheat, while Raqqa lost 9 000 hectares of barley and 2 000 hectares of wheat. Most fires were thought to have been started accidentally, but there was also evidence to suggest that some of them started maliciously, particularly in the areas with active conflict.

In the 2020/21 crop season, with weather conditions less prone to fires compared to 2019, field fires were less frequent. About 16 500 hectares of wheat and 12 200 hectares of barley were burnt in Hasakeh, Raqqa, Aleppo, Hama and Dara'a combined. In addition, extensive wildfires in October 2020 destroyed 9 200 hectares of fruit trees in Latakia, Tartous, Hama, Homs and Idleb, as well as 60 greenhouses in Latakia and Tartous. Limited losses were reported also in poultry farms, dozens of sheep and cattle, and some beehives. In Latakia, from September 2020 to July 2021, 307 agricultural and 20 forest fires were reported, affecting 132 villages with a total area of more than 8 000 hectares and affecting 20 000 families. In Tartous, 396 agricultural and 95 forest fires were reported.

At the cereal harvest time in 2021, wheat and barley field fires were much less frequent than that in the previous year, which could be partially explained by the smaller harvestable area and lower risk for accidents due to engine sparks. At the time of data collection in July, fires occurred in the coastal governorates of Tartous and Latakia, Hama, Homs, Idleb and Aleppo, possibly fuelled by high temperatures and the presence of dry weeds. Still, in Homs, the number of wildfires in 2021 halved compared to the previous year, when 8 500 hectares burned, compared to 1 300 hectares in 2020/21. The losses have not been completely recorded yet as the capacity to deal with fires has been weakened by lack of fuel hampering the ability to reach the fire sites. However, total losses are unlikely to reach the level incurred in 2019.

MAAR estimated that more than 50 000 households were affected by fires across the country in the 2020/21 season. While the

overall area burnt is not large from the national perspective, individual farmers whose crops were burnt lost most, if not all, their livelihoods and are likely to require assistance for the next season. There is an insurance scheme in place in the country, which can be triggered by natural disasters, but it does not cover field fires.

Factors affecting yields

Weather

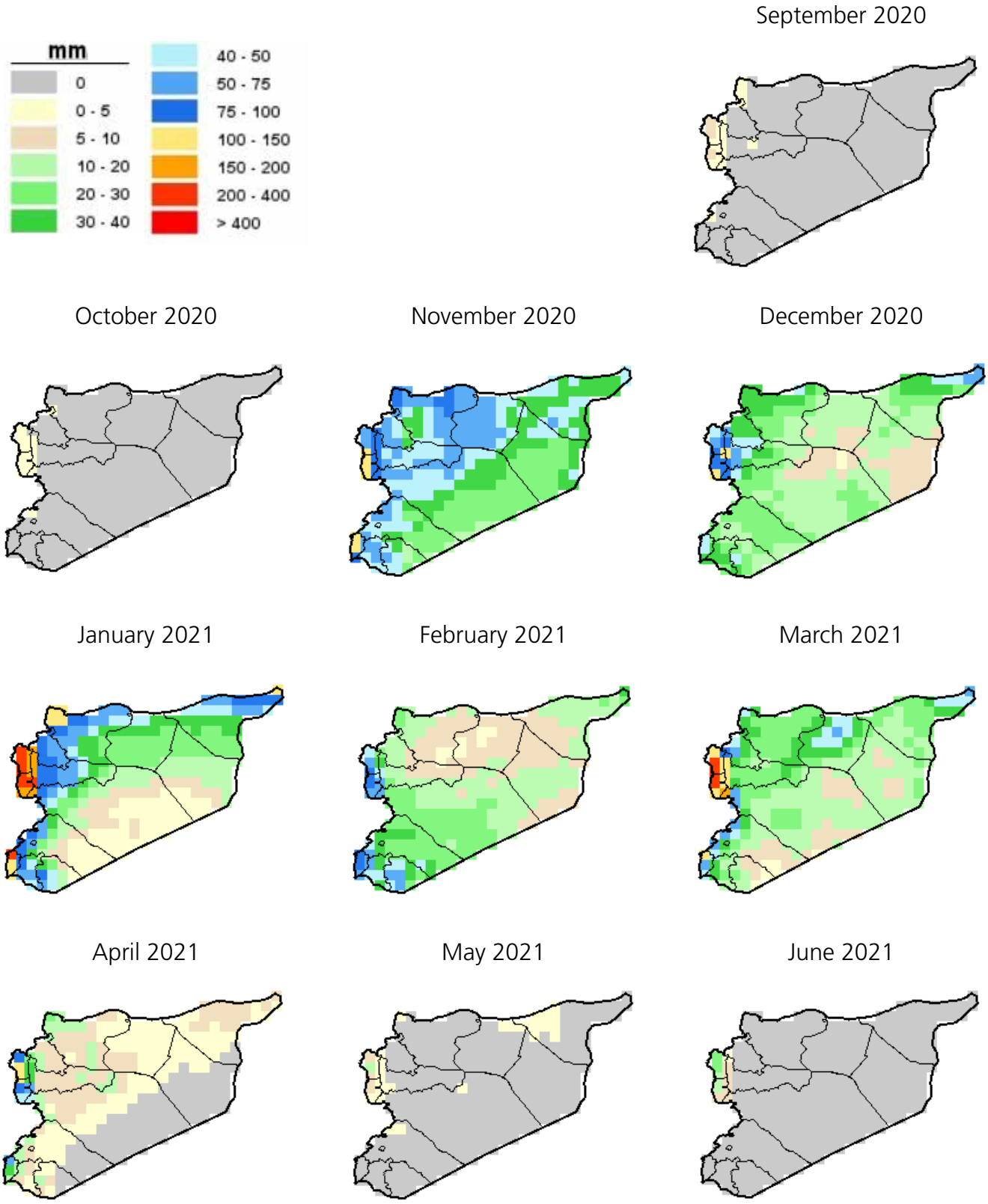
Rainfall during the 2020/21 cropping season was markedly worse than in recent years in terms of both amount and distribution. Across the country, the first substantial rainfall of the season was recorded with almost a two-month delay in November. From December onwards, rainfall amounts varied significantly between eastern and western governorates, resulting in erratic weather conditions on the east. Rains ceased by early April, about six weeks earlier than usual, hampering grain formation in all governorates, even in western parts and southern parts of the country which were not particularly affected by the erratic weather conditions earlier in the season.

In the eastern governorates, including Hasakeh and parts of Raqqa, Aleppo and Deir-ez-Zor, rainfall amounts were less than in the previous two seasons, and the temporal distribution was erratic. While in Aleppo the significant lack of precipitation was limited to Ain al-Arab District and only about 5 percent of the total winter cereal production comes from Deir-ez-Zor, the entire area of Hasakeh, the governorate with the largest planted area, was affected.

In western governorates, including Idleb, Hama, Homs, Quneitra, Dara'a, cumulative precipitation amounts, although less than in the previous year and the average, were deemed more favourable than in the eastern part of the country. In Taldu sub-District of Homs, for example, the cumulative precipitation reached 440 mm this season compared to the long-term average of about 550 mm, while 250 mm of rainfall were recorded in Al-Qusayr sub-District, compared to the long-term average of 350 mm. However, the temporal distribution was not ideal, with a late onset of the rains in November, erratic rainfall throughout the season and early cessation at the beginning of April. Despite intermittent rainfall, the areas of the country with clay soils and poor water drainage experienced flooding and waterlogging, particularly in Tartous District. Precipitation in April was not deemed sufficient and affected grain formation and filling across the country.

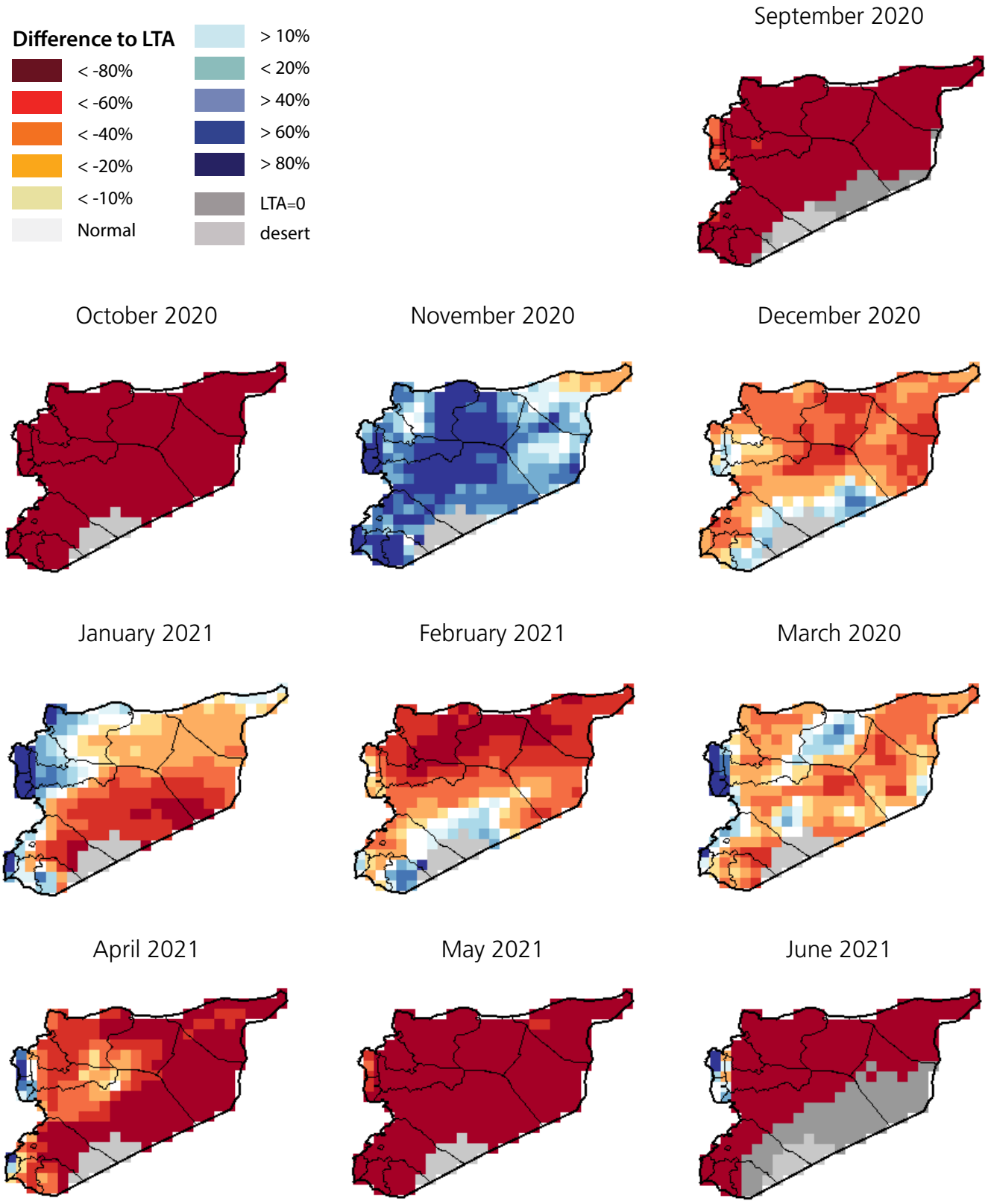
Figures 3 to 5 illustrate the estimated monthly rainfall amounts, the monthly rainfall anomaly and the Agricultural Stress Index (ASI) across the country from September 2020 to June 2021.

Figure 3: Syrian Arab Republic - Estimated monthly rainfall amounts (September 2020-June 2021)



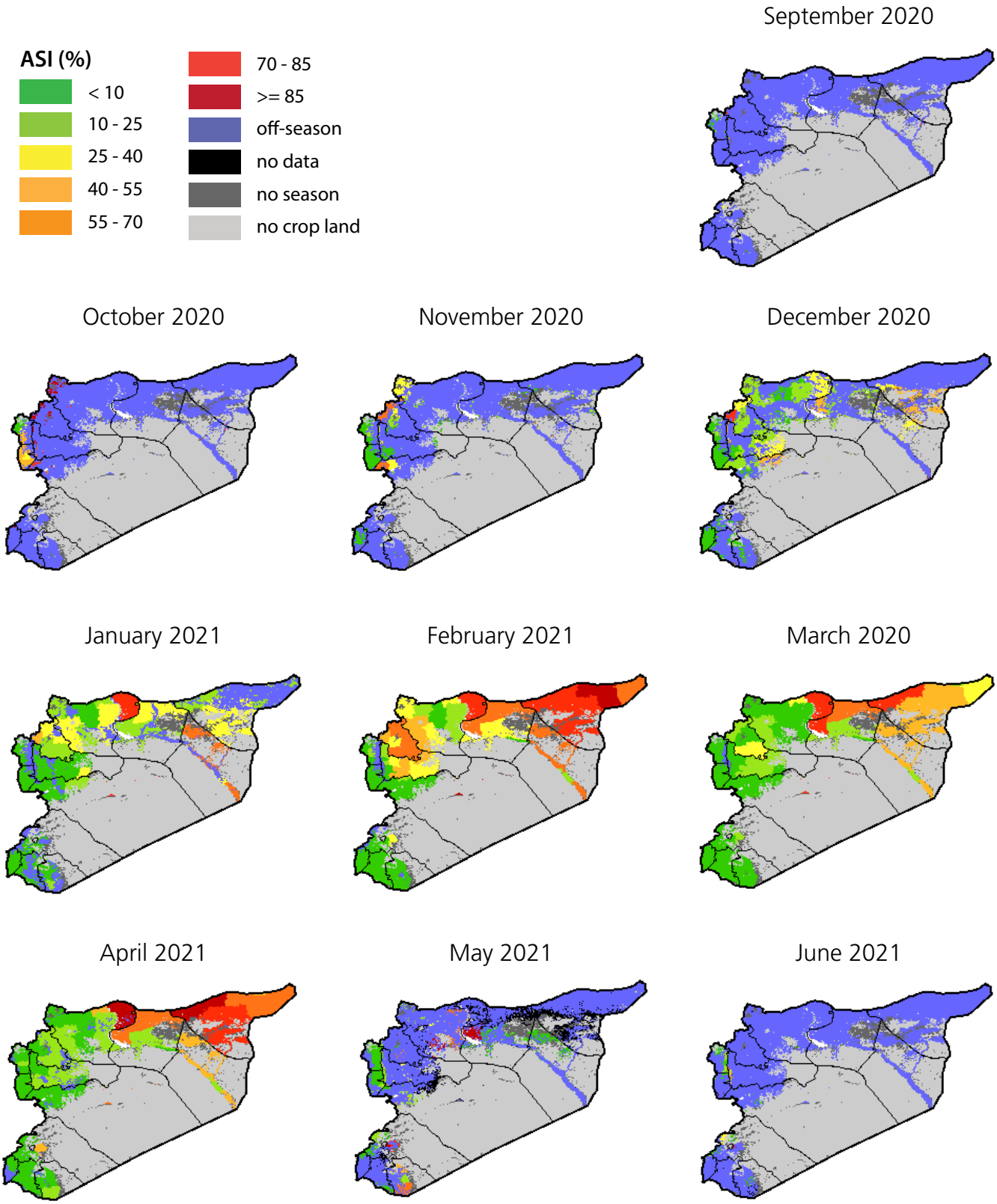
Source: FAO/GIEWS, Earth Observation Tool, 2021.
http://www.fao.org/giews/earthobservation/index.jsp?lang=en

Figure 4: Syrian Arab Republic - Rainfall anomaly, difference between 2020/21 monthly rainfall amounts and Long-Term Average (LTA)



Source: FAO/GIEWS, Earth Observation Tool, 2021.
http://www.fao.org/giews/earthobservation/index.jsp?lang=en

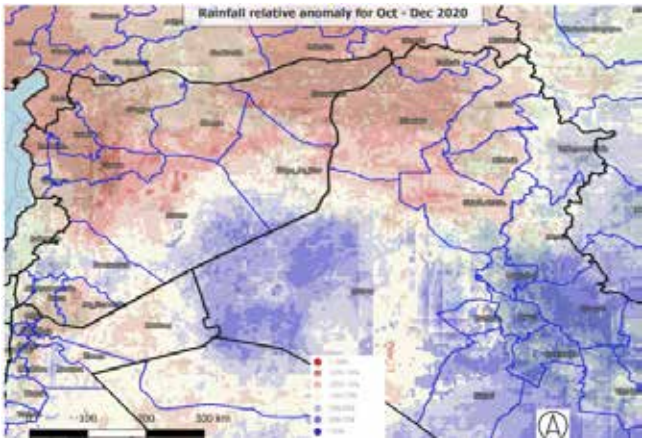
Figure 5: Syrian Arab Republic - Agricultural Stress Index (ASI) during middle decade of each month (September 2020-June 2021)



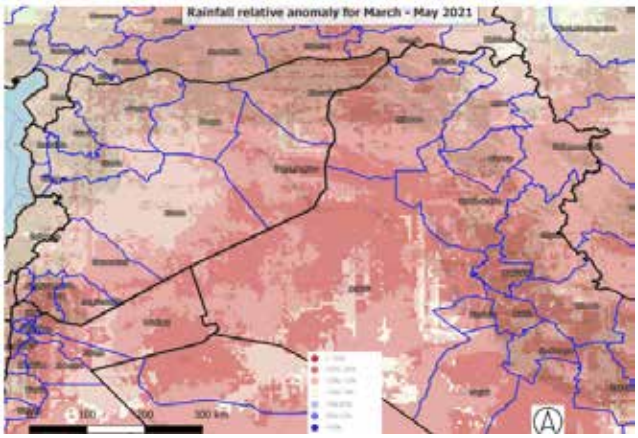
Source: FAO/GIEWS, Earth Observation Tool, 2021.
http://www.fao.org/giews/earthobservation/index.jsp?lang=en

Figure 6: Syrian Arab Republic - CHIRPS Rainfall relative anomaly

October–December 2020



March–May 2021



Source: EC/MARS/JRC, 2021.
https://mars.jrc.ec.europa.eu/asap/files/special_focus_2021_08.pdf

Figure 6 illustrates the CHIRPS[x] rainfall relative anomaly for October to December 2020 (left) and March to May 2021 (right). While the autumn rainfall deficit was moderate (33 percent deficit for October–December) and localized to the northern parts of the Syrian Arab Republic (mainly Hasakeh), the March-May rainfall deficit affected the Middle East Region and was very severe. Hasakeh received about 85 percent of its average rainfall in March but 30 percent in both April and May.

Table 3 shows the actual monthly and cumulative rainfall amounts observed across the country during the 2020/21 cropping season. Notably, Deir-ez-Zor received only 34 percent of the average cumulative rainfall amount. However, even in governorates which received over 90 percent of the average precipitation, rainfall distribution was not favourable.

Overall temperatures were higher than average (Table 4), with unusually large differences between minimum and maximum daily temperatures.

Above-average temperatures in March were experienced at the same time as night frost in some areas, leading to additional crop damages. Continuous cold periods were fewer than in the previous years, with very small amounts of snow. Several bouts of frost were reported, with varying impact on crop conditions. In Deir-ez-Zor and Aleppo, night frost was reported in January. Hama and Rural Damascus reported two frost waves in February and late March, with detrimental effects on the formation of flower buds on fruit trees (especially almonds), vegetables and potatoes. Homs, Quneitra and Dara'a reported night frost at the end of March and in the first decade of April, affecting fruit and olive trees in the flowering phase, as well as vegetables and potatoes. Wheat was also affected by night frost in March in some areas of the west, including Rural Damascus, but the impact of frost damage on the crop failure compared to the lack of precipitation was of minor importance.

[x] The Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS) is a quasi-global rainfall dataset.

Table 3: Syrian Arab Republic - Actual monthly and cumulative rainfall amounts, 2020/21 cropping season, September 2020–January 2021 (mm)

Governorate	September 2020		October 2020		November 2020		December 2020		January 2021		February 2021		March 2021		April 2021		May 2021		Total for 2020/21 crop season		
	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Actual rainfall	LTA	Percent of LTA
Damascus	0.3	0.0	10.5	0.0	27.1	74.8	42.9	30.0	44.9	43.7	40.2	14.3	22.7	5.0	9.6	0.0	7.2	0.0	205.3	167.8	82
Sweida	0.8	0.0	11.2	0.0	36.1	72.5	55.6	32.0	83.8	67.0	80.1	54.5	51.5	20.5	16.9	6.0	6.6	0.0	342.6	252.5	74
Dara'a	1.1	0.0	8.1	0.0	25.9	41.0	57.4	34.0	66.9	71.5	60.8	87.5	38.9	24.5	13.6	2.5	8.3	0.0	281.0	261.0	93
Quneitra	2.2	0.0	17.1	0.0	52.3	126.0	122.3	71.0	147.0	211.0	135.0	52.5	98.2	67.5	31.5	28.0	16.8	0.0	622.5	556.0	89
Homs	5.7	0.0	24.7	0.0	45.8	61.0	66.0	51.2	91.5	165.6	82.0	27.9	53.5	36.9	28.4	26.2	10.2	0.0	407.9	368.8	90
Hama	3.1	0.0	21.5	0.0	40.4	46.3	63.1	31.6	73.6	147.0	63.6	10.2	43.2	24.2	24.2	8.9	12.8	0.0	345.4	268.2	78
Tartous	13.4	0.0	71.1	0.0	124.6	223.1	189.2	231.2	197.3	385.7	171.3	67.6	147.2	63.1	67.1	57.3	38.6	0.0	1 019.0	1 028.0	101
Latakia	14.5	0.1	63.7	0.0	97.3	151.1	184.3	124.4	186.2	172.1	136.1	47.5	82.2	81.0	41.3	32.7	33.9	0.0	839.5	608.9	73
Idleb	7.4	0.0	16.1	0.0	48.6	28.0	98.3	43.0	106.9	170.0	93.8	30.0	70.7	12.0	36.6	25.0	20.9	0.0	435.0	308.0	71
Aleppo	4.0	0.0	22.7	0.0	45.2	47.0	66.6	33.0	69.7	128.5	70.3	8.5	50.1	39.0	37.5	9.0	19.7	0.0	385.9	265.0	69
Raqqa	1.0	0.0	7.6	0.0	13.9	24.0	23.8	3.5	32.6	23.0	28.2	2.0	22.3	32.0	20.5	9.5	14.6	0.0	165.9	94.0	57
Hasakeh	1.6	0.0	19.3	0.0	31.9	51.0	38.7	19.0	40.5	30.0	41.6	9.0	37.1	42.5	28.1	2.0	16.2	0.0	255.1	153.5	60
Deir-ez-Zor	0.1	0.0	11.5	0.0	18.9	20.0	20.0	4.0	27.9	15.3	26.2	4.5	21.3	8.0	16.0	0.0	11.3	0.0	153.3	51.8	34

Sources: Ministry of Agriculture and Agrarian Reform, 2021. Daily rainfall bulletins.

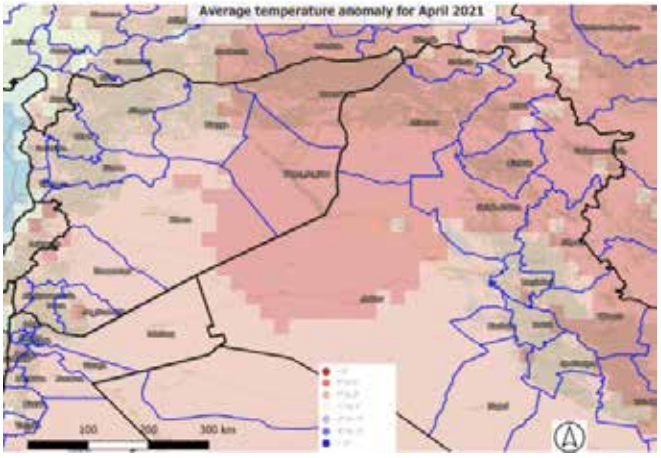
Table 4: Syrian Arab Republic - Deviation of maximum monthly temperatures from LTA, 2020/21 cropping season (C°)

	Oct 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021
Damascus	3.9	-0.05	1.2	2.5	2.1	2.1	2.3	3.9
Quneitra	3.6	0.02	1.9	2.5	2.8	2.8	2.9	3.9
Dara'a	3.3	-0.05	1.2	2.1	2.0	2.0	2.3	4.2
Sweida	4.5	0.02	1.9	2.5	3.2	3.2	2.7	3.1
Homs	4.3	0.02	1.7	2.9	3.1	3.1	2.8	3.6
Hama	4.8	0.00	2.4	2.9	3.8	3.8	3.3	4.3
Hasakeh	4.7	-0.01	1.8	3.6	4.3	4.3	4.7	6.1
Latakia	3.2	0.06	3.5	2.8	2.9	2.9	1.8	2.3
Tartous	3.6	0.06	2.7	3.3	2.7	2.7	1.3	2.3
Aleppo	4.3	-0.03	2.4	3.2	3.0	3.0	2.2	4.5
Idleb	4.1	0.00	2.2	2.9	3.6	3.6	2.5	4.0
Deir-ez-Zor	5.5	0.06	3.3	4.0	4.4	4.4	4.3	4.8
Raqqa	5.6	0.05	3.4	3.7	3.5	3.5	3.7	5.0

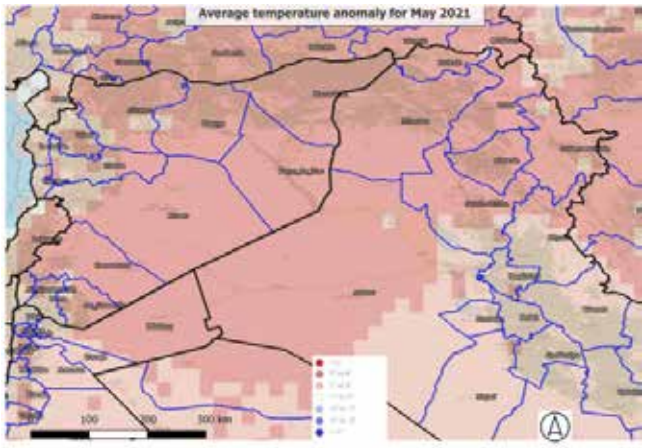
Sources: MAAR, 2021. Monthly drought monitoring bulletins.

Figure 7: Syrian Arab Republic - Average temperature relative anomaly

April 2021



May 2021



Source: EC/MARS/JRC, 2021.
https://mars.jrc.ec.europa.eu/asap/files/special_focus_2021_08.pdf

The main threat to cereal crop development was the above-average temperatures from mid-March onwards, which culminated in a heatwave from mid-April that compromised cereal grain formation and filling, contributing to quantitative and qualitative reduction of yields. High temperatures exacerbated the impact of the moisture deficit on winter cereal crops which survived erratic precipitation that were at crucial reproductive stages.

Large temperature differences between night and day in most of the governorates, especially in Deir ez-Zor, Hama, Dara'a and Rural Damascus, also impacted fruit and vegetable production. Figure 7 highlights the average temperature relative anomaly for April (left) and May (right) 2021, showing 3 to 6 Celsius degrees above-average temperatures in eastern parts of the country in April and for the whole country in May.

Under normal circumstances, high temperatures in April would have affected yields of wheat more than barley, which tends to fill grains earlier. However, during of 2021 the barley crop, almost entirely rainfed, failed. Yield losses caused by high temperatures during the wheat grain filling stage are estimated at up to 30 percent. Another severe heatwave occurred in June 2021 but caused no damage to cereal crops as, those worth harvesting, were already harvested or close to being harvested. The June heatwave affected mostly fruit and vegetable production and contributed to the spread of insects and pests.

Poor temporal distribution of rainfall during the season and its early cessation, coupled with a sharp increase in temperatures, contributed to the decline in crop production in terms of quantity and quality. Rainfed crops in the areas affected by erratic rainfall failed completely, while yields in other rainfed or in irrigated areas were also reduced due to poor rainfall amounts at grain filling stages and high temperatures. Figure 8 compares Sentinel 2[xi] high resolution imagery of the main cereal producing areas of Hasakeh, Raqqa and Aleppo in 2021 and 2020.

High resolution imagery of the Sentinel 2 sensor allows zooming at field scale for the agricultural areas most concerned by lack of precipitation and comparing crop conditions with reference years. The images from Sentinel 2 presented in Figure 8 are false-colour composites with (i) red showing active vegetation, (ii) blueish, light green corresponding to bare or sparsely vegetated soil or dry vegetation, and (iii) black indicating water bodies; the reference year is the previous season (2020), which was very rainy. The images on the left are from April 2021, images on the right from April 2020. The contrast with 2020, which was a rainy year, is striking; in 2021, it seems that only a few irrigated fields had active vegetation.[xii] On the Hasakeh images, the contrast with the irrigated fields of the Turkish northern border is striking.

Given the early cessation of the rains and the above-average temperatures supporting premature ripening of the crops, the winter cereal harvest started about two to three weeks earlier than usual. Barley was generally harvested from mid-May and wheat from late May or early June, depending on the governorate. Hasakeh reported an exceptionally early start of the harvest, launching harvesting activities as early as 10 May, while in previous years they would not start until the first decade of June.

During the field work, farmers in the eastern part of the country mentioned they had been experiencing shifts in the rainy season: the rain now starts after mid-November (used to be in October) and stops in mid-March (used to be until the end of April). They reported also experiencing increased heatwaves and decreased frost frequency. This shift in weather patterns might be worth exploring in a detailed study to fully understand the current situation and allow the implementation of appropriate adaptation and mitigation measures.

Irrigation

Before 2011, about 1.6 million hectares of the country's 4.6 million hectares of farmland were irrigable. The state-administered public irrigation area amounted to 488 000 hectares, with the rest accounted for by private farmers who, individually or in groups, pumped water from lakes, reservoirs, rivers or wells. Irrigation was primarily used on wheat, vegetables, cotton, potatoes, sugar beet and citrus. Starting in 2011, the civil conflict brought about the destruction of irrigation structures and pumping stations, frequent and unpredictable electricity outages and increased fuel prices, which caused a substantial reduction in the area under irrigation. The irrigated area under industrial crops, such as cotton and sugar beet which require processing factories, many of which were damaged or destroyed, also declined drastically. According to the Ministry of Water Resources, the area of irrigable land increased from 1.42 million hectares in 2019/20 to 1.44 million hectares in 2020/21 as some progress was made on rehabilitation of irrigation infrastructures. Currently, the principal irrigated crops are wheat and vegetables.

[xi] Sentinel is an Earth observation mission from the European Space Agency's (ESA) Copernicus Program that provides accurate, timely and easily accessible information to improve the management of the environment, understand and mitigate the effects of climate change and ensure civil security. Sentinel 2 acquires optical imagery at high spatial resolution over land and coastal waters. Sentinel's data are available to the public at no cost.

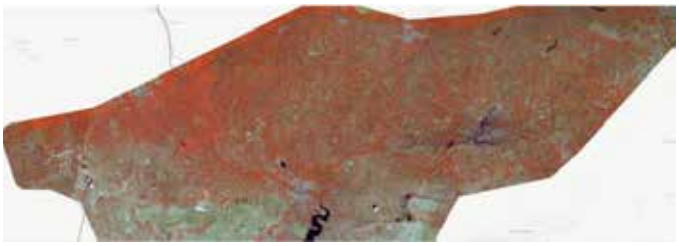
[xii] See more at the ASAP High-Resolution Viewer https://mars.jrc.ec.europa.eu/asap/hresolution/?region=0.

Figure 8: Syrian Arab Republic - Comparison of high-resolution images from Sentinel 2

Hasakeh Governorate

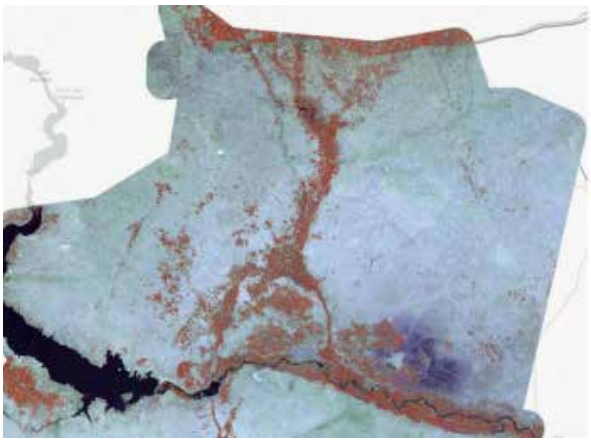
April 2021

April 2020

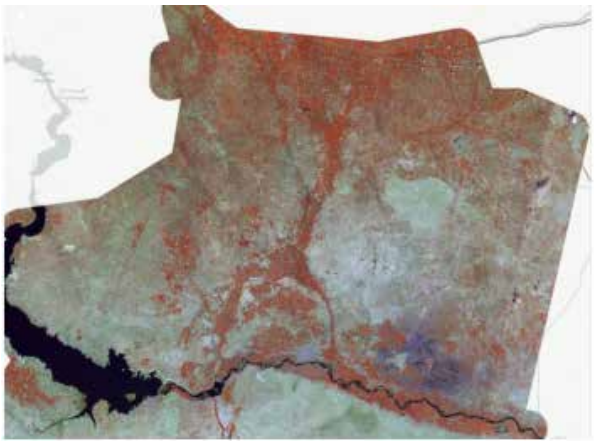


Raqqa Governorate

April 2021

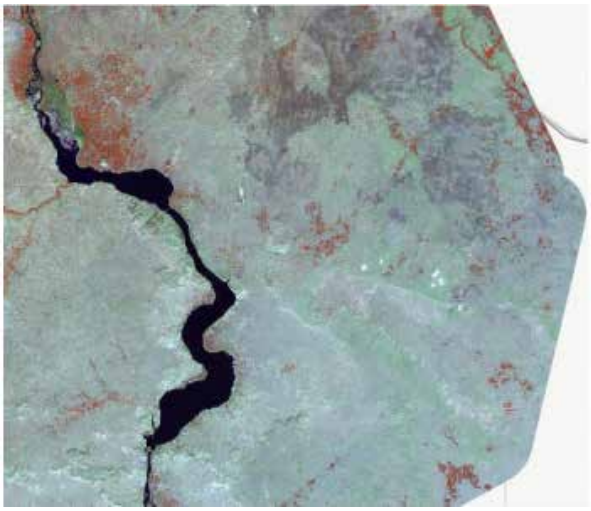


April 2020



Aleppo Governorate

April 2021



April 2020

Source: EC/MARS/JRC, 2021.
https://mars.jrc.ec.europa.eu/asap/files/special_focus_2021_08.pdf

In 2019, the MWR estimated that the country's annual water requirement, including agricultural, industrial and domestic use, was about 12.9 billion cubic metres (= 12.9 km^3), with agriculture using between 86 and 89 percent of it. This figure has not been updated in the last two years. Given the high price of fuel and the general drop in the water table (discussed later), it is very likely that the proportion of water used in agriculture is currently considerably less than the quoted 86-89 percent. Nevertheless, despite the reduction in the irrigated area, the country remains in water deficit for a variety of reasons, including erratic weather patterns related to climate change, which has resulted in the lowering of water levels in reservoirs and rivers, inefficient irrigation practices and inequitable shares of water from international rivers, especially the Euphrates. The most notable river that flows entirely within the country's territory is the Barada River, which flows through Damascus, but its level has mostly been low for many years. Other major rivers are shared with neighbouring countries: the Euphrates with Turkey and Iraq, the Tigris with Turkey, the Orontes with Lebanon and Turkey, and the Yarmouk with Jordan. According to a 1989 agreement, the country was granted 42 percent of the Euphrates inflow from Turkey, which at that time averaged about 500 cubic metres per second. Since then, Turkey has constructed several dams upstream with the result that the inflow to the Syrian Arab Republic has averaged less than 300 cubic metres per second in recent years and is often reduced to a mere trickle. In June 2021, the inflow was reported to be 214 cubic metres per second (Humanitarian Response, 2021), while apparently in early 2021, it was as low as 181 cubic metres per second (Enab Baladi, 2021a). In April 2021, the Autonomous Administration of North and East Syria (AANES) estimated the decline of the Euphrates River at more than 5 metres from the initial river level, over 4 metres in the Tishreen Lake and over 3 metres in al-Assad Lake on the Euphrates River (Enab Baladi, 2021b). The water assessment conducted by FAO from June to August 2021 indicated that 438 pumping stations were out of order due to the reduced water flow in the Euphrates River and would need urgent attention (Humanitarian Response, 2021).

Private irrigation depends largely on groundwater from wells, about half of which were authorized and half unauthorized in the past, and this ratio probably has not changed. The rate of unauthorized drilling of wells accelerated in the first two or three years of the crisis in response to the wide destruction of the public irrigation network. Pumping groundwater from an increasing number of wells is thought to be lowering the water table in many governorates although no direct systematic measurement of the depth of the groundwater table has been performed recently, reportingly due to the unavailability of the necessary measuring devices. However, preliminary field indicators show an increase in the groundwater consumption. In Dara'a, for example, the number of unauthorized wells is estimated at 3 300. In Taldu sub-District of Homs, there are only 32 licensed groundwater wells and more than 200 are not authorized, with water levels of 100 to 150 metres in depth. The increased use of groundwater wells, in addition to lowering the water table, results in high cost of water extraction and increased salinity of the water, consequently lowering yields. Increased salinity has been reported in Deir-ez-Zor, Hasakeh and parts of the coastal governorates. Water pumps operating on solar power, both self-financed and donated via projects, although popular with farmers and perceived as a win-win solution, are also blamed for increased extraction and resulting in declining water table.

This year's poor rainfall failed to sufficiently replenish dams and wells, and water availability in storage dams was judged to be below average. In addition, many small rivers, such as the Jaghjagh River in Hasakeh, dried out in February 2021, while they used to run until April in the past. In Dara'a, where farmers rely heavily on wells for irrigation after the Upper-Yarmouk irrigation network went out of service, increasing pressure on the groundwater in westsouthern areas, the water table is reported to have declined by 15 metres compared to the previous year, increasing extraction costs of decreasing volumes.

Given the erratic rainfall in the 2020/21 season, farmers should have irrigated their crops more frequently to maintain yield potential. Even farmers who could afford to buy fuel were not able to extract enough water for irrigation due

to the low groundwater level. However, in most cases, high costs, and in many cases general shortages, of fuel and electricity (discussed in detail in the Fuel section) prevented farmers from pumping adequate amounts of water even in areas with sufficient water availability and irrigation could have significantly improved yields. Although farmers remain eligible for subsidized diesel (whose price was SYP 180/litre during most of the season), its availability was limited and farmers had to rely on the free market to satisfy their needs. In Rural Damascus, for example, subsidized diesel covered about one-third of total fuel needs for pumping. In order to limit their losses as production costs soared, many farmers reduced the areas they irrigate and the number of irrigations. In the main wheat-producing governorates, it is common for farmers to normally irrigate crops four or five times during the growing season, although many would aspire to carry out as many as six to nine irrigations. In this season, in Hasakeh, most farmers irrigated their fields only two to three times. In Hama, winter crops were irrigated twice in the areas serviced by government irrigation canals, while in other areas that rely on groundwater wells, farmers were able to irrigate only once, in the best cases, due to high prices or even lack of fuel. In Deir-ez-Zor, only a few wheat farmers were able to provide final supplementary irrigation for their crops.

Despite some progress on the rehabilitation of irrigation channels and wells, farmers in Hasakeh, Idleb, Raqqa and Deir-ez-Zor repeatedly pointed out that damages to irrigation infrastructure and pumps as well as the failure to carry out a full rehabilitation of the irrigation infrastructure are the main reasons for not being able to irrigate during the current season. In Rural Damascus, about 60 percent of the irrigation infrastructure still needs rehabilitation. In the public irrigation network in Taldu sub-District (Homs), the canals are extensively damaged and 85 percent of the irrigated areas remain unserved by water. Regarding the status of irrigation infrastructure, many farmers reported that open channels lack usual maintenance and suffer from wear and tear, particularly in areas which were spared of a broader conflict, such as Tartous and Latakia. Underground irrigation channels fared better and most of them still provide sufficient amounts of water. Most of the irrigation water pumps are old and prone to malfunctions and stoppages due to the lack of spare parts. Thefts of already rehabilitated irrigation infrastructure, particularly pumps, were also mentioned in some areas, including Hama, Homs and Quneitra. Before the crisis, farmers in parts of Rural Damascus used to irrigate their fields with water from a sewage treatment plant, which provided enough water to irrigate 18 000 hectares annually, but the plant is currently out of service. In Raqqa, conflict prevails over the control of water resources between the government and Syrian Democratic Forces (SDF). In Dara'a, about half of the wells were damaged during the crisis and many are still out of service. In Deir-ez-Zor, which relies heavily on irrigation to cover water requirements for agriculture, damaged irrigation infrastructure and declining water availability in the Euphrates River resulted in insufficient water availability to irrigate crops (especially wheat, cotton and vegetables), pushing farmers to increase their reliance on groundwater wells.

In theory, farmers are obliged to pay token fees for irrigation from the public networks and could be required to pay fees also for previous periods in which they used the water of the public network. In the past, in Aleppo, the fee, levied by the General Organization for Land Reclamation, was SYP 10 000/hectare/year. In practice, the fee is rarely collected.

Some reports indicated that untreated wastewater was also being used for irrigation of crops, given the lack of other sources, with evident risks for human health.

Water scarcity in agriculture comes against the backdrop of the general shortage of water in the country. Before 2010, 98 percent of the people in cities and 92 percent of the people in rural communities had reliable access to safe water. In 2021, only 50 percent of the water and sanitation systems function properly across the country, with a negative impact also on water availability for agricultural and livestock production (ICRC, 2021).

Box 1: Summary results from the household survey - Access to irrigation

About 16 percent of the interviewed farmers could not access any source of irrigation water, therefore, adopting rainfed agriculture only in the 2020/21 season. However, more than half of the farmers who were able to secure water to irrigate their crops, agreed that the availability of irrigation water from all sources decreased compared to the previous season. Decreased availability was partially attributed to the lack of rains and decreasing water table, but also to the scarcity and high prices of fuel needed to operate water pumps, especially in the northeast governorates. The lack of irrigation water from dams and rivers (especially the seasonal ones due to the low flow of the Euphrates River, early dryness of seasonal rivers in Rural Damascus and a decline in dam reserves in most governorates) combined with still not fully rehabilitated public irrigation infrastructure, led to increased dependence on private groundwater wells on which 40 percent of the farmers rely for irrigation. Fuel shortages were singled out as the main obstacle of extracting groundwater. Farmers in the areas with difficult access to irrigation water rely on purchasing water in tanks which have become less available and more expensive.

Water Source	Farmers Using Each Source		Water is Said to be Less Available this Season	
	% of Farmers	Most Common in:	% of Users Stated That	Mostly in:
Private Wells	40%	Rural Damascus, Al-Hasakeh, Aleppo	54%	Al-Hasakeh, Aleppo, Hama
Public Grid	27%	Ar-Raqqa, Quneitra, Tartous	46%	Ar-Raqqa, Aleppo
Rivers & Springs	15%	Deir-ez-Zor	46%	Deir-ez-Zor, Rural Damascus
Water Tanks	12%	Idleb	58%	Idleb, Dar'a
Public Wells	2%	Rural Damascus	20%	-

Inputs

Farmers reported increased prices of all agricultural inputs and, in some cases, even general shortages, resulting from the deteriorating exchange rate which increased prices of inputs of non-Syrian origin, both imported officially and smuggled. Prices of domestically produced inputs also increased due to high production costs, particularly for energy and transportation. In some areas, fragile security conditions limited the availability of inputs on markets and also constrained farmers' ability to access them. In some cases, market access was also temporarily reduced due to repeated curfews which were introduced as part of the COVID-19 containment measures to limit the spread of the pandemic. Responding to the high input prices, some farmers left part of their lands fallow for the season or stopped servicing the planted crops. While in the past credit was sometimes provided by input sellers, including agricultural pharmacies, with significant differences between official and parallel market exchange rates, very limited credit facilities are available, particularly for those possessing only Syrian pounds.

Seed

Despite the financial setbacks stemming from unfavourable economic conditions, farmers were able to access enough seed to plant a slightly expanded area of wheat and barley in 2020/21 (see Cereal area 2020/21 above). The various sources of seed included a limited supply of (somehow certified) seeds directly from the General Organization for Seed Multiplication (GOSM), farmers' own seed retained from the above-average 2020 harvest (which allowed sufficient replenishment of household seed stocks), seed distributed by donors, seed borrowed or purchased from neighbours and seed purchased on the open market.

Annually, the country requires about 400 000 tonnes of wheat seed and 260 000 tonnes of barley seed to satisfy its planned cereal area at seeding rates of 220 kg/hectare for wheat and 170 kg/hectare for barley. Before the conflict, GOSM was able to provide a substantial proportion of this requirement by contracting out-growers, but its activities were seriously curtailed during the crisis. GOSM's capacity was affected by the loss of physical facilities and skilled staff as well as damages to infrastructure.

For the 2020/21 season, GOSM distributed 69 624 tonnes of wheat and 385 tonnes of barley seed. GOSM seeds were sourced from seed multiplication fields (contracted out-growers) in the country. Although still covering only about

a small share of total wheat seed needs,[xiii] the amount of wheat seed increased compared to the previous seasons: in 2019/20, GOSM distributed 36 500 tonnes of wheat seeds and in the 2018/19 season 41 000 tonnes. The amount of barley seed provided by GOSM decreased significantly, presumably due to larger emphasis on wheat production. In 2019/20, GOSM distributed 628 tonnes of barley seeds and, in the 2018/19 season, 6 500 tonnes. In the past, GOSM occasionally resorted to purchasing wheat grain from Hoboob and distributing it as seed to farmers.

Although still insufficient to cover domestic needs, GOSM has substantially increased its production capacity since 2017 when about 1 500 out-growers were producing wheat seeds for the 2018/19 cropping season and, by 2018, the number doubled to 3 000, with an expected production of 75 000 tonnes for the 2019/20 season. However, only 36 500 tonnes were actually distributed in 2019/20, hinting possible production problems stemming from lack of quality inputs. A similar situation was noted for barley. Four seed screening centres, located in Aleppo, Deir-ez-Zor, Dara'a and Hama, are working at full capacity, although room for improvement in terms of maintaining steady performance prevails. In 2018, only two out of 13 seed-processing centres were operational.

Sources of cereal seeds varied across the country. In government-held areas, including Aleppo, Idleb, Al-Ghab, Hama, Deir-ez-Zor, Latakia, Tartous, Homs, Quneitra and Sweida, wheat seed from GOSM was generally available, covering between 30 (in government-controlled areas of Idleb) and 90 percent (in Homs) of total seed needs. Both in Hama and Homs, GOSM seeds were available. Yet in Hama, farmers deemed prices were reasonable and quality acceptable, while in Homs, the quality of seeds was said to have deteriorated and the price was higher than last year. In Tartous and Latakia, seeds were more readily available than in the previous year, but still in low quality. In Rural Damascus and Deir-ez-Zor, farmers complained about delays in delivery from both GOSM and the implementing partners of donor projects. In Al-Ghab, soft wheat seeds were not distributed, only durum wheat seeds.

In 2020, farmers were eligible to purchase the quantity of seeds from GOSM at the subsidized price of SYP 450/kg according to the officially recommended seed rates (20-25 kg/dunum of Sham 3 under irrigation, equivalent to 200-250 kg/hectare). Given the low quality of seeds, real seed rates used by farmers were much higher which prompted them to secure the rest of their needs from their own production (saved seeds), rely on donor projects (where available) or purchase on markets. Seeds are often mixed with different varieties or, in some cases, even different species. Farmers tend to exceed the recommended seeding rates by 50 to 75 percent, ranging from 250-350 kg/hectare for irrigated wheat and from 250-350 kg/hectare for barley, depending on the variety and location. In Hasakeh, the seeding rate of irrigated wheat can be as high as 400 kg/hectare. Rainfed wheat and barley is often sowed with lower seeding rates, about the recommended 200-250 kg/hectare. Higher seeding rates of irrigated crops are meant to mitigate the risk of failure given the high costs of production, in particular irrigation. Some farmers increase seeding rate in an effort to prevent the growth and spread of weeds which, given the high cost of herbicides, they are not able to control otherwise.

In Hasakeh, where seeds from GOSM were not available in 2020, seeds were either saved from the previous harvest or purchased in the market for SYP 500-600/kg of wheat and SYP 250-260/kg of barley. Very limited amounts of seeds from GOSM were available in Dara'a. In Sweida, the market price of barley seed was reported as SYP 1 200/kg (Furat-2 and Arabic White varieties), justified by small, cultivated area and limited supply.

The usual varieties were available on most markets: Sham 1, 3, 5 and 7; Douma 1 and Douma 3 for durum wheat; Golan 2, 4 and 6, Sham 4, 6 and 9, and Duma 4 for soft wheat; Arabic Black, Baladi (local variety), Furat and Euphrates for barley. Bouhuth

[xiii] Using a lower seed rate per hectare, and likely to prioritize seed provision in government-held areas, MAAR estimates the total wheat seed needs at 269 500 tonnes. The amount of seeds distributed by GOSM in 2020 covered about one quarter of the total wheat seed needs estimated by MAAR.

(hard wheat) was also present, but on a smaller scale (mostly in Quneitra). In some areas, farmers cultivated varieties previously unused in the governorate, such as Douma in Dara'a. Due to the decline in GOSM's ability to meet the needs for improved seeds, farmers' dependence on saved self-produced seeds increased, contributing to a decline in yields due to the use of successive generations of existing varieties. The quality of purchased and saved seeds continues to worsen, as currently fifth or sixth generation seeds are being used. Certified traits, originally present in the first generation seeds, have been outgrown in several multiplications and first generation seeds are not available. MAAR is also concerned about mixing varieties, particularly in the areas out of government control that may depend to some extent on smuggled seeds from neighbouring countries. In 2019, FAO distributed wheat seeds to 14 910 households and in 2020 to 23 660 households. In 2021 wheat seed distribution was aimed to seed multiplicators, and 69 households benefitted.

Fertilizers

The use of fertilizers has declined significantly since 2011 due to the low availability and high prices occasioned by the conflict and economic downturn. In the past, agricultural directorates in most governorates estimated that only between 40 and 50 percent of their farmers applied fertilizers to their wheat crop but, based on the interviews with the farmers, that figure may have been an over-estimation and that those who did use fertilizers applied them at low rates. Barley crops rarely receive fertilizer.

The main source of urea and superphosphate in the past was a fertilizer factory in Homs which ceased operations in 2016 after being damaged, briefly re-opened in 2017, but closed again in late 2018 for further rehabilitation with the support from the Russian Federation. In 2017, the factory produced about 44 000 tonnes of urea and 32 000 tonnes of superphosphate. In 2018, these amounts decreased to 17 000 and 20 000, respectively. As of 2021, the factory was under investment by a private company in return for a certain percentage of the production sold directly to the ACB, which sells it to farmers. Although no breakdown on quantities was made available in 2020, the factory sold about 100 000 tonnes of fertilizers (The Syria Report, 2021b).

Prior to 2011, the ACB used to annually import about 600 000 tonnes of urea. In 2018, it imported 60 000 tonnes and in 2020 only 6 000 tonnes as additional attempts to import were reported to have failed due to the embargo and economic sanctions, although depleted foreign exchange reserves probably played an additional role. In 2021, no fertilizer was imported. It is reported that distribution of urea was strictly confined to areas under state control, ruling out key-producing areas of Hasakeh, parts of Deir-ez-Zor and East Aleppo. Nitrogenous fertilizers (such as urea and ammonium nitrate) are not allowed to be imported privately into the country under the dual use provision in international sanctions to avoid their misuse to make explosives.

According to MAAR, in the 2020/21 cropping season, only a small share of fertilizer needs, ranging from 6 percent of potash to 17 percent of urea (Table 5) were satisfied, either by sales from ACB or market. Although it is unclear at what application rates the needs were calculated, it is evident that, given the high prices, farmers used very low rates of fertilizers and most of them did not apply fertilizers at all. Some farmers resorted to soluble fertilizers, particularly for high value crops such as vegetables, but did not service their entire crop.

Table 5: Syrian Arab Republic - Estimated fertilizer needs and quantities provided by MAAR, 2020/21

Urea 46%			Phosphate			Potash		
Tonnes needed	Tonnes provided	Share provided (percent)	Tonnes needed	Tonnes provided	Share provided (percent)	Tonnes needed	Tonnes provided	Share provided (percent)
316 714	52 689	17	143 477	11 122	8	42 553	2 514	6

Source: MAAR, 2021.

Table 6: Syrian Arab Republic - Sales of fertilizers from the ACB (tonnes)

	2019/20	2020/21
Superphosphate 46%	35 000	4 500
Urea 46%	44 000	45 000
Potash 50%	1 500	600
Calnetro 26%	30 000	33 000

Source: ACB, 2021.

Table 7: Syrian Arab Republic - Prices of fertilizers from the ACB (SYP/tonne)

	2018/19	2020 - for planting of 2021 crop (average)	2021 - after subsidy removal in June 2021
Super phosphate	184 000	240 000 - 250 000	1 112 000
Urea 46%	164 000	200 000 - 270 000	1 366 000
Potash 50%	460 000	412 000	n.a.
Calnetro 26%	n.a.	n.a.	789 600

Source: ACB, 2021.

Table 6 summarises the sales of fertilizers at subsidized prices by ACB. Sales of nitrogenous fertilizers, urea 46% and Calnetro 26%[xiv] remained steady or increased in the 2020/21 season compared to 2019/20, while sales of superphosphate declined by almost 90 percent and those of potash by 60 percent, albeit starting from low levels. Virtually no farmer currently uses potash, a trend which started early in the crisis.

Subsidized prices of superphosphate and urea increased significantly between 2018 and 2020: urea by up to 35 percent and superphosphate by up to 60 percent, while the already expensive price of potash decreased by 10 percent (Table 7). As of the beginning of June 2021, fertilizer prices were liberalized, the subsidy was lifted and the ACB started selling fertilizers at (close to) the market price to farmers, with a likely negative consequence on the application of fertilizers in the upcoming crop season.

Actual availability of fertilizers in the 2020/21 season varied across the country. Some governorates, such as Raqqa, Aleppo, Dara'a, Latakia, Tartous, Sweida and Homs, reported lack of fertilizers or, at least, lower amounts than in the previous season. In Idleb, fertilizers available through the ACB in the areas under government control were very limited and covered less than 10 percent of the total need. Likewise, in Hama, availability of urea from the ACB was limited and even farmers who were able to access it received amounts sufficient for one application only. Similarly, in Al-Ghab, only the first batch of urea was distributed and no superphosphate was available at subsidized prices. Phosphate in Hama was only targeted to farmers who had been contracted by GOSM to produce seed. Farmers that could buy at subsidized prices were eligible to purchase an insufficient volume of 100 kg of phosphate/hectare and had to purchase the rest on the market. In Deir-ez-Zor, phosphate fertilizer was generally not available and was applied only to a small share of wheat fields. Nitrogen fertilizers were applied at lower rates than required. The supply situation was slightly better in Rural Damascus, where 50 percent of the farmers' urea needs were secured through the ACB, while potassium or phosphorous fertilizers were not available at subsidized prices and had to be purchased on the markets.

In February 2021, in areas of its competence, the ACB provided granular nitrate fertilizer at the subsidized price of about SYP 200/kg (while the average market price in February was SYP 1 500/kg) and phosphate

[xiv] Urea 46%, CO(NH2)2, is usually used to fertilize field crops and fruit trees. Calnetro 26%, or ammonium nitrate NH4NO3, is used to fertilize vegetables because it decomposes in the soil faster, promotes plant growth, increases yields and its effect is short-term.

at SYP 240/kg (compared to SYP 1 175/kg on the market). In Rural Damascus, fertilizer prices increased by about ten times, the increase attributed mostly to currency devaluation. In Sweida, the price was SYP 1 200-SYP 1 500 on average. At SYP 1 400-SYP 2 000/kg of fertilizer, the market price in Hama significantly exceeded the price of fertilizer sold by the government (SYP 212). Likewise, in Latakia, prices in the market were out of reach of many farmers: for example, the cost of 50 kg bag of urea reached SYP 100 000 (SYP 2 000/kg). In Dara'a, the market price of urea increased from SYP 250 last season to SYP 1 800 this year. In Hama, Homs, Dara'a, Deir-ez-Zor, Tartous and Latakia, farmers reported low availability, high prices and mediocre to medium quality of fertilizers. In Hasakeh, although sold on the markets illegally, smuggled goods, often from unknown sources, improve market availability. Iranian-made supper-phosphate and urea fertilizers were available in the markets but at high prices (USD 375/tonne).

Even when ACB was selling fertilizers at subsidized prices, many farmers preferred to buy from traders even if the price was higher. Often it was due to credit arrangements as, in many cases, the ACB required immediate payment that is generally difficult for farmers before the harvest takes place, while traders usually extended a credit facility. At the moment, given the prevailing macroeconomic conditions in the country, very few traders in the country extend credit. Even in governorates where the supply was deemed more adequate, high prices, coupled with constrained liquidity and no availability of credit facilities, prevented farmers from applying fertilizers in adequate amounts. Application of nitrogenous fertilizers was particularly affected. A large share of fields did not apply any type of fertilizer due to the high prices, combined with limited availability in the markets. Fertilizers are often not applied before planting. Although not verified by the mission, farmers are apparently applying fertilizers to the roots as opposed to the soil surface.

Fuel

The 2020/21 season was characterized by the low availability of fuel leading to persistent shortages and high prices, affecting mechanized operations as well as the capacity to pump water for irrigation (water availability permitting, as highlighted in the Irrigation section), which, given the erratic rains, was crucial this year.

Registered farmers are entitled to 150 litres of diesel per month through the farmers' cooperatives at the subsidized price of SYP 180,[xv] although this volume, even where available, covered only less than two days of mechanized operations. During FGDs, farmers reported that a tractor requires about 100 litres/day. The harvester needs 30 litres of diesel per hour and 6 litres/hour for the accompanying vehicle, and the subsidized price of diesel is SYP 180. Thus, most farmers had to resort to purchasing on the parallel market at about SYP 600/litre for at least part of their requirement. MAAR estimated that about 40 percent of the farmers' needs were secured from subsidized fuel, roughly the volume needed for land preparation and sowing, but due to the blockade, economic sanctions and the scarcity of fuel, the fuel needed to operate the pumps for irrigating the crops was not secured. Many farmers indeed brought up shortages of diesel at the subsidized price in April and May, when it was urgent to irrigate field crops. Availability of subsidized fuel was not uniform across the country. Electricity supply, which in most cases relies on diesel generators, was disrupted by fuel shortages as well.

Fuel availability on the free market varies between summer and winter season: in winter, when diesel is used for heating, less fuel is available and prices are generally higher. In Tartous and Latakia, which rely on officially imported fuel, 20 litres of diesel reached SYP 25 000-SYP 30 000 compared to SYP 4 000-SYP 9 000 in the previous year. In Dara'a, the price of 1 litre of diesel reached SYP 3 000 (SYP 60 000/20 litres). In Hasakeh, where smuggled goods improve market availability, the price is generally lower: SYP 300/litre of diesel (SYP 6 000/20 litres).

Crop protection materials

Crop protection materials, such as herbicides and pesticides, were generally available but expensive, with the result that they were often used below

[xv] After the 2020/21 season ended, the price of subsidized diesel increased to SYP 500/litre.

the recommended rates or not at all. Only farmers in Deir-ez-Zor reported limited availability of crop protection materials.

Some herbicides are produced in the country, but farmers often consider imported products originating from the European Union or China (mainland), a non-selective Chinese product, Atlantis, continues to be the preferred herbicide of most farmers, to be more effective. However, crop protection materials, often of unknown origins and at times sold just before the expiration date, do not appear to be systematically tested or otherwise supervised and approved, and are likely to be of low quality and weak efficiency for declared use. To the extent possible, the government tests officially imported agrochemicals for their safety and efficiency and applies an official stamp to the approved products. Unavoidably, however, unapproved chemicals find their way onto the market. It is possible that such chemicals are ineffective, but it is also possible that farmers or contractors apply the chemicals at the incorrect concentration or at the wrong time. The latter possibility would seem to be supported by the fact that many farmers complained of inefficacy even when they used government-approved products.

In 2020/21, the average cost of Chinese or European herbicides in Hasakeh, brought in from Iraq, was SYP 4 200/dunum for fine weeds and SYP 1 875/dunum for broad weeds. Most farmers do not apply herbicides because of the high prices or use suboptimal quantities. In some areas, such as Raqqa, high prices and low efficiency of herbicides available on the markets led to an increase in weeds within the crop fields and consequently lower yields. One litre of fungicide was selling in Hama for SYP 120 000. In Tartous, the price of pesticides increased about five times compared to the previous year. In Homs, 1 litre of herbicide was sold for SYP 40 000 (up from SYP 13 000 in the previous year) and 1 litre of insecticide was sold for SYP 48 000 (up from SYP 30 000 in the previous year). Similar increases were reported in other governorates.

In Sweida, the most used crop protection materials are broadleaf herbicides for cereals and *H. Armigera* pesticide for chickpeas. Some governorates (Sweida and Rural Damascus) reported that the government provided free pesticides to control against sunn pests, locusts and rodents (field rats, voles and mice).

Given the high costs of materials as well as fees charged by operators of specialized machinery, farmers used alternative crop protection methods. For example, in Dara'a, farmers used sulphur to protect tree crops, watermelons, eggplants and tomatoes from fungal diseases and to fend off pests, a practice which is unlikely to work as well as agrochemical treatment. Hiring a sprayer with specialized workers and purchasing necessary chemicals costs about SYP 250 000, while sulphur treatment costs SYP 50 000 (Enab Baladi, 2021c).

Mechanization

In all governorates, agricultural machinery (harvesters, tractors, threshers and seed drills), sourced mostly from the private sector, was available, but at high rental fees. In Hasakeh, availability was deemed to be higher or similar to the previous year, while in Idleb, Hama, Deir-ez-Zor, Homs, Quneitra, Latakia and Tartous, farmers perceived the availability to be lower. In governorates under different commands, machine availability was often lower than in the areas under government control, presumably because of tighter controls on the supply chains and lower incidences of smuggling, such as spare parts. Although the availability of machinery has not significantly deteriorated compared to previous years, agricultural equipment is aging and, given no significant renewal of the fleet, there is an increasing need for maintenance and spare parts. Most combine harvesters are over 30 years old. Spare parts and maintenance services were reported to be costly, but generally available.

Reflecting the higher price of diesel, the cost of mechanized farm operations and hiring mechanization have increased in the 2020/21 cropping season. Most cereal farmers prepared their seedbeds mechanically, but not all used machinery for subsequent operations. In Homs, a few seed drills were available and farmers were seeding by hand, with significant waste of seeds. The timing of harvesting is often seriously compromised by the scarcity of mechanized equipment. However, in 2021, because of the lower demand for harvesters stemming from the reduced harvestable area in most

significant production areas, harvesters were more available than in 2020 when an above-average output was gathered. Increased fuel costs pushed the rental fees up and some farmers harvested completely manually or reaped and threshed separately, which is more time-consuming, more wasteful of grain and more expensive than the single operation of combine harvesting. Mature crops standing for long periods in the field awaiting harvest are susceptible to lodging, shattering and bird damage.

The rental cost of machinery usually includes a driver and fuel. However, as no systematic inspection of figures cited in the focus groups was carried out, rental cost figures should be considered as indicative rather than for strict comparison. In Tartous, the costs of mechanized agricultural activities were reported to have increased by up to 265 percent compared to the previous year. For example, the cost of tilling of 1 dunum (1 000 square metres or one-tenth of a hectare) increased from SYP 8 000-SYP 10 000 to SYP 25 000. In Rural Damascus, the cost of renting machinery from the private sector for ploughing and sowing was SYP 15 000-SYP 25 000/dunum, up from SYP 6 000 in the previous season. In Deir-ez-Zor, the cost of land preparation was given as SYP 25 000/dunum, while the preparation costs last year were SYP 8 000-SYP 10 000/dunum. In Dara'a, the cost of planting 1 dunum of irrigated wheat amounted to SYP 180 000, while last season it was SYP 100 000, including ploughing, sowing, harvesting and all necessary inputs. In Sweida, tillage costs were estimated at SYP 3 000/dunum and the harvesting cost at SYP 8 000/dunum. In Hama, the cost of tilling dunum ranged between SYP 20 000 and SYP 25 000. In Homs, the cost of tilling 1 dunum was SYP 20 000, while in 2018/19 the entire cost of seedbed preparation and sowing was between SYP 5 000 and SYP 8 000/dunum.

In Hasakeh, the fees for harvesters almost doubled compared to the previous year: mechanically harvesting 1 dunum of irrigated wheat costs about SYP 7 000-SYP 8 000 compared to SYP 4 000-SYP 5 000 in the previous year. Likewise, rainfed wheat harvesting costs reached SYP 2 000-SYP 3 000/dunum compared to SYP 1 500-SYP 2 000 in the previous season. In 2019, when the last crop assessment was conducted, combine harvesting in Hasakeh costs were between SYP 2 200 and SYP 2 500/dunum. The cost of mechanized operations per dunum of irrigated wheat was estimated at SYP 7 000-SYP 8 000 (including the cost of running the pumps for irrigation) and per dunum of rainfed wheat at SYP 2 000-SYP 3 000. In Deir zor, the cost of harvesting 1 dunum of wheat in 2021 costs SYP 30 000. In Dara'a, the cost of the harvester was about SYP 25 000/dunum. In Tartous and Latakia, the cost of harvesting was SYP 15 000-SYP 25 000/dunum compared to SYP 6 000-SYP 8 000 in the last year (the cost differs from one village to another). In Homs, the cost of harvesting 1 dunum reached SYP 22 000, in Hama between SYP 20 000 and SYP 25 000. For comparison, the same amount would have been sufficient to harvest 1 hectare (10 dunums) in 2019.

Some farmers, in Deir-ez-Zor or in government-held parts of Idleb, reported to be unable to cover the high rental fees (resulting from high fuel costs and lack of working harvesters) and opted for manual operations or, in some cases, using draught animal power.[xvi] Manual operations used either family labour or hired labour and were reported also to make a better use of wheat residues, in particular straw, left from manual threshing. For manual harvesting, workers charged by the hour (SYP 1 200) or by dunum (SYP 20 000), (Enab Baladi, 2021a). Prevalence of manual operations over mechanized was also noted in Tartous. In Sweida, some delays in the cultivation date due to the shortage of machinery were reported. Draught animal power, although less frequent, was reported to be used for weeding in Raqqa. For many farmers that were used to mechanized operations in the past, resorting to draught animal power was a way to cut costs of machinery rental (Enab Baladi. 2021a).

[xvi] In 2020, there were an estimated 3 300 horses in Hasakeh and about 1 000 horses in Rural Damascus as well as 960 heads of buffaloes in Al-Ghab. Additional herds are likely in other governorates.

Labour

Given the lack of economic opportunities in other economic sectors, labour remains generally available for agriculture, although in many governorates (Idleb, Hama, Homs, Quneitra, Dara'a, Tartous, Latakia, Sweida) farmers reported that fewer workers were available this year than in the past, presumably due to increased migration to urban areas or low remuneration rates as daily labourers. Across the country, wages, or the cost of hiring labour to farmers, were reported as high from the farmers' point of view but remain low from the livelihood's perspective. There are considerable differences across the country. In Hasakeh, where no labour shortages were signalled, wages are low. Hourly wages increased from SYP 400-SYP 500 in the previous year, to about SYP 500-SYP 650, depending on the activity. In comparison, in 2018/19, a labourer was earning SYP 200/hour.

Elsewhere in the country, where less labour is available for hire, wage rates are higher. In Homs, hourly wages increased from SYP 500 in the previous year, to SYP 1 500 to SYP 2 000 this year. Similarly, in Tartous and Latakia, hourly wages increased from SYP 400-SYP 1 500 (in Tartous, in 2018/19, the cost of general labour in the polytunnels was SYP 400/hour). In Dara'a and Raqqa, workers were paid SYP 1 200-SYP 1 300/hour. Similar rates, at SYP 1 500, prevailed in Hama. In Rural Damascus, when paid based on area, the cost was SYP 15 000/dunum. In Deir-ez-Zor, daily wages, although high from the farmers' perspective, were reported as SYP 3 000-SYP 6 000, increasing to SYP 5 000-SYP 7 000/12-hour day during the harvest time as many farmers opted not to use mechanic harvesters given the high costs of rental. Skilled labour wages can reach SYP 25 000/day in Tartous and Latakia. In Sweida, manual harvesting of 1 dunum of barley costs SYP 17 000 and for chickpeas SYP 8 000.

As in previous years, a number of tasks are carried out by women, except for wheat threshing and irrigation activities. Young men tend to migrate towards cities hoping to find employment there. Worryingly, child labour remains present. Labour is mobile between governorates. Farmers also make greater or exclusive use of family labour in a quest to reduce costs, particularly in areas where labour availability was low, such as in Quneitra.

Pests and diseases

Generally warm conditions throughout the 2020/21 season increased prevalence of pests and crop diseases, although damages were generally within acceptable limits. Expensive herbicides (described in Crop Protection Materials section) and high wage rates of skilled labour applying chemicals constrained farmers' ability to control weeds and favoured widespread occurrence of broad (mostly in winter crops) and thin weeds (mostly in summer crops).

Across the country, locust outbreaks were reported in April 2021.[xvii] Small mature groups arrived in the Euphrates Valley near the Iraq border on 17 April 2021 near Ash-Shafah and crossed the river to Al Sayyal in Abu Kamal District in the southeast. The adults settled near the crops where local control operations were quickly undertaken. In eastern regions, a few small groups of mature adults moved northwest along the Euphrates Valley from Al Bukamal to Deir-ez-Zor. In the west, a few small groups of mature adults were seen north of the Jordan border near Sweida on 18-19 April 2021 and then further north near Qarah on 22 April. Egg-laying was seen on 23 April in the Qalamun Mountains north of Damascus. The impact of locusts on standing crops was limited as control operations were carried out on time. Crop protection material against locusts were provided by agricultural departments and 3 136 hectares were treated. The arrival of Desert Locusts to the Syrian Arab Republic (and Jordan) is thought to be a single, unusual event caused by several days of strong southerly winds that brought adult groups and swarmlets from infested areas several hundred kilometres to the south in northern Saudi Arabia near Tabuk and Al Jawf. The adults themselves originated from extensive breeding this past winter along the northern Red Sea coastal plains of Saudi Arabia. Although substantial control operations

[xvii] Section on desert locust prepared based on https://www.fao.org/ag/locusts/common/ecg/2598/en/DL512e.pdf.

have been carried out by Saudi Arabia, treating more than 200 000 hectares this year, it is common that some infestations escaped detection and control because the breeding areas were so vast and remote.

Sunn pest (*Eurygaster integriceps*), seedling chewer and fungal diseases were present in several locations, but with a prevalence rate of less than 5 percent. Despite dry weather conditions, presence of yellow rust (*Puccinia striiformis*) and wheat burn (*Tilletia tritici*) was reported on wheat in limited areas of Deir-ez-Zor. Soft wheat varieties were more susceptible than the durum varieties. In Hasakeh, the American thistle worm spread up to an estimated 11 percent of the fields in some areas. In Dara'a, autumn crowd bug (a stone bug) appeared on the maize crop on about 300 dunums in the southwestern region. Only about 50 dunum were treated, resulting in a crop quarantine. It is forbidden to move the crop outside the Dara'a Governorate. The situation is being closely monitored.

Across the country, field rodents (meadow voles and field mice) were present in much higher numbers than in the past. In some areas, such as Idleb, field mice increased dramatically, likely due to large number of abandoned and neglected agricultural holdings. It is probably that their numbers will further increase due to limited pest control and low efficiency of rodenticides available. The spread of voles in Homs was attributed to climate change and the absence of snow or heavy rain, which would contribute to reducing their population, uncontrolled hunting of natural enemies and resulting long-term imbalance in the ecological system. Flocks of storks,[xviii] migrating from northern Europe to sub-Saharan Africa, used to pass by the area and feed on the field mice, but in 2020/21 storks appeared in unusually small numbers, presumably due to changes in migration patterns and routes due to climate change. Some ectoparasites that are also natural enemies of the field mouse disappeared due to pest control. Zinc phosphide was distributed to farmers to combat the invasion of voles, although some farmers were hesitant to apply it. In most areas of Homs, the damage caused by the field rodents was estimated at 10-15 percent, but in some areas, damages exceeded 70 percent. In extreme cases, entire fields were destroyed. After cereals were harvested, field mice were reported to attack olive trees and feed on olive tree back. Some areas in Quneitra reported attacks of wild boar, but those were quite contained.

Fall Armyworm (FAW) was also reported, in particular in wheat producing areas, including Hasakeh, Homs and Hama. This seems to be the first time that a presence of FAW was reported in the country. The largest outbreaks took place in Dara'a and Rural Damascus and have been monitored by the Plant Protection Directorate. The outbreaks were attributed to repeated cultivation of wheat without applying any crop rotation. Rainfed areas, in particular, were affected. In irrigated areas, farmers controlled the pest given the increased cost of production of irrigated wheat and a greater investment on the crop before the pest appearance. Fields in rainfed areas were often left untreated in an effort to reduce costs, given that the crop prospects did not look promising given the low rainfall.

Vegetables, which being an economically lucrative crop, are often sprayed with pesticides preventively, were affected by fungal diseases and a variety of insects. Among the reported diseases were *gryllotalpa*, powdery mildew (eggplant and cucumber), nematodes, *Acarus*, whiteflies and dodders; *Tuta absoluta*, dodder and *Alternaria solani*. In particular, the high costs and limited success of treating *Tuta Absoluta* in tomatoes was reported. Cucumber suffered from Powdery mildew, whiteflies, aphid and thrips; and finally, chickpea (mostly in Sweida) from *H. Armigera*. Olive fly was reported on olive trees in Hama. Apple fruit worm and pistachio capnodes were also noted.

[xviii] Storks, unlike other migratory birds, migrate over land using thermal currents to glide and avoid crossing the Mediterranean Sea as currents do not form over water.

Box 2: Summary results from the household survey - Production inputs

As GOSM was unable to provide the entire amount of wheat seed at seeding rates generally applied by farmers, farmers purchased additional quantities from the local markets or used their own saved seeds. About two-thirds of the surveyed farmers stated that the quality of used wheat seeds, from markets or own produced, was not good or barely acceptable. The quality of seeds provided by GOSM was deemed acceptable. Some fertilizers, such as urea, were also provided by the government and the needs were supplemented by market purchases. However, the availability decreased and prices increased significantly compared to the last season. Although over 60 percent of the farmers stated that they used urea on their fields, not all of them applied it according to the recommended rates. Pesticides and herbicides were less used due to their high prices and low efficiency, although, as with fertilizers, it is not obvious whether they were applied at the right time and right concentrations. Livestock feed (discussed in the report in the Livestock section) was affected more than other agricultural inputs: it became less available and more expensive when sufficient quantities were sourced. The quantity of feed provided by the government covered only 10 percent of the needs.

Agricultural input	Percent of farmers used it	Source (percent)					Compared to last season (percent)		
		Own farm	Market	Other farmers	Government	Aids	Less available	Low (unchanged) quality	Higher cost
Wheat seed	72	25	24	1	53	12	57	59	79
Urea	61	-	48	0	65	5	58	74	79
Herbicides	21	-	26	31	0	2	56	69	76
Livestock feed	30	25	94	1	17	0	74	69	88

Cereal production, 2020/21

Yields

Yields are calculated as the amount of grain obtained from the area actually harvested, not the area planted and then abandoned due to the unfavourable crop prospects. In the 2020/21 season, a large share of rainfed wheat and barley area was not harvested and converted to sheep grazing (discussed in Feed and Fodder in the Livestock section).

At an average of 1.7 tonnes/hectare, wheat yields on irrigated land were lower than those of 2019/20. This was likely due to the significant reduction in the use of irrigation as a consequence of the high fuel costs to operate pumps. Average rainfed wheat yields, at 0.4 tonnes/hectare, were less than one-third of those of last year at 1.4 tonnes/hectare. Irrigated barley yields reflected the pattern seen in wheat. This year's average of 2 tonnes/hectare of irrigated barley was only 75 percent of last year's 2.7 tonnes/hectare. However, average rainfed barley yields, at 0.6 tonnes/hectare, showed a more-than-twofold decrease on last year's 1.5 tonnes/hectare. Factors responsible for low yields are weather conditions (lack of rain combined with high temperatures), poor quality of inputs, decreasing water availability and high fuel costs. In Rural Damascus, it was estimated that the aforementioned factors decreased attainable yields by about 30 percent. Average yields by governorate are shown in Table 8.

Production

The 2021 wheat production is estimated at 1.05 million tonnes, showing a 63 percent decline on the harvest of 2020 (Table 9). Part of this decrease was attributable to the decrease in harvested area, especially for rainfed crops. Had the farmers had the opportunity and resources to adequately irrigate, the decrease in production would have been smaller. This year's wheat production is at the lowest levels in almost 50 years. While according to FAOSTAT, wheat harvests of about 600 000 tonnes to slightly over 1 million tonnes were common in the 1960s and early 1970s when both the country's population and cultivated area were much smaller, in more recent times only harvests in 1984 (1.07 million tonnes) and 1989 (1.02 million tonnes) were lower. At the current level, 2021 wheat production is about one-quarter of

Table 8: Syrian Arab Republic - Wheat and barley yields by governorate, 2019/20 and 2020/21 (tonnes/hectare)

Governorate	Wheat				Barley			
	Irrigated		Rainfed		Irrigated		Rainfed	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Rural Damascus	3.4	2.0	1.2	-	2.7	1.9	1.5	0.6
Dara'a	2.6	2.1	1.0	0.4	-	-	1.4	0.6
Sweida	4.2	1.3	0.9	0.3	-	-	1.0	0.3
Quneitra	0.7	1.4	0.4	0.6	-	-	0.5	1.1
Homs	3.1	2.1	1.5	0.6	1.4	1.6	0.4	0.4
Hama	4.1	2.0	2.4	0.7	2.4	1.9	1.1	0.8
Al-Ghab	3.6	1.9	2.6	0.7	2.9	2.0	2.5	1.0
Tartous	3.4	2.4	1.2	0.8	1.6	-	0.9	0.9
Latakia	-	-	1.7	1.2	-	-	1.2	1.0
Idleb	1.8	2.3	0.8	0.5	-	-	1.0	1.1
Aleppo	3.2	1.8	1.4	0.2	3.0	2.0	1.2	0.5
Raqqa	3.2	1.4	1.6	-	2.5	1.7	1.3	-
Hasakeh	2.9	1.7	1.3	-	3.1	2.0	2.0	-
Deir-ez-Zor	3.2	1.6	-	-	2.5	1.6	1.2	-
TOTAL	**3.2**	**1.7**	**1.4**	**0.4**	**2.7**	**2.0**	**1.5**	**0.6**

Sources: MAAR and CFSAM, 2021.
Note: Totals computed from unrounded data.

Table 9: Syrian Arab Republic - Wheat production by governorate, 2019/20 and 2020/21 ('000 tonnes)

Governorate	Irrigated		Rainfed		Total	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Rural Damascus	50.3	33.6	2.2	-	52.5	33.6
Dara'a	24.6	22.0	65.5	13.0	90.1	35.0
Sweida	1.9	1.3	28.6	2.6	30.5	3.8
Quneitra	0.9	1.6	2.4	3.0	3.3	4.0
Homs	25.6	36.8	42.5	13.7	68.1	4.6
Hama	99.0	42.0	31.9	9.0	130.8	50.5
Al-Ghab	144.3	84.0	4.2	1.0	148.5	85.0
Tartous	13.3	10.5	9.4	9.6	22.7	20.1
Latakia	-	-	3.8	5.4	3.8	5.4
Idleb	26.6	22.6	23.9	5.5	50.5	28.1
Aleppo	356.0	231.0	234.1	20.0	590.4	251.0
Raqqa	508.0	220.5	122.5	-	630.5	220.5
Hasakeh	354.2	210.0	450.5	-	804.8	210.0
Deir-ez-Zor	221.9	46.2	-	-	221.9	46.2
TOTAL	**1 827**	**916**	**1 022**	**83**	**2 848**	**1 045**

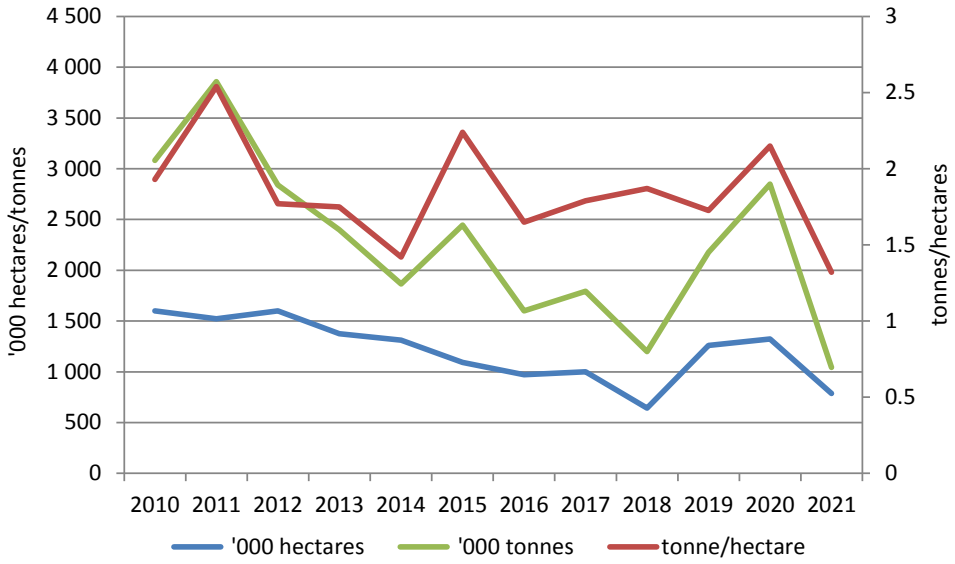
Sources: MAAR and CFSAM, 2021.
Note: Totals computed from unrounded data.

Table 10: Syrian Arab Republic - Wheat harvested area ('000 hectares), yields (tonne/hectare) and production ('000 tonnes), 2010-2021

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Area	1 599	1 521	1 601	1 374	1 313	1 092	973	1 001	642	1 260	1 324	787
Yields	1.93	2.54	1.77	1.75	1.42	2.24	1.65	1.79	1.87	1.73	2.15	1.32
Production	3 083	3 858	2 840	2 400	1 865	2 445	1 601	1 793	1 199	2 176	2 848	1 045

Sources: FAOSTAT, 2010-2012, 2014; CFSAMs, 2013, 2015-2019, 2021 and MAAR, 2020.

Figure 9: Syrian Arab Republic - Wheat harvested area, yields and production, 2010-2021



Sources: FAOSTAT, 2010-2012, 2014; CFSAMs, 2013, 2015-2019, 2021 and MAAR, 2020.

the pre-crisis level of 4.1 million tonnes (2002-2011). Additional parametres can be seen in Table 10 and Figure 9 which show the trend of wheat production, yields and harvested area from 2010 to 2021.

Barley is mostly grown as a rainfed crop; this year less than 3 percent of the crop was irrigated or grown on normally irrigated land. The 2021 barley crop was compromised by the lack of rainfall and only slightly over 20 percent of the rainfed area was actually harvested. Production is estimated at 268 000 tonnes, just about 12 percent of the 2020 output (Table 11). Small barley harvests (below 500 000 tonnes) have not been unusual in the country and occurred in years with unfavourable rainfall even before the conflict (e.g., 212 000 tonnes in 2000, 271 000 tonnes in 1989). Other production parametres are presented in Table 12 and Figure 10.

Table 11: Syrian Arab Republic - Barley production by governorate, 2019/20 and 2020/21 ('000 tonnes)

Governorate	Irrigated		Rainfed		Total	
	2019/20	2020/21	2019/20	2020/21	2019/20	2020/21
Rural Damascus	5.2	5.0	13.3	5.4	18.4	10.4
Dara'a	-	-	41.2	3.4	41.2	3.4
Sweida	-	-	18.0	2.0	18.0	2.0
Quneitra	-	-	1.9	3.0	1.9	3.0
Homs	0.6	0.6	3.6	50.0	15.2	4.2
Hama	22.0	13.0	140.7	60.0	162.7	73.0
Al-Ghab	0.6	1.3	4.2	0.1	4.8	1.3
Tartous	0.1	-	0.5	0.6	0.5	0.6
Latakia	-	-	0.4	0.3	0.4	0.3
Idleb	-	-	55.1	20.0	55.1	20.0
Aleppo	8.6	2.4	474.9	93.0	483.4	95.4
Raqqa	25.0	14.0	427.0	0.0	452.0	14.0
Hasakeh	60.2	40.0	862.4	0.0	922.6	40.0
Deir-ez-Zor	37.5	0.5	31.6	0.0	69.1	0.5
TOTAL	**163**	**77**	**2 083**	**191**	**2 246**	**268**

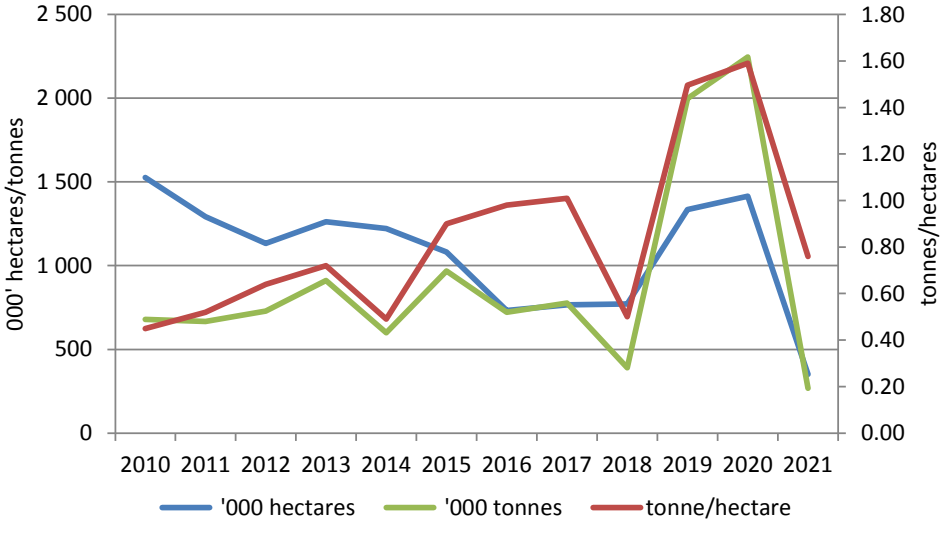
Sources: MAAR and CFSAM, 2021.
Note: Totals computed from unrounded data.

Table 12: Syrian Arab Republic - Barley harvested area ('000 hectares), yields (tonne/hectare) and production ('000 tonnes), 2010-2021

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Area	1 527	1 293	1 133	1 263	1 221	1 081	733	766	772	1 336	1 414	351
Yields	0.45	0.52	0.64	0.72	0.49	0.90	0.98	1.01	0.50	1.50	1.59	0.76
Production	680	667	728	911	600	968	722	777	390	1 999	2 246	268

Sources: FAOSTAT, 2010-2012, 2014; CFSAMs, 2013, 2015-2019, 2021 and MAAR, 2020.

Figure 10: Syrian Arab Republic - Barley harvested area, yields and production, 2010-2021



Sources: FAOSTAT, 2010-2012, 2014; CFSAMs, 2013, 2015-2019, 2021 and MAAR, 2020.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OTHER CROPS

Wheat and barley are grown across the country. Other cultivated crops include:

1. **Winter crops:**
   a. Food legumes:
      i. The main lentil-producing provinces Aleppo, Hasakeh, Idleb, Hama, Dara'a and Sweida.
      ii. Broad (fava) beans, kidney beans and green peas Aleppo, Rural Damascus, Hama, Dara'a, Homs and Idleb.
   b. Vegetables such as cauliflower and cabbage in Homs, Dara'a, Rural Damascus, Aleppo, Idleb, Al-Ghab, Hama, and Quneitra.
   c. Fodder crops such as alfalfa, forage maize and legume fodder in Hasakeh, Rural Damascus, Homs, Deir-ez-Zor, Raqqa, Hama, Aleppo and Dara'a.
   d. Medical and aromatic plants such as cumin and coriander in Hama, Homs, Hasakeh, Aleppo, Idleb, Rural Damascus, Tartous and Al-Ghab.

2. **Summer crops:**
   a. Potatoes in Idleb, Aleppo, Hama, Al-Ghab, Homs, Dara'a and Rural Damascus.
   b. Food legumes:
      i. Chickpeas in Hama, Homs, Dara'a, Raqqa, Hama, Quneitra and Sweida.
   c. Vegetables:
      i. Tomato, cucumber, pepper, eggplant, okra, beans, cucumbers, zucchini in Hama, Hasakeh, Homs, Deir-ez-Zor, Raqqa, Aleppo, Al-Ghab, Hama, Quneitra and Dara'a).
      ii. Yellow maize in Tartous, Deir-ez-Zor.
   d. Industrial crops:
      i. Cotton in Hasakeh, Deir-ez-Zor, Raqqa, Hama, Al-Ghab, Idleb and Aleppo.
      ii. Tobacco in Tartous, Hama, Latakia, Al-Ghab and Aleppo).
   e. Oilseeds:
      i. Sunflower in Aleppo, Hama, Idleb and Al-Ghab.


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      ii. Soybeans in Raqqa.
      iii. Peanuts in Tartous, Al-Ghab and Hama.
      iv. Sesame in Raqqa, Aleppo and Latakia.
   f. Sorghum in Aleppo.

3. **Permanent and other crops:**
   a. Trees:
      i. Fruit trees such as walnut, apricot, almond, and apple in Hama, Homs and Sweida.
      ii. Citrus fruits in Tartous, Latakia, Hama and Homs.
      iii. Vine in Homs, Sweaid, Rural Damascus and Aleppo.
      iv. Olives in Latakia, Tartous, Quneitra, Homs, Sweida and Dara'a.
   b. Greenhouse vegetables in Tartous and Latakia.

In this section production challenges and the state of the main "other crops" are discussed, without delving into as much as details as with cereals. Most figures were obtained from MAAR but, unlike for cereals, were not verified in the field and triangulated with other sources. However, the mission deems they generally reflect the current situation in the sector. In the past, sugar beet was widely cultivated but missing marketing channels

and not a single functioning sugar refinery made sugar beet production unfeasible.

Food legumes

The area planted to food legumes has decreased since the onset of the conflict but remained relatively stable since then. In total, about 192 000 hectares were cultivated mostly with lentils, chickpeas, broad beans and peas in 2021, slightly below the area of 205 000 hectares in 2020 (Table 13). Over 90 percent of the food legume area is rainfed.

According to MAAR figures, total combined food legume production in 2021 is estimated at 170 000 tonnes, over 40 percent below the exceptional 2020 food legume harvest of 300 000 tonnes, but similar to 2019 levels of 179 000 tonnes, implying that yields of winter legumes have been less affected than cereals by the early cessation of the rains (Table 14). However, legume production is concentrated in western governorates that were less affected by erratic weather. Aleppo remains the single largest legume-producing governorate in the country, contributing almost two-thirds of the production volume in 2021 and 45 percent in 2020. Production in Hasakeh, mostly rainfed, which supplied over one-quarter of total legumes produced in 2020, was severely decimated in 2021 given the lack of rain.

Chickpea seeds were generally bought on the market, at an average price of SYP 2 000/kg. The usual seed rate is 5 kg/dunum. In Dara'a, soil moisture (at 55 cm depth) at seeding time in March 2021 was satisfactory, encouraging many farmers to cultivate chickpeas. However, severe rain deficits after the seeding led to crop losses at about 40-50 percent. The average yield was 35-75 kg/dunum compared to 140 kg/dunum in the previous year. In Sweida, about 25 percent of chickpea farmers did not cultivate this year due to low precipitation. Those that did, achieved low yields, reported to average less than 20 kg/dunum. In Hasakeh, farmers have been considering expanding lentil cultivation as it requires less water than wheat and the cultivation season is short, making it a suitable crop to adopt to climate change. The area planted to rainfed food legumes in Hasakeh increased from 34 600 hectares in 2020 to 37 100 hectares in 2021 (about 20 percent of the total rainfed area of food legumes), but the entire crop failed. In Rural Damascus, farmers are turning from growing wheat to planting other crops, such as beans and peas, because of the low purchase price of wheat by Hoboob that often does not even cover production costs.

Potatoes

MAAR estimated that 18 400 hectares were planted to potatoes in 2020/21, well below the 27 500 hectares planted in 2019/20 and the 30 000 hectares in 2018/19. Along the coast, potatoes are planted in December, while further inland they may be planted as late as March. As virtually all potatoes grown in the country are irrigated, the decline in the planted area probably responded to the high cost of fuel, needed to irrigate the crop, and other inputs. Potato crops were also damaged by spring frost.

Yields, at about 23 tonnes/hectare, did not change significantly compared to the previous year, but the total production declined from 647 000 tonnes to 438 000 tonnes, mostly on account of the lower planted area. The largest potato-producing governorates are Dara'a (18 percent of total production in 2020 and 2021), Homs (18 and 14, respectively), Tartous and Latakia (about 20 percent combined). No information was given about the origins of the seed potatoes (mostly Spunta and Safari) used in 2021. However, in 2019, GOSM started a programme of tissue culture and micro-tuber production at its headquarters in Aleppo. At the time virus-free meristematic material was imported from the Netherlands and then multiplied up in test-tubes. In 2018, 150 000 micro-tubers were produced. Full implementation of the programme, to the point where it would no longer be necessary to import seed potato, was expected to take another four or five years, making to realize its full potential in 2022 or 2023.

In Dara'a, one of the most significant potato-producing governorate, the area cultivated with potatoes decreased by about 30 percent due to high input costs. The cost of cultivating 1 dunum of potatoes in 2021 was estimated at SYP 800 000 compared to SYP 350 000 in 2020. In addition, the expected yield this season is only 3 tonnes/dunum

compared to 4.5-5 tonnes/dunum last year due to two rounds of frosts that occurred in March and April. In Rural Damascus, potatoes were not cultivated in the past, but cultivation was tested in December 2020 for the first time in the southern countryside of Damascus by a private company and production was encouraging. Proximity to the main markets in Damascus are likely to ease some marketing concerns related to the high costs of transportation

Vegetables

Being a high maintenance crop, it was feared that farmers would have decreased the area planted with vegetables in response to high production costs and in particular fuel and irrigation water shortages. However, according to MAAR data (Table 13), combined irrigated and rainfed area planted with winter vegetables in 2020/21 remained almost unchanged from 2019/20. While the area planted with irrigated winter vegetables decreased, increases in the area planted with irrigated winter vegetables compensated for the decline. For summer vegetables, the irrigated area increased by one-third compared to the previous year, while the rainfed area marginally decreased.

The increase in the area planted with vegetables, despite the high production costs and the high costs of running irrigation pumps, should be seen through a profit lens: farmers who could afford the cost of pumping water (and were in the areas where water table was sufficiently high or irrigation infrastructure functional), chose vegetables due to higher returns. In addition, rehabilitation of irrigation canals and increasing the efficiency of irrigation contributed by FAO in cooperation with the Ministry of Water Resources in several regions, most notably Deir-ez-Zor, Homs and Hama, supported the increase in the irrigated areas, including for summer vegetables. Despite the decreases in summer cultivation in the coastal governorates of Tartous and Latakia, due to limited availability of the irrigation water, most vegetables are still produced there. Other governorates where vegetables are not the primary agricultural product, such as Sweida, Hasakeh, and Deir-ez-Zor, reported an increase in the 2020/21 area planted.

Although wholesale prices of vegetables have generally increased compared to previous years, the rates of increase did not match those of the costs of production. In addition to increasing the costs of running pumps for irrigation, high fuel costs also complicated transportation to more distant markets, forcing farmers to sell their products on local markets or to traders at low prices. Therefore, many farmers, for example in Hasakeh and Deir-ez-Zor, reported that they decided to grow vegetables more for household consumption than to sell them on the markets compared to previous years. Even in non-farming households, home gardening and vegetable production have been increasing due to supply of seed distribution packages. For example, in Quneitra and Hasakeh, a range of vegetables, including onions, garlic, cauliflower, lettuce and radish are grown in the home gardens mainly as a result of

Table 13: Syrian Arab Republic - Area and production of winter and summer vegetables, 2019/20 and 2020/21

Years	Area of winter vegetables (hectares)		Production of winter vegetables (tonnes)	
	Irrigated	Rainfed	Irrigated	Rainfed
2019/20	44 003	15 360	798 366	54 463
2020/21	40 977	18 129	774 975	66 638
Years	**Area of summer vegetables (hectares)**		**Production of summer vegetables (tonnes)**	
	Irrigated	**Rainfed**	**Irrigated**	**Rainfed**
2019/20	75 700	13 225	1 868 678	68 318
2020/21	101 304	12 745	2 226 624	78 461

Source: MAAR, 2021.

the seeds distribution assistance to improve the food security of vulnerable households. Vegetable seeds are often distributed by MAAR and other implementing partners in combination with drip irrigation kits. In 2019, FAO provided 4 288 households with packages of vegetable seeds and the number of beneficiaries increased to 6 138 households in 2020 and 6 255 in 2021. A similar FAO administered programme was developed to support school gardening, reaching 3 966 households in 2019, 1 450 households in 2020 and 409 households in 2021.

During the past few years, vegetable seeds were imported from the Netherlands as GOSM was planning to revive, in the medium-term, its production of tomato, eggplant and cucumber seeds. In the present, farmers report using hybrid varieties from unknown sources purchased on the local markets. Vegetable production in the 2020/21 season was significantly affected by weather anomalies, especially night frosts in the spring and sharp changes between day and night temperatures which affected the crop conditions and yields. Fungal and insect infections, described earlier under Pests and diseases, also constrained yields.

In Homs and Aleppo, vegetable planted area and yields did not change significantly compared to last year. In Hasakeh, cultivation of vegetables is, in general, expanding in the northern parts and it is carried out usually by small producers, often in substitution of fodder crops, and declining in the middle parts of the governorate. However, most farmers who in the past used to plant large areas with vegetables often decreased their output compared to the previous season due to high input costs and the lack of fuel and water. In Deir-ez-Zor, although the area planted with vegetables increased compared to the previous season, the decreasing water level of the Euphrates River and other problems related to irrigation, which caused an increase in salinity levels, reduced summer vegetables yields. Despite the difficulties to export, some farmers manage to market their produce across the country and even to export to Iraq. An FAO intervention in Upper Baqras Village in Al Mayadin District of Deir-ez-Zor introduced modern methods of cultivation, such as low tunnel nurseries and drip irrigation systems for vegetable production. However, shortage of irrigation water constraints the production in other villages.

In Hama, the area planted with winter vegetables in 2020/21 decreased compared to the previous year. In Dara'a, the area cultivated with winter vegetables increased by about 40 percent, while the area with summer vegetables decreased by 30 percent compared to the previous season due to the high costs of water pumping. In Izra' Village, for example, the tomato cultivated area in the current season was about 110 hectares compared to 200 hectares in the last season, with an estimated yield of about 11 tonnes/hectare. As farmers were concerned about profitability, they balance consumer demand with the cost of production considerations which include also cost of pumping irrigation water. In some areas of Al-Qusayr sub-District in Homs, farmers reported switching to cucurbits (pumpkins, melons, etc.) from other summer vegetables due to smaller water requirements.

A small crop of yellow maize is also harvested. In Latakia and Tartous, where the maize crop is sold within the area of production, yields reached 0.8-1.3 tonnes/dunum while at SYP 500-SYP 700/kg, the price increased from SYP 200 last year.

Greenhouses produce

Table 14 summarizes information provided by MAAR on vegetables and other crops produced in greenhouses. The number of greenhouses producing tomatoes is twice as high as those producing other vegetables (cucumbers, eggplant, chili peppers, zucchini, beans and leafy vegetables). An increased number of greenhouses in 2020/21 is noted compared to the previous season, presumably due to higher returns on early fruits and vegetables. However, increases in production quantity were not corresponding to increases in the number of greenhouses, indicating possible challenges in input provision and sufficient management.

Production in greenhouses is concentrated on the coast. Tartous has 144 196 operational polytunnels producing vegetables, out of a total of 145 285, up from 133 862 the operational greenhouses in 2019. Latakia has 15 133 operational greenhouses our of a total of 15 875, up from 13 400 reported in 2019. About 60 percent of the greenhouses are used for tomato cultivation. Producer households usually have three or four polytunnels (average size 400 sq. m.).

Table 14: Syrian Arab Republic - Greenhouse vegetables and other crops, 2019/20-2020/21

Years	Number of greenhouses	Area (hectares)	Production (tonnes)	Yield (tonnes/greenhouse)
	Tomatoes			
2019/20	95 640	3 825	573 840	6
2020/21	97 547	3 902	487 735	5
	Other (cucumbers, eggplants, chili peppers, zucchini, beans, leafy vegetables)			
2019/20	43 855	1 754	153 493	3.5
2020/21	46 410	1 856	162 435	3.5
	Strawberries			
2019/20	7 625	305	11 438	1.5
2020/21	14 725	589	17 670	1.2
	Ornamental plants, bananas, seedlings, roots			
2019/20	1 602	64	-	-
2020/21	1 613	65	-	-

Source: MAAR, 2021.

Greenhouses were damaged by rainstorms and heavy wind. For example, 149 greenhouses belonging to 475 farmers were damaged in Harisun Village in Tartous Governorate this year. In previous years, farmers reported difficulties accessing plastic sheeting. Given that plastic beads to produce sheeting in the country are imported, there have been probably disruptions in the supply.

Production of vegetables in greenhouses is significantly affected by high costs of production, poor quality of inputs, especially seeds varieties and pesticides, and water shortages linked to energy shortages preventing irrigation or water pumping in sufficient amounts. Despite the application of preventive measures and treatments, viral and fungal infections (*Tuta absoluta and Nematodes*) led to losses of up to 10-20 percent of production.

Fruit trees

After several years of damage, destruction, neglect and natural deterioration of trees, fruit production started to recover in 2019. However, in 2020/21, poor distribution of rainfall, high costs of inputs and poor management techniques, combined with lack of extension services to farmers, hampered the recovery process and significantly reduced the amount harvested. Although not reported yet, high fuel costs for cooking and heating in the winter months are likely to lead to a renewed interest in collecting wood and timber logging, as it was seen on the early stages of the conflict.

Overall, in 2019, about 1.04 million hectares were under fruit tree cultivation, including 45 000 hectares under productive citrus trees and 690 000 hectares under productive olive trees. Olives and citrus provide the livelihood of many thousands of households. For instance, in Latakia, 57 300 households are sustained by 45 000 hectares of olives and 44 700 households benefit from 42 500 hectares of citrus.

In the areas where fruit tree production constitutes an important source of income, more orchards are irrigated as in other areas. Fruit production was affected by weather factors, in particular by the erratic temporal distribution of the rains and their early cessation, spring frosts in February and March (in some places as late as April), heatwaves in April and May with a particularly damaging impact during flowering and bud-forming stages as well as the large differences between day and night temperatures. In Hama, the frost period in March is estimated to have caused a 50 percent decrease in the buds/flowers' formation compared

to the previous year. In Dara'a, losses due to frost in April during the flowering stage were estimated at about 35 percent of the potential. Heatwaves in April, particularly in the western part of the country (Tartous, Latakia, Quneitra, Sweida, Rural Damascus), occurred in the flowering period and significantly affected citruses, especially Meyer lemons and clementines, cherry and almond trees. Olive trees suffered similar damages from the high temperatures at flowering and pollination stages, which led to the dropping of a large percentage of flowers and newly formed fruits, with consequent expected reduction in production. The olive oil sector is likely to face difficulties also due to fuel shortages which will impact operation of oil presses.

The high prices of inputs, including crop protection and pest control material, combined with the lack of fuel for irrigation and low availability of irrigation water, affected also the fruit tree sector. The high cost of fuel also prevented farmers from ploughing and otherwise treating their orchards. In Dara'a, where mostly olives and pomegranate are cultivated, it is expected that olive production will decrease by about 20 percent to 20 000 tonnes and oil production to about 2 500 tonnes, mostly due to lack of irrigation. A large share of the trees depends on irrigation by tanks and the price of 5 cubic metres of water increased from SYP 2 500 last season to SYP 15 000 this season.

In Latakia, one of the most significant fruit producing areas, the forest fires in 2020 destroyed about 800 hectares of fruit trees and over 5 000 hectares of olive trees, most of which will need years to return to production. The area planted with citrus declined to 32 533 hectares, a slight decline by about 270 hectares. The conditions of the trees are deemed moderate. High fuel prices increased the cost of hiring mechanization. At 35 000 tonnes from 2 500 hectares, apple production is estimated to be less than in the previous year. About 15 percent of the apples are damaged by hail every year. Apples, in particular, are affected by water shortages due to the absence of local permanent water sources. Similar conditions prevailed in Tartous where citrus fruits production is expected to be significantly lower than last season due to high input costs, weather conditions and high mechanization fees. In Dara'a, like elsewhere in the country, thousands of trees, mostly olives and grapes, were cut down during the crisis. Some farmers started re-planting, but the high costs are limiting their efforts. For example, a two-year olive sapling price is about SYP 5 000. In many areas, fruit trees need urgent rehabilitation. FAO implemented projects supporting nurseries which benefited 2 000 households in 2019, 26 000 in 2020 and 1 500 in 2021.

In Aleppo, the most common types of fruit trees, olive, vine and pistachio, are generally in good condition and no major problems were reported during the season. In Homs, some farmers switched from cultivating almond to pistachio that, despite requiring more servicing, it carries prospects of higher profits. In Hasakeh, the areas of fruit trees, olives, grapes and pomegranates, do not constitute a main source of income or a main agricultural activity. In Deir-ez-Zor, trees are generally deemed to be in poor condition, similar to the last season.

In Latakia and Tartous, fruit flies were plentiful and farmers noted a difficulty in securing control materials and deterrents, pheromones, scale insects, to treat the fruit trees. Losses on olives in Latakia affected by Peacock eye spot (*Spilocaea oleaginea*), a fungal disease that can be spread from tree to tree by rain splash, for which control materials were available on the market yet at high prices, prevented many farmers from treating their trees, were estimated at 15 percent. As of July 2021, no control materials were provided for Olive fruit fly (*Bactrocera oleae*). If the situation does not improve, damages to olives can be as high as 60 percent. Apples in Latakia were attacked by leg borers, fruit worm and gadobe. Elsewhere in the country, insect infestations such *Capnodis*, olive fruit fly and *Euphyllura Olivina*, were detected but despite expensive pest control material which led to insufficient application, no widespread damages were reported. In Homs, no significant attacks of fruit flies or olive psyllid were reported, unlike in the last year.

Herbs

Shortly after 2011, and especially in years of poor rainfall, cereal farmers considered aromatic and medicinal plants, including cumin, coriander, anise and nigella, as suitable drought-tolerant, easy-to-be-managed with short growing season and lucrative cash crops to be cultivated instead of wheat. The interest continues. In 2021, cumin was sold for

SYP 6 000-SYP 6 500/kg, anise for SYP 7 000/kg and nigella for SYP 11 000. Returns are often good in relatively dry years, but rainfall during the 2020/21 season was too erratic and insufficient. In addition, when humidity is high during the weeks immediately preceding harvest time, as it was in 2019, yields are particularly low and many farmers risk losing their entire crop.

In 2019/20, slightly over 80 000 hectares were planted with herbs, attracted by higher profitability and, in 2020/21, the area increased to 95 000 hectares. For example, in Dara'a, the area planted with herbs, especially cumin, increased by 300 hectares, similarly in Homs and Hama. However, as most of the herbs are planted as rainfed, it is likely that crops did not fare very well. In Raqqa, for example, rainfed cumin was planted on 4 500 hectares, but not the entire area was harvested. Similarly, in Al-Ghab, where black cumin (*Nigella sativa*) yields in 2020 ranged between 250-300 kg/dunum, in 2021 yields did not exceed 100 kg/dunum (Enab Baladi, 2021d).

Industrial crops

Sugar beet

In 2011, the production of sugar beet was estimated at 1.8 million tonnes from 26 000 hectares (FAOSTAT). In 2015, the country's production sharply declined to just 29 000 tonnes from 860 hectares (MAAR), all in Al-Ghab, Hama governorates. This represented only eight days of work for the remaining functioning sugar beet factory, which had a capacity of 3 600 tonnes/day. In 2016, there was a further reduction in area down to 252 hectares on land where contracts had already been drawn up between MAAR and producers. Since the production from such a small area would not justify operating the factory, the produce was used as fodder. By 2018, only 144 hectares were sown to sugar beet, again solely for fodder. No sugar beet was cultivated in 2019/20 and 2020/21 following a decision by MAAR.

Cotton

The traditional cotton-producing governorates are Raqqa, Hasakeh, Deir-ez-Zor and Aleppo, with small amounts also coming from Hama and Al-Ghab. Cotton is planted in late April or early May and harvested in October. At its height in the early 1960s, the area under cotton covered more than 250 000 hectares, but, largely due to shortages of irrigation water and increasing labour costs, the area halved by 2011. With the crisis and the resulting shortages of seed, crop-protection materials and credit, and following damage to irrigation systems and ginneries, the area under cotton experienced further dramatic reductions. In 2016, only 16 000 hectares were harvested, but the bulk of this (12 000 hectares) was in Raqqa Governorate, controlled by the Islamic State at the time. Since 2018, cotton production appears to be experiencing some revival and MAAR estimated that 33 000 hectares were planted in 2019, 32 500 hectares in 2020 and slightly below 30 000 hectares in 2021. In 2020, almost half of the planted area and over 40 percent of the production originated from Raqqa, followed by Deir-ez-Zor (37 percent of both area and output).

Over 80 percent of the total cotton area in 2021 was planted in Raqqa and Deir-ez-Zor. In Deir-ez-Zor planting was delayed and farmers responded to declining availability of irrigation water by decreasing the planted area to 10 000 hectares, down from 12 200 in 2020. Cotton seeds are provided by GOSM at a seeding rate of 60 kg/hectare. In the past, GOSM did not always provide the right varieties to specific geographic conditions, but it was not mentioned this year. Cotton seeds in Hasakeh originate from Turkey and are often higher yielding. In an average year with adequate irrigation and suitable varieties, the Syrian Arab Republic's cotton yields are between 3.5 and 4.5 tonnes/hectare. In 2020, yields ranged from 2.4 tonnes in Al-Ghab to 4.2 tonnes in Hasakeh.

The 2021 cotton production is likely to be lower than in 2020, due to the same challenges faced by other irrigated crops: shortage of fuel and electricity needed to operate irrigation pumps and agricultural machinery, insufficient amounts of irrigation water, delays in rehabilitating irrigation infrastructure, lack of quality inputs, etc. No major pest attacks were reported. However, as of August 2021, crop conditions were relatively favourable given shortages in irrigation.

Tobacco

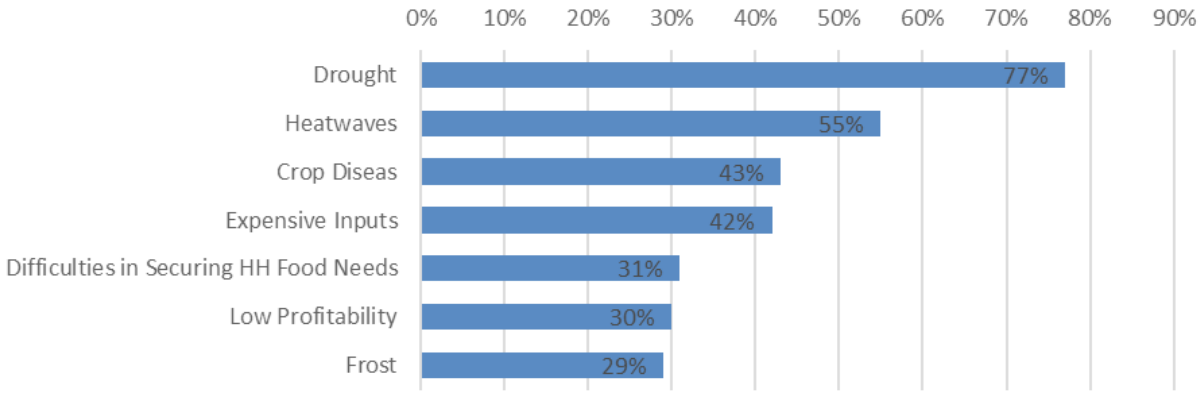
The General Organization of Tobacco (GOT) grants licences to producers based on the suitability of land for tobacco rather than for food crops. The GOT also provides farmers with tobacco seedlings and purchases the produce. Growers are not allowed to sell to private traders. There are three operational cigarette factories, one in each of Latakia, Hama and Damascus. Tobacco is mainly produced in the coastal governorates of Tartous and Latakia, with a smaller yet significant quantity originating from Al-Ghab, which combined host around 90 percent of tobacco area in the country and produce between 80 and 90 percent of the total output. In 2021, about 6 245 hectares were planted with tobacco, down from 9 650 hectares planted in 2020. About half of the area is irrigated. The average yield in 2020 was 2.5 tonnes/hectare of irrigated crops and 1.2 tonnes/hectare of rainfed crops. Since most of the tobacco is grown in the areas which were relatively less affected by the lack of precipitation in the 2020/21 season, the expected average yield of rainfed is about the same, but irrigated is likely to decrease to 2 tonnes/hectare. With a smaller area and lower expected yields, 2021 production is expected to decline to about 10 000 tonnes, a decrease of over 80 percent compared to 2020.

Tobacco remains more profitable than food crops. Although not verified by the mission, it is reported that tobacco farmers obtained higher fuel allocations than other farmers. In Tartous, the cost of production is about SYP 400 000/dunum and farmers receive SYP 2 500/kg of product. With a yield of 1.6 tonnes/hectare, a farmer can cover the costs. It appears there is no transportation costs involved as production is sold in the village. Tobacco diseases that affected production this year were Downy mildew and *Broomrapes/Orobanche*, which resulted in a production decrease of 25-50 percent.

In the past, the GOT reduced the number of licenses granted to growers of "*beladi*" (local) varieties which are air-dried and generally yield between 500 kg and 2 tonnes of leaf/hectare, and instead required growers to produce "*Katerini*" variety which needs more water and is flue-cured.

Box 3: Summary results from the household survey - Challenges and difficulties

Erratic weather was the most commanding problem of the 2020/21 crop season, affecting farmers across the country, but being particularly detrimental to those relying on rainfed crops for income. Insufficient and irregular precipitation aggravated by heatwaves affected 77 and 55 percent of the surveyed farmers, respectively, in particular in Idleb, Hasakeh, Raqqa, Dara'a, and Sweida. Frost, although less frequent, caused crop damages to 29 percent of the farmers, especially in Quneitra and Aleppo. About two-thirds of the farmers, whose fields were affected by erratic precipitation and extreme temperatures, reported that the impact was severe to very severe, while half of those affected by the frost reported that the impact was severe. Agricultural inputs, often in low quality and unaffordable to many, were used at lower rates than recommended and even lower rates than in the past, supporting more frequent outbreaks of crop diseases. Consequently, the decimated production resulted in lower returns which worsened the already challenging economic conditions to secure the food needs of the farming households.



LIVESTOCK

Livestock activities have always been an essential part of the country's farming system and an important source of household income. Livestock rearing mostly takes place in the rural, more arid parts, of the country such as in southern parts Hasakeh, south Raqqa, Deir-ez-Zor, east Homs, east Rural Damascus, Dara'a and Sweida. Households that owned cattle as part of a mixed-farming operation would typically have had fewer than ten animals, often less than five. Prior to the crisis, livestock accounted for between 35 and 40 percent of the country's total agricultural production and provided employment to about 20 percent of the labour force in rural areas. In addition, 35 percent of the rural households used to raise livestock, which was considered their main source of food and income. Animal production contributed over one-third to the total agricultural production and about one-third of agricultural exports. Mutton exports alone generated foreign currency estimated at approximately USD 450 million/year and, in 2010, the country exported 871 000 sheep (FAOSTAT). Exports of live sheep reached their lowest level in 2016 with about 11 000 animals and, in more recent years, they were estimated at about 35 000 animals per year.

Poultry production was mainly a private sector activity, with a public sector share of less than 10 percent. The poultry sector used to employ, directly and indirectly, more than 1 million workers. It was also an important foreign exchange earner with significant exports of meat, eggs and day-old chicks. In 2010, 76 000 tonnes of hens' eggs were exported (FAOSTAT), while exports were unofficially estimated in 2019 at only 5 tonnes.

Before the crisis, MAAR supported the livestock sector by a number of initiatives: encouraging formation of cooperatives, providing extension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services and fodder rations, contributing to cultivation of pasture seeds and seedlings, digging of wells in "*Badia*" (Syrian Steppe) to provide water for the population and livestock, grading and improving activities and artificial insemination (AI) to enhance the productivity of local breeds, vaccination, various livestock treatments, veterinary drugs, improved breeds, and research services.[xix] Some of these services are still currently active, but at a much smaller scope due to financial and other constraints.

Although an important source of livelihood for many poor people in coastal and lacustrine areas, fisheries contributed to only an estimated 0.38 percent of the pre-crisis agricultural GDP. Information on the current contribution is not available. Beekeeping used to be a traditional industry in the country. Just before the crisis, there were about 700 000 beehives and a large number of them have been abandoned or destroyed, with significant implications for pollination. Worth to note that the limited use of pesticides in agriculture is likely to lead to improved conditions for beekeeping.

[xix] Dairy Value Chain Study – unpublished.

Livestock numbers

The last comprehensive livestock census, conducted in 2010, put the main livestock species at 18 million sheep, 2.3 million goats, 1.1 million cattle, 7 000 buffaloes and 26.2 million poultry. In the first years of the crisis, with the increased movement of people, at times accompanied by their animals, but often fleeing their original locations without their assets, it was evident that the livestock population had shrunk considerably. MAAR estimated that, during the first three years of the crisis, sheep numbers fell by 45 percent, goat numbers by 30 percent, cattle numbers by 40 percent and poultry numbers by 55 percent.

In the absence of a census, the current livestock numbers are difficult to monitor under normal circumstances, but the task becomes even more difficult under conditions of crisis. An approximate estimate can be made by extrapolating the number of vaccines administered and routine drugs provided, the volume of trade in livestock markets, the abattoir records (if available), the number of animals registered for feed from the GOF, etc. Given that the veterinary services are operating below their pre-conflict capacity, any potential estimate of livestock heads depends on very limited sources of information. In addition, not all farmers, especially those that own only a few heads, register their animals with the veterinary extension units in the governorates.

MAAR provided the mission with its estimates of 2020 livestock numbers, which included 16 million heads of sheep, 1.8 million heads of goats, 780 000 heads of cattle, 40 000 heads of camels and 7 000 heads of buffaloes. Triangulating the MAAR information with information received from the governorates (Table 15), the estimate of the sheep heads is likely to be too high, while the estimates of the goat and cattle heads appears to be in line with the mission's expectations. A possible explanation of discrepancy might be the exaggeration of numbers by breeders in order to benefit from more feed from GOF given the lack of efficient controls of veterinary services. The amount

Table 15: Syrian Arab Republic – Estimated livestock numbers ('000 heads)

Governorate	Sheep			Goats			Cattle		
	2010	2018	2020	2010	2018	2020	2010	2018	2020
Hasakeh	1 833	1 401	1 485	226	159	168	108	70	27
Homs	2 400	1 400	1 600	222	91	160	107	70	110
Deir-ez-Zor	1 700	270	1 980	200	166	137	110	70	192
Hama	3 200	1 004	1 010[1/]	350	117	115[1/]	56	56	57[1/]
Al-Ghab	285	210	235	32	52	71	42	29	28
Idleb	726	568	570[2/]	181	137	138[2/]	66	30	30[1/]
Raqqa	2 064	1 263	1 445	235	159	164	23	16	16
Aleppo	2 000	1 200	1 200[1/]	311	213	213[1/]	90	60	60[1/]
Tartous	78	103	113	12	18	18[1/]	32	31	31[1/]
Latakia	141	90	95	15	15	16	40	37	39
Rural Damascus	1 800	1 700	1 775	450	391	406	250	101	96
Sweida	280	384	601	78	90	151	10	11	16
Quneitra	111	152	177	12	22	21	21	23	31
Dara'a	635	653	666[1/]	109	94	100[1/]	56	34	36[1/]
TOTAL	17 253	10 399	12 951	2 432	1 722	1 877	1 010	604	768

Sources: MAAR estimates, 2010, 2017, 2018; Agricultural Directorates on governorate levels, 2020.
[1/] Change compared to previous years indicated qualitatively ("about the same", "slightly more", etc.).
[2/] Extrapolation.

of feed that registered livestock breeders could purchase from GOF at subsidized prices depends on the number of animals they own. The International Fund for Agricultural Development (IFAD) and a government-supported project were carrying out livestock numbering since 2019. Several governorates have already been covered, including Latakia, Tartous and Rural Damascus. The project to number livestock, especially cattle, is ongoing in areas under state control. At the same time, it provides sheep and feed grants and small loans from the project's microfinance fund.

After a significant decline during the first years of the crisis, overall numbers of animals appeared to increase slightly or stabilize during 2016 and 2017, with 2017 being considered as the threshold year. Despite the economic challenges, including the high cost of feed, the latest (as of 2020) livestock situation in the country is characterized by gradual stabilization. An above-average 2020 harvest and good pasture conditions led to an increase in livestock numbers.

Estimates at times might include only livestock heads in government-controlled areas. In Raqqa, the Department of Agriculture estimates that between 65 and 90 percent of the livestock are located in areas outside the control of the government. In Hama, Idleb, and Deir-ez-Zor, some areas reported waves of returnees with their flocks and herds, resulting in an increase in livestock numbers. In Idleb, at 328 000 heads, the number of sheep and goats currently in the government-controlled areas is about 25 percent higher than in the previous season. The numbers also vary according to prevailing animal diseases: in Al-Ghab as well as neighbouring governorates, an outbreak of Lumpy Skin Disease in cattle led to a number of breeders to sell their cows and switch to raising sheep and goats.

However, as the objective of the mission in the livestock sector was not to substitute an agricultural census, the mission did not attempt to harmonize livestock numbers.

Sheep and goats

Traditionally, sheep production is concentrated in the more arid areas in the eastern and southeastern parts of the country with limited crop production but vast availability of rangeland pastures using a pastoralist approach. Sheep would move seasonally from the rangelands in the east and southeast to cropping areas in the west to graze on crop residues. Reports indicate that, towards the end of the last century, a large share of nutritional requirements were provided by an improved availability of feed concentrates and less by grazing.

In 2020, a *Peste des petits ruminants* (PPR) vaccination campaign was carried out which vaccinated 12.5 million goats and sheep. The provisional estimate for the total number of sheep for 2020 is about 13 million heads. This represents a decrease of 33 percent compared to the last pre-crisis census, but a 24 percent increase compared to 2018. The total number of goats is estimated at about 1.8 million heads which decreased by 30 percent compared to pre-crisis year (2010) but increased by 9 percent compared to 2018. Noticeable fluctuations between governorates in the numbers are likely to be related to the previous underestimation of livestock numbers in areas out of government control. In some cases, such as in Al-Qusayr sub-District of Homs, in 2020 herders increased the size of their herds given higher profitability of mixed crop, livestock production systems than simple crop production systems, particularly for those that also cultivated fodder crops.

Cattle

Before the onset of the crisis, cattle farms mostly raised hybrid dairy breeds (local Frisian) with beef production as a by-product of dairy farms. Cattle are concentrated in AEZs 1-3 (Figure 1) and on irrigated lands around cities where green fodder is available. Traditionally, cattle did not graze, but were stall-fed. The total number of cattle in 2020 is estimated at 768 000 heads, a decrease of about 30 percent compared to 2010, but an increase by 27 percent compared to 2018.

Poultry

The poultry sector, the cheapest source of proteins, was the hardest hit by the crisis. A large number of poultry units were destroyed or abandoned, resulting in a decreased supply of poultry meat and eggs. It is estimated that the country's poultry population, mostly raised in intensive production systems and

numbering about 26.2 million birds before the crisis, decreased by 50 percent by 2015. In addition, many smaller poultry farms and hatcheries were damaged and disruptions in energy supply threatened the production of small chicks. In 2018, 6 094 poultry units were operational, out of a total of 9 610 units. In 2017, the poultry population was estimated to stabilize at around 11.5 million birds and a similar number is assumed for the current season.

The poultry sector was one of the sectors most affected during the first months of the COVID-19 pandemic in 2020. During the lockdown, sales and consumption of broiler meats in closed restaurants decreased. The supply chains for both inputs and outputs were disrupted. The high cost of poultry feed, the scarcity of chicks and vaccines, led to heavy losses for breeders, with more than 60 percent of broiler facilities leaving the business. Although poultry meat remains the most accessible protein, the extremely high costs of fuel used for cooling and heating poultry farms and high feed costs, are likely to further decrease their numbers unless output prices, capped by the weak purchasing power of the population, increase.

Initiatives to distribute chicken, feed and vaccines as part of livelihood support programmes remain popular among donors. In Hasakeh, about 75-80 percent of farmer households raise chicken. While having a positive impact on household food security and local sales, distributions are unlikely to have a substantial effect on the recovery of poultry production. Although some support was already provided by FAO and other organizations assisting with the re-establishment of poultry units, the high costs of poultry feed, mostly imported, acts as a disincentive for producers. Electricity, mostly generated from expensive diesel, also adds to the cost of production. Producers suspect that chickens imported (or smuggled) from neighbouring countries, where the cost of production is lower, are eroding their markets.

Other species

Although the mission did not strive to estimate the numbers of other, less economically important livestock species, such as buffaloes, horses and camels, it appears they have suffered reductions similar to other types of livestock during the crisis.

Animal nutrition

Natural pastures and rangelands, cultivated green and conserved feed and fodder as well as crop residues and processed by-products, constitute the main sources of livestock nutrition in the country. Barley is the major and preferred fodder crop for livestock but, although more drought-tolerant than wheat, its production varies year on year depending on weather conditions. In years with low rainfall amounts, as in 2021, or when other weather events render the crop not worth harvesting, feeding livestock on residues of failed crops became an important source of low-cost fodder for ruminants.

In 2020, following favourable weather conditions, livestock body conditions were generally good, despite the already increasing production costs. By July 2021, across most of the country (Hasakeh, Deir-ez-Zor, Homs, Dara'a, Latakia, Tartous, Sweida and Rural Damascus), livestock were in poor body condition as natural pastures were scarce due to erratic rains and high temperatures. Feed was not readily available and its prices were high. With a high probability of declining body conditions, increased occurrence of wasting, weakness and spread of diseases (tape and liver worms), miscarriages of pregnant females and higher rate of still births, are likely. In some governorates, as Aleppo, Hama, Al-Ghab and Quneitra, livestock body conditions were reported to be relatively acceptable, but a worsening of the situation is inevitable.

Pastures

The total area of grassland and natural pastures in the country is about 8.22 million hectares, out of which some 86 percent, known as "*Badia*", is situated in the fifth agro-ecological zone (see Figure 1) with an annual precipitation of less than 200 mm. In an average rainfall year, the "*Badia*" provides an estimated 15 percent of the national sheep flock's grazing resources, assuming a grazing period of six to seven months per year.

Although pasture in the first half of 2020 was plentiful owing to abundant and well distributed rains in the 2019/20 cropping season, pasture conditions during the second half of 2020 deteriorated following unfavourable rain distribution and heatwaves. While pastures in the eastern part of the country failed, they

fared better in the west, including Hama, Quneitra and coastal areas, despite a decline in quality due to the early cessation of the rains. In Homs, which was less affected by the lack of rain than the areas in the east, but still pastures are in worse conditions than in the previous year, herders complained about overgrazing as, Al-Qaryatayn, for example, livestock keepers from the areas with decimated pastures moved their herds across governorate borders to better pastures. In some areas of Deir-ez-Zor, access to the eastern regions of "*Badia*" remains constrained by security concerns, especially the continuing threat of landmines and unexploded ordinances. Some pastures in Hama are also out of reach due to remnants of the war.

Pastures, which usually remain adequate for grazing until May, dried out already in April (Enab Baladi, 2021e). Lack of pasture early in the season put additional pressure on feed markets, particularly for sheep and goat herders. Given the high prices of feed, the nutritional status of livestock has been affected.

Feed and fodder

Feed and fodder[XX] are key factors of livestock growth. The main agricultural stubbles are wheat, barley and cotton. Cotton seed cake provides the major source of supplementary protein even for grazing animals. Wheat bran and straw are the most important crop by-products for feed production. Barley and wheat bran are the commonly used feed and ingredients for livestock concentrates. The high costs of feedstuff ingredients were persistently brought up as a challenge by farmers even in years with abundant natural pastures and grazing rangelands as well as adequate production of cereals. In terms of feed availability, the current situation in the sector is similar to the 2017/18 season. After the fodder prices increased in April 2021, many farmers moved livestock to feed on crop residues and, where still available, on pastures. One kilogramme of hay increased from SYP 150-SYP 400.

GOF, a profit-oriented public establishment, buys and stores a significant portion of fodder to be distributed to the public, private and corporate sectors through its branches across the country. It purchases grain and farm by-products from farmers and imports fodder additives to produce fodder concentrates. In the pre-crisis period, the GOF factories used to produce about 250 000 tonnes of cattle feed concentrates annually. In 2018, it produced 100 000 tonnes. The role of GOF in fodder supply has been declining with increasing privatization process and increasing number of private fodder firms competing with the GOF.

In government-held areas, small quantities of subsidized feed are available. In 2019, the GOF was selling barley for SYP 75/kg compared with SYP 130/kg in 2017. In 2020, despite the abundant barley harvest, GOF barley prices increased from SYP 200 to SYP 350/kg, while 1 kg of subsidized barley was sold for SYP 500-SYP 600 in the first half of 2021. Prices of other subsidized feed ingredients offered by GOF are summarised in Table 16.

Table 16: Syrian Arab Republic - Development of feed prices (SYP/kg)

	2020	2021
Mixed feed capsules	99-385	460-950
Mixed groats	91-225	460-600
Bran	44-250	250
Maize	118-485	600-1 075
Barley	200-350	500-600
Cotton seed	190-600	950-1 000
Soybean meal	300-865	1 140-1 850

Source: GOF, 2021.

[XX] Feed usually refers to concentrates made from crop products/grains or by products of food industries or blended fodders. Fodder refers to crops/pastures on which animal can graze: forage (hay), crop residues, crop products/grains for feed production (barley, bran, etc.).

In 2020, GOF purchased domestically over 348 000 tonnes of bran, in the first half of 2021 less than 50 000 tonnes of bran were purchased. GOF also imports small amounts of feed ingredients, mostly maize and soybeans which do not have readily available domestic substitutes. Additional amounts of feed might have been imported privately. It is not known whether there are any stocks available from the extraordinary barley harvest of 2019 and 2020 when more than 2 million tonnes of barley were harvested. Anecdotal evidence seems to suggest some of it found markets in neighbouring Lebanon.

In the areas where GOF feed was unavailable or available only in small quantities, farmers had to rely on open markets, such as in Hasakeh. In Hasakeh, feed availability is limited and prices are estimated to be five to ten times the prices in the previous season. Table 17 shows prices of feed components compared to the previous season in Homs, Deir-ez-Zor and Hasakeh.

Similar patterns of lower, sometimes no, availability, higher prices and lower quality compared to the previous year prevail across much of the country in 2021. In Aleppo, barley prices exceeded SYP 1 200/kg, even at the height of the harvesting season, when prices should be at their lowest level. In Idleb's government-controlled areas, there are no feed sales centres, forcing breeders to buy feed from neighbouring governorates at higher prices (barley at SYP 1 600/kg, bran at SYP 1 000/kg and compound feed at SYP 1 500-SYP 2 200/kg) plus paying for transportation costs. In Dara'a, farmers reported that prices increased from the last season by five times on average both of government-supported feed and in the local market. Purchasing livestock feed includes also high transportation costs considering its bulkiness.

In governorates which reported a relatively sufficient availability of feed, Quneitra, Al-Ghab, Latakia, Tartous, Rural Damascus and Hama, prices are high, while quality is often deemed low. In Latakia, prices have doubled during the current season compared to the last season. In Tartous, concentrated feed was sold for SYP 65 000/50 kg bag, barley for SYP 1 400-SYP 1 500/kg and hay for SYP 400/kg. In Rural Damascus, GOF provided 25 percent of the feed need for cows and poultry at

Table 17: Syrian Arab Republic - Comparison of feed prices in Homs, Deir-ez-Zor and Hasakeh (SYP/kg)

Type of produce	Hasakeh		Deir-ez-Zor		Homs	
	2020	2021	2020	2021	2020	2021
White hay	75	400	50	400	50-55	500
Crop residue	110	500	75	500	Free	175 000-200 000 /dunum
Bran	160	700	220	900	40-100	800-900
Barley	260	1 300	250	1 200-1 500	120-150	1 200-1 300
Pressed seed residues (cotton, sunflower, soybeans)	550	1 350	-	-	-	-
Fodder maize	400	1 100	900	1 100	-	-
Wheat	400	1 200	-	-	250-300	900-1 200
Soybeans	450	1 500	-	2 300		
Soybean meal	600	1 550	-	-	-	-
Concentrated poultry feed	800	1 800	800	2 000	300	1 800
Concentrated feed for laying hens	-	-	600	2 100	-	-
Mixed cattle feed	600	1 400	-	-	100	1 200
Maize	-	-	500	1 500	-	-

Source: CFSAM, 2021.

subsidized prices, while the rest was secured from the markets where soybeans costs SYP 2 250/kg, maize SYP 1 250/kg, barley SYP 1 300/kg and bran SYP 800/kg. In Hama, barley costs SYP 1 400/kg, hay SYP 325/kg and concentrated fodder SYP 1 470/kg. Poultry feed remains expensive and, in July 2021, the average selling price of concentrated feed for egg production was SYP 1 694/kg, 8 percent higher than one month before (FAO, 2021). Given the high cost and limited availability of feed, herders often rely on one or two cheapest feeds, usually hay and bran, with negative consequences on the nutritional and health status of their herds. Malnutrition can lead to increases occurrences of parasitic diseases, with subsequent veterinary cost.

Crops not worth harvesting always carry a price for grazing as farmers try to recover part of the costs incurred in field preparation, sowing, etc. However, the remnants of the harvested crop flocks used to graze for free, although this year they became a source of income. In Hasakeh, given the overall difficult situation of the sector, crop farmers charged from SYP 175 000 to SYP 200 000/dunum. In Hama, livestock keepers paid SYP 150 000 to graze on 1 hectare of unharvestable barley. In Deir-ez-Zor, the only available grazing resources were crop residuals in river-bed areas, but they were costlier than the previous season. In Sweida, the unharvestable cereal fields were deemed to be providing low-nutrition fodder. In addition, like with pasture, herders were reported moving their flocks from the eastern region of Deir-ez-Zor and the "*Badia*" of Hasakeh to graze in agricultural areas and caused a great pressure on remnants of crops and fields which were not deemed worthy of harvesting efforts. In northern Hasakeh, herders coming from outside the region, most of them owning 15-25 sheep and goats, purchased the right to graze on failed crops and crop residuals to feed their herds.

The price of straw is also likely to increase further as winter progresses given smaller harvestable areas. Wheat straw is sold at SYP 400-SYP 500/kg, up from SYP 80/kg in 2017 to SYP 180/kg in 2018. In addition to being used as livestock fodder, straw is demanded to make mud bricks, which gained in popularity as conventional construction materials, often priced in United States dollars, became too expensive and inaccessible.

High feed prices are particularly noticeable in the winter time when livestock, particularly cattle, are fed with expensive concentrates (barley) and, to a smaller extent, with remaining crop residues. Although forced livestock sales usually increase in the winter, farmers have been already destocking to feed the rest of their herds (discussed under Marketing and other problems). In 2019, FAO's feed distribution benefited 1 066 households, in 2020 18 310 households and in 2021, 11 965 households.

Water

Even in years with abundant rainfall amounts, livestock watering is insufficient in some areas or is too expensive as water is often supplied by water tankers, possibly resulting in insufficient water intake by animals. This, compounded by localized insecurity and high transportation costs, increases the overall costs of production. In addition, an inadequate water intake reduces animal performance as water constitutes approximately 60-70 percent of an animal's live weight. Water requirements regulate body temperatures and is vital for organ functions such as digestion, waste removal and the absorption of nutrients. Hence, animals should be given all the water they can drink because animals that do not drink enough water may suffer stress or dehydration leading to reduced performance.

In the current year, no watering problems were signalled in Al-Ghab, Homs, Tartous, Latakia, Idleb and Aleppo. However, even farmers with direct access to wells were affected by expensive or even lack of fuel, or electricity cuts for long periods. Limited water availability for animals was reported in parts of Hama, Hasakeh and in parts of "*Badia*". In Deir-ez-Zor, the receding water level in the river as a result of the lack of flow and stagnant water, led to increased water pollution and the spread of insects and germs causing diseases to humans and animals, in particular diarrhoea and parasite infections. In Raqqa, water is obtained from the Euphrates River 40-50 km away from the settlements in some areas of the governorate, increasing the costs.

Artificial insemination

Artificial insemination (AI) practice in the country has been common since the 1980s. Before the crisis, there were several projects for genetic improvement with semen production centres, improved registered bulls, liquid nitrogen storage facilities and trained veterinary technicians. In 2010, MAAR produced 1.2 million doses of semen from 74 Friesian bulls and AI services were provided free of charge.

Since the onset of the crisis, the practice has decreased considerably due to difficulties of producing semen and the shortage of qualified technicians to administer AI. In 2019, there were reported to be only 26 qualified technicians. Consequently, the number of AIs of cattle fell to 1 400 cases in 2017/18; but has considerably increased in 2018/19 to about 43 000 cases. Although the breakdown by species is not available, MAAR estimates indicate that, in 2020, about 618 000 AIs took place, while they were 268 000 in the first half of 2021. In 2018, about 640 000 straws of semen were produced from 60 elite registered bulls maintained in one of the rehabilitated AI centres where liquid nitrogen production was restarted with 300 litres. According to MAAR, slightly over 682 000 straws were produced in 2020 and about 390 000 in the first half of 2021.

Despite the interest among farmers for AI, there are complaints that the practice is often unsuccessful, possibly due to poor identification of oestrus under field conditions as well as due to poor management and general shortage of feed resources which impact fertility. Unreliable storage and shortages of liquid nitrogen also limit the success. In Dara'a, the poor nutritional status of animals led to a decrease in the success rate in cows, as the need for successful insemination increased from 2 straws to 3 straws. Likewise, in Rural Damascus, the success rate of AI was 70 percent due to lack of experience or poor efficiency in preserving the insemination material. While the procedure is provided for free by the government, the technician requires SYP 5 000 per visit to cover transportation costs (Homs). In Deir-ez-Zor, FAO provided insemination services to cattle breeders in many villages, but not all, in the governorate.

In addition, the programme of importing in-calf Holstein Friesian heifers from Europe to restock the country's dairy herd, started in 2017 with 5 011 heads. In 2018, 4 465 cows were shipped from Germany, of which 404 were rejected for non-conformity and 25 died in transit. Of the remainder, 2 126 were sold to breeders in Quneitra, Homs, Latakia, Aleppo and Sweida at a 30 percent discount with favourable loan repayment terms using a credit facility from ACB. The remaining 1 910 went to the General Organization for Cattle for multiplication. In 2020, no animals for breeding were imported, live animal imports included 6 400 calves for consumption as meat. In 2021 so far, no live animals were imported.

Fisheries

The fishery and aquaculture sector plays a minor role in the economy due to the low natural productivity of inland fisheries. National fish-consumption patterns and general preferences for other sources of protein constrained the yearly sea food and freshwater fish consumption to 0.9 kg/person, which is low compared to neighbouring countries. The area covered by water, including marshes, is 1 610 km^2 and it represents approximately 0.9 percent of the total area of the country. Marine fisheries are dominated by small-scale fishermen and, as of 2019, included about 1 200 licensed coastal fishing vessels. Artisanal fishery in inland waters is also practiced, but the actual number of working fishing vessels and boats is not available. Prior to the crisis, the sector used to be the major income-earning and employment opportunity of the population in coastal and lacustrine areas. Currently it represents only a small portion of the economy, but it remains a major source of livelihood for the poorest households in coastal areas.

With the increasing cost of protein, cheap types of fish, such as catfish and carp, are likely to be in higher demand. Freshwater fish breeding is increasing in Hama, Al-Ghab and Homs, where there are dozens of public fish breeding facilities and hundreds of family fish facilities. In order to support this sector, the General Fisheries Corporation in 2021, provided hundreds of families of freshwater fish breeders with fish chicks. In addition, about 2 million fish chicks for breeding were provided to lakes and dams in Hama and Homs governorates.

While a clear picture of the impact of the crisis on the fisheries sector is lacking, information available indicates that the sector has suffered problems similar to the livestock sector.

Beekeeping

Beekeeping used to be a traditional industry in the country before the crisis, producing honey, royal jelly, natural wax and propolis. Beekeepers could live off this production if they owned at least 100 hives. Transhumant hives could produce an average of 20-25 kg of honey/year/hive. Prior to 2011, there were 700 000 beehives in the country, with an annual average production of 3 200 tonnes of honey. During the crisis bee colonies were destroyed or neglected, with a decrease of almost 90 percent in many places from Rural Damascus to Latakia. As bombs have contaminated the environment and polluted the air, many beekeepers have fled their land. In 2019, the annual honey production was estimated to be between 1 500 and 2 000 tonnes. Although no updates were provided for 2020, the average honey production in Tartous was 10-20 kg/beehive, while it was 5-10 kg in 2019. Honey production costs were estimated at SYP 10 000-12 000/kg. Compared to international market prices, the local honey selling price is very high, up to an average of SYP 8 000/kg in 2018 and it is reported to have been above the international prices also in the past.

Given the high transportation costs to move hives across different locations (in Tartous, costs were reported to have increased up to six times compared to the previous year), and the lack of "bee pastures" due to low precipitation amounts, honey production is likely to decrease in 2021. Additional difficulties facing the beekeepers include, external parasitic mites (*Varroa mite*) and the high costs of their treatment plus issues related to securing the beehives. Currently, given the lack of marketing channels, beekeeping does not have the potential to serve as a main livelihood option for beekeepers and it could be considered as a supplement to other livelihoods. A small number of beehives (20-25) do not need a full-time beekeeper, but at the same time provide him with an additional acceptable source of livelihood. Therefore, investing in the subsector and supporting young beekeepers with production inputs should be considered. In addition, the importance of beekeeping should also be seen through an environmental lens as contributing to pollination.

Animal health

A major impact of the crisis on the livestock sector has been through the sharp decline of the number of technicians which contributed to a breakdown in veterinary services. The veterinary vaccine production department in Shabaa, near Damascus, was damaged early in the conflict, but, according to MAAR information, it recovered. However, despite the crisis, the government has been able to implement a free vaccination programme using both locally produced and imported vaccines, mostly from the Russian Federation. MAAR maintains an annual vaccination programme which includes vaccinations against foot-and-mouth disease (FMD) (twice for cattle and once for sheep and goats), *Enterotoxaemia* (once for sheep and goats), PPR (once for sheep and goats), Sheep pox (once for sheep and goat), *Anthrax* (area specific), and *Brucella* (once for newborn cattle, sheep and goats). According to MAAR, 18.8 million doses were administered in 2020, and 10.8 million doses up to July 2021.

In general, veterinary services were available in 2021, with no significant changes compared to the previous year. Government clinics, where available, still provided prevention in the form of free vaccinations for livestock, while supplies last, but other vaccines and the therapeutic medicines were purchased from the markets at very high prices. In Hama, *Enterotoxaemia* vaccine for sheep provided by MAAR covered only 1 percent of the animals and vaccines of sheep FMD and *Pastella* were not available. In Rural Damascus, only 100 000 doses of the streptococcal dermatitis vaccine were secured out of the 160 000 required. The high costs of medicine might prevent farmers from fully and timely addressing veterinary issues, forgoing treatment of animals when medicines are expensive. In Homs, for example, the price of a 50 cl bottle of external antiparasitic medication increased from SYP 500 in 2020 to SYP 3 000 in 2021. Over the same time period, the price of vitamins and feed supplementary material increased from SYP 2 500 to SYP 8 000 on average. Therapeutic treatment is generally provided by private veterinary services and the cost of provision is deemed high by the farmers.

Relatively acceptable conditions of veterinary services are reported from Raqqa, Aleppo, Al-Ghab, Quineitra, Sweida, Tartous, Latakia and Homs, although differences exist between and within governorates. In Hama, for example, availability of veterinary services is relatively acceptable in Shezar, but not in Tall Atout and Jarjrah, influencing also the availability of vaccines. Weak services were reported from Dara'a and Hasakeh, where prices in 2021 increased significantly compared to 2020. In some areas of Hasakeh, livestock owners must cover large distances with their animals or rely on visits of veterinary specialists to their farms. To cover their fees and the cost of transportation, veterinarians charge up to SYP 20 000 per visit, in addition to the price of veterinary medicines. A similar situation prevails in Idleb, where farmers bring their sick animals to Hama or Aleppo. For farm visits, charges are similar to those in Aleppo. It was also indicated the availability of veterinary medicines in the local markets with weak efficiency and not subject to drug control. Livestock keepers often rely on smuggled veterinary medicines of unknown origin, which are available at high prices and at times with an uncertain efficacy. In Deir-ez-Zor, veterinary services this year are relatively better than last season due to the contribution of FAO and MAAR to secure quantities of vaccines (PPR and internal and external parasites) as well as AI although coverage depends on a specific area.

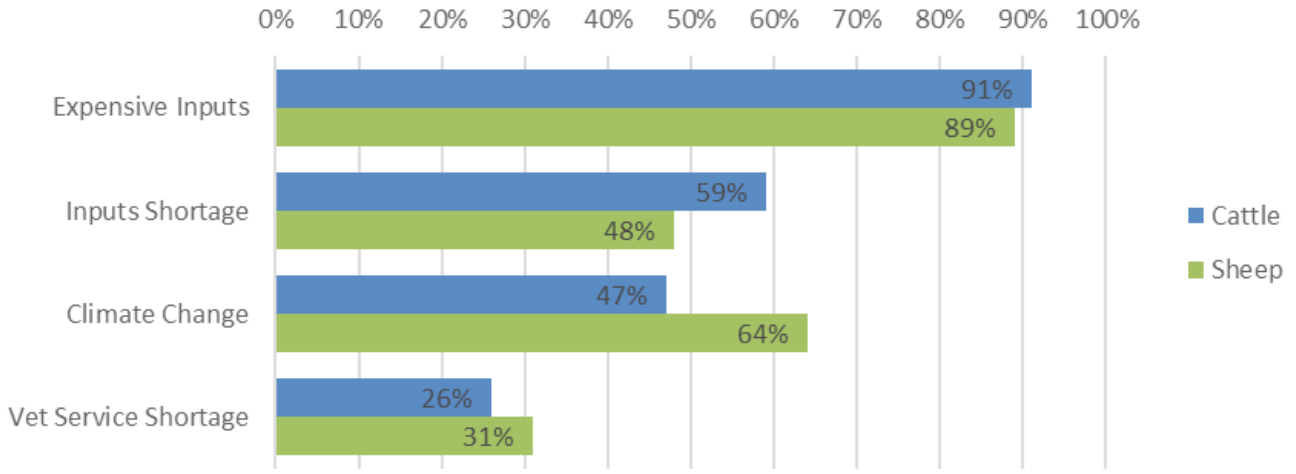
Among diseases, Lumpy Skin Disease (LSD), Smallpox, FMD, *Brucellosis*, Mastitis and Scabies were frequent, although generally with limited impact. In Jarjarah, in the Hama sub-District of Hama Governorate, most newborn sheep died due to FMD as availability of veterinary services was limited.

In the 2019/20 season, the LSD spread on cattle in Latakia, Tartous, Hama, Homs, Al-Ghab, Damascus' countryside and Idlib. In Al-Ghab, an outbreak of FMD among cattle in 2020 decimated some herds and some farmers reportingly sold cows and switched to raising sheep and goats. During the last three months of 2019, 300 heads of cattle died in Homs. As a likely source, livestock smuggled from neighbouring countries to the border areas outside government control with weak veterinary services was identified. Through cooperation between MAAR and FAO, treatments, vaccinations, veterinary services and necessary training were provided, contributing to the recovery of most sick animals and reducing the spread of this disease in 2020/21. For animals that recovered, decreased health conditions, multiplication rates and productivity are often reported.

Despite the severe problems of the veterinary services, the general livestock health situation remains relatively acceptable. At least in government-held areas, animals received, at least some of, the required vaccinations through the departments of agriculture. However, veterinary centres and clinics need to be rehabilitated. In governorates where veterinary services are weak, gaps are often attributed to the shortage of staff in both government and private veterinary clinics as well as the low capacity for laboratory diagnosis due to the lack of technical supplies, such as working machinery and sampling kits for analysis and diagnosis. In many cases, analysis can only be done in the main laboratories rather than in the field, which complicates the treatment and negatively affects the success rate. In 2019, FAO assisted 5 299 households with veterinary services. The number of beneficiary households increased to 156 847 in 2020 and almost 100 000 in 2021.

Box 4: Summary results from the household survey - Situation in the livestock sector

Livestock farmers are facing significant shortage in feed supplies. Following the failed 2021 cereal harvest, it has become difficult and expensive to secure adequate feed for their animals, constraining only nutritional and health conditions. In addition to feed, cattle farmers faced difficulties in accessing the proper veterinary services, especially in marginal areas. About 65 percent of the interviewed cattle farmers stated that the health situation of their animals was poor or barely acceptable and to almost half of them, the situation is worse than in the last year. The health condition of sheep flocks was no better than cattle, over 80 percent of sheep herders said the situation was bad this year: 16 percent detected FMD, 15 percent *Pasteurella* and about 12 percent reported Smallpox. Like cattle farmers, sheep herders faced challenges related to affordability of adequate feed and veterinary services in addition to erratic weather that mainly affected the natural pastures. The situation in the poultry sector was also affected by the low availability and high prices of inputs, mainly feed, in addition to extreme high and low temperatures throughout the year. About two-thirds of the beekeepers stated that the situation of their beehives was bad mainly due to expensive inputs, especially the costs of transporting beehives and other inputs, which multiplied several times compared to the past season and extreme weather. A small number of beekeepers reported cases of Varroa, Parasites and Rot.

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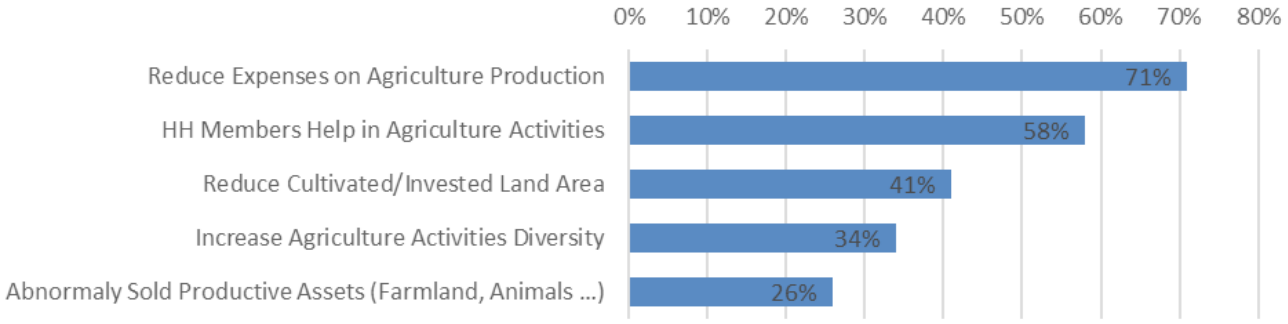
CHALLENGES FACING THE AGRICULTURAL SECTOR

As in past years, farmers brought up concerns about increasing production costs, which this season were exacerbated by the rapid deterioration of economic conditions and currency depreciation. Many farmers, having depleted their resilience capacity in over ten years of conflict, continue farming for lack of other feasible economic and employment opportunities. Production costs in 2020/21 were amplified by the erratic rainfall which increased the need for irrigation. Many farmers stopped servicing their crops for lack of financial liquidity, leading to declining production. The estimates of production cost increases vary across governorates, depending on the baseline used and costs included in the calculation. The estimates ranged from at least doubling in Tartous, Aleppo, Rural Damascus, Idleb, a 135 percent increase in Hama; a 160 percent increase in Latakia and Homs, and over a 220 percent in Hasakeh and Dara'a. Prices of seeds and fertilizers in some cases, e.g., in Hasakeh, were reported to increase by up to 300 percent. Prices of urea and diesel in Dara'a increased by 620 percent and 730 percent, respectively. While output prices strengthened as well,

lack of purchasing power among broad segments of the population constrained the increases. Most farmers have made no profit in many years and have been postponing productive investments. Agriculture has often become a low input subsistence activity, resulting in low yields. Across the country, profit margins remain low, especially in marginal areas.

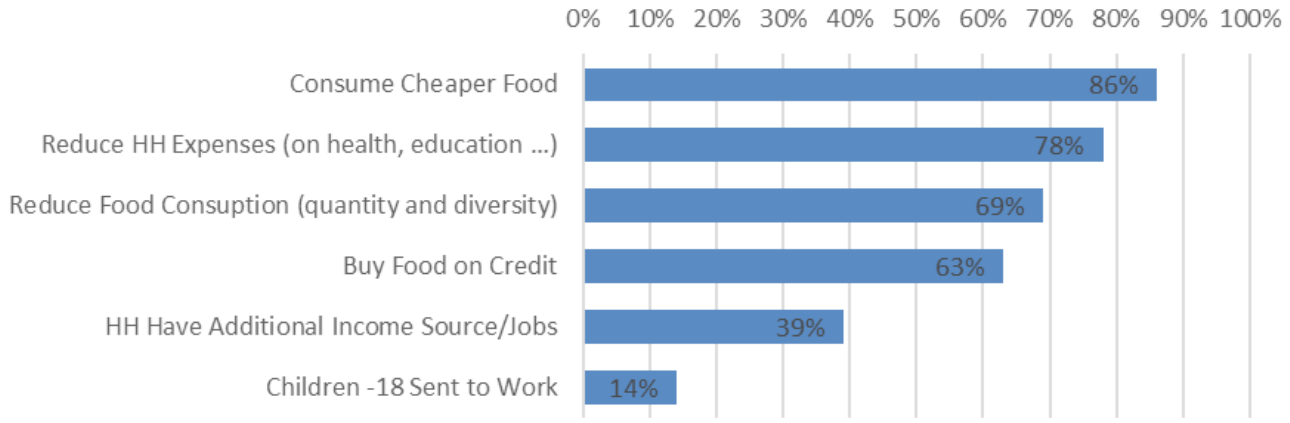
Box 5a: Summary results from the household survey - Coping strategies

The severe challenges in the 2020/21 crop year forced many farmers to adopt a variety of coping strategies related to their farm activities. The most common strategy was to reduce spending on agricultural production by lowering the quantity and quality of inputs and services, resulting in a decline in agricultural production and profitability during the current season and possibly also in subsequent seasons. The more severe coping strategies, such as reducing the cultivated area compared to the past years or forced sales of productive assets, including parts of the agricultural land, livestock, machinery or pulling children under the age of 18 from school to earn income, have more negative and irreversible impacts on households employing them.



Box 5b: Summary results from the household survey - Coping strategies

In addition to coping strategies in the agricultural sector, farming households also need to mitigate their income losses and low purchasing power by utilizing additional strategies to maintain their expenses and food consumption habits or expanding their income-earning opportunities. Many of these coping strategies are likely to be harmful in the long-term. The three most widely used coping strategies lead to a decline in the health and nutritional status of household members, children in particular, as well as foregoing investments in health, education, etc., possibly leading to declined health, increased exposure to diseases and food insecurity.



Farm access and movement of farmers and produce

With better security across most of the country, there has been a significant improvement in farmland access. However, despite continued efforts to demine, the possible existence of unexploded landmines is still a disincentive to cultivate or graze land in some parts of the country, especially those that were occupied by the Islamic State.

Farmers are used to selling to the government collection points or to traders, often shortly after the harvests, and many of them have very limited experience handling storage facilities and adding value to their products. Activities of traders and middlemen, whose liquidity was already constrained by the low purchasing power of domestic customers in recent years, have been further impacted by the economic crisis and the increasing costs of doing business. In the height of the conflict, the transport of agricultural products from farms to collection points or markets was problematic due to road closures and blocks with exorbitant levies imposed by armed groups, especially at the beginning of the conflict.

Although most road closures were dismantled following the conflict easing in 2019, the cost of transport remains elevated as the high cost and frequent shortages of fuel result in supply chain bottlenecks. Some farmers, particularly in the coastal governorates of Tartous and Latakia, have reported acceptable transport conditions within the governorates, but cross-governorate movements remain difficult. Similarly, in Deir-ez-Zor, cross-river movements were highlighted as arduous, presumably to existence of checkpoints. Bottlenecks in transportation were also reported from Homs.

Transportation and handling remain available, but at a high cost mostly due to high fuel prices, which impact the cost of inputs as well as profit received from selling the output, was also mentioned, among other, in Aleppo, Idleb, Al-Ghab, Homs, Tartous and Latakia. In Rural Damascus, focus group participants estimated that transport and handling fees doubled compared to the previous season, while they tripled in Dara'a. In Sweida, given the low volume of production in 2021, combined with high transportation costs, farmers mainly sold their output on local markets. In general, faced with

high transportation costs, farmers tend to sell more locally to traders and middleman where, given the high concentration of producers, prices are generally lower than in markets further away served by fewer suppliers.

Although some agricultural exports have taken place in the region, especially in Gulf countries, Iraq and Lebanon, the total volume traded remains small. Although it is not yet clear whether any agricultural products will be allowed to be exported to Jordan as the Government of Jordan aims to protect the local market from foreign competition, in early August 2021, the Jaber-Nassib border crossing with Jordan reopened, eliminating the "back-to-back" system used earlier. Syrian truck drivers will be allowed to enter Jordan, while previously they were forced to reload their goods on board of Jordanian trucks. Trucks are also allowed two-way movement between Jordan and the Syrian Arab Republic, in addition to transit trucks coming from the Syrian Arab Republic towards Saudi Arabia (Enab Baladi, 2021f). Informal exports remain rampant.

Cereals

In March 2021, the government set the local purchasing price for the 2021 first-grade wheat at SYP 900/kg, using the official exchange rate as of mid April 2021 equivalent to USD 350/tonne, almost double when compared to the 2020 price of SYP 425/kg and almost five times the 2019 price of SYP 185/kg. In past years, the largest percentage of delivered grain fell into the second-grade category, for which payment is slightly less, reported to be SYP 800/kg in 2021. However, using the unofficial exchange rate of SYP 3 200/USD from late June–early July 2021 when most farmers were marketing their wheat harvest, the United States dollar equivalent of the price of the first-grade category shrunk to only USD 280/tonne. At that time, export price quotations for hard wheat were also around USD 280/tonne, without transportation costs, with currency devaluation erasing any effective subsidy granted by the guaranteed purchasing price. Kurdish authorities in areas outside government control pay SYP 1 150/kg (The Medi Telegraph, 2021). AANES set the price at SYP 1 115/kg for wheat and SYP 850/kg for barley (NPA, 2021), while the Syrian Salvation Government, which controls Idleb and parts of western Aleppo, announced last May the intention to pay USD 300/tonne for wheat, up from USD 240/tonne last year (The Syria Report, 2021c). Barley is sold to the GOF which pays SYP 1 200/kg, up from SYP 140/kg paid in 2020 and SYP 130/kg paid in 2019. On the unofficial market, barley was traded at SYP 1 500/kg (Enab Baladi, 2021g).

On 12 May 2021, the government announced the allocation of SYP 450 billion for wheat purchases, representing 6 percent of the total government budget and similar, in nominal terms, to the previous year's amount. At the announced prices, the budgeted amount will enable the government to buy 500 000 tonnes of wheat, slightly more than two-thirds of the 705 000 tonnes purchased in 2020 (The Syria Report, 2021d) and equivalent to about one-quarter of the 2021 estimated production. For strategic reasons, Hoboob has not revealed the amount of grain purchased from the 2020/21 season, but quantities of grain marketed this season are likely to be significantly less than the last season. Submissions of wheat grain to Hoboob are rejected when the percentage of impurities is above the allowed limit or when the specific weight of the grain, crucial to produce flour and bread, is below the required standard. No specific information was provided to the mission about the rejection rates by Hoboob in the current season, while, in 2019, it was less than 5 percent, significantly lower than in previous years, when it reached 25 percent in some areas. The grain that is rejected by Hoboob is often sold to non-governmental traders. This year, farmers who were refused their wheat by Hoboob were obliged to either sift and clean it of impurities at their expense or sell it to the feed establishment as fodder material.

Although it is likely that overall wheat purchases by Hoboob in 2021 were less than in 2020, their geographical location varied. In Hama, as of early July 2021, the quantities of marketed wheat and barley were more than last year. In Hasakeh, farmers reported selling wheat on the market for SYP 1 050-SYP 1 100/kg, but it likely might be later resold to Kurdish authorities at SYP 1 150/kg. Barley and feed wheat are sold

at SYP 1 300/kg and SYP 1 000/kg, respectively. In Deir-ez-Zor, marketing was delayed by the shortage of harvesting machinery. In Dara'a, wheat was marketed either directly to the Hoboob or via traders. Hoboob maintains that farmers are paid within a maximum period of 48 hours after receiving the grain, sometime even on the same day. However, many farmers complained that they were left waiting for payment for several weeks. On the other hand, traders pay immediately on receipt of the produce, which is appreciated by farmers.

Prior to the crisis, the country had 144 grain collection centres where the government purchased grain from farmers at controlled prices. By 2017, only 29 remained operational and under government control. In 2021, there are between 46 and 49 centres distributed in all governorates to receive wheat grains from farmers, up from 37 centres in 2020. According to Hoboob, the government had 36 large concrete silos in 2010, with a grain storage capacity of 7 million tonnes.[xxi] As of 2021, wheat grain is stored in five concrete silos (averaging 100 000 tonnes capacity each) and nine metal silos (averaging from 10 000-30 000 tonnes capacity), up from five and seven, respectively, in 2020. In 2021, three damaged metal silos were dismantled and two were rehabilitated. As part of cost-saving, solar energy is used to operate some silos. As a result, the wheat storage capacity, which was around 3.5 million tonnes before the conflict, is currently estimated between 590 000 and 770 000 tonnes, which would have been sufficient to store the wheat grain bought by Hoboob in 2020. In the past, when Hoboob attracted a larger number of sellers, about 80 percent of the wheat stocks were stored in open spaces and were affected by weather vagaries. However, with careful stacking, 150 tonnes in 1 350 bags/pile, protection from rain, regular fumigation and good management, Hoboob reckoned that grain losses at the collection points were less than 1 percent. Before the crisis, the national milling capacity was estimated at about 3.8 million tonnes per year, compared to 2.8 million tonnes per year in 2015. With limited investments in recent years, it has remained unchanged in 2021.

Although Hoboob is a guaranteed buyer of wheat, and it is technically obligatory to sell strategic commodities to government buyers, farmers reckon that the price offered by Hoboob does not secure sufficient profit, in particularly when accounted for transportation costs to Hoboob depot. In Deir-ez-Zor, the cost of transporting a 100 kg bag of wheat from the field to the Hoboob collection centre was estimated at SYP 2 500/bag. In the past, Hoboob also required grain to be packaged in 100 kg hessian sacks which in 2019 cost SYP 1 200, the price of which likely increased in the meantime. Although traders tend to offer a lower price than that offered by Hoboob, they collect grains from the farm and do not request farmers to bag their grain in new hessian sacks, with consequent saving for the farmers. There is also the chance that Hoboob downgrades the delivered grain due to high moisture content or contamination with barley or oats and thus pays a lower price to farmers. In some cases, Hoboob may reject a consignment completely. It appears that traders are usually less discriminating.

Re-emergence of checkpoints have been reported in Homs, presumably to secure sales of strategic crops to government entities as opposed on the parallel market or other buyers who pay higher prices. Fines three times the amount of the quantity confiscated are decided by an economic court. Bribes ranging between SYP 10 000 and 50 000 are frequent (Enab Baladi, 2021g).

Fruits and vegetables

While grain marketing faces significant challenges, as a non-perishable product it is more forgiving to delays in marketing than perishable fruits and vegetables. High transport costs and low consumer purchasing power lead to bottlenecks in the marketing of fruits and vegetables, which can result in wastage, especially at peak harvest time. Most of the unsold products in the wholesale fruit and vegetable markets is used as livestock fodder. The number of government's operational cold stores for

[xxi] Some sources give the number of concrete silos at 32.

the collection of perishable fruits and vegetables has been reduced to only 10 percent of its pre-crisis level and renting private facilities has increased substantially compared to pre-crisis levels, reflecting the shortage of cold storage facilities as well as difficulties in ensuring they run properly given the possibility of electricity outages and high fuel prices.

Although consumer prices have increased in 2021 compared to 2020, producers face the problem of low consumers' purchasing power. Table 18 compares market prices of fruits and vegetables in Deir-ez-Zor, Homs and Latakia.

The prices of tomato in Banyas market in Tartous Governorate was SYP 250-SYP 600/kg, even less than the last year where the price reached SYP 700/kg, while the production cost was SYP 700/kg. With increasing costs of production, many growers claimed that they were producing with a financial loss. Vegetable production from Dara'a is marketed in the main market of Al-Hal Souq in Damascus which is monopolized by few traders who impose price controls. Transportation costs are very high, averaging SYP 35 000-SYP 40 000/tonne. For comparison, in 2019, the same amount of SYP 40 000 was needed to transport about 1 tonne of produce from Quamishli in Hasakeh to Aleppo or Damascus, covering a distance larger than Dara'a to Damascus and crossing different areas of control.

Table 18: Syrian Arab Republic - Comparison of retail prices of fruits and vegetables, in Deir-ez-Zor, Homs and Latakia, 2020 and 2021 (SYP/kg)

Type of produce	Deir-ez-Zor		Homs		Latakia	
	2020	2021	2020	2021	2020	2021
Onions	150	175	-	-	400	900-1 000
Potatoes	350	450	260	520	300	500
Cucumbers	275	800	300	940	500	800
Tomatoes	275	800	250	500	300	300-500
Zucchini	250	550	270	844	300	500-600
Eggplants	250	225	300	400	250-300	300-400
Peppers	350	550	-	-	200	500-700
Watermelons	350	600	-	-	200	300
Peaches	1 500	2 250	-	-	1 500	2 000
Apples	1 250	2 250	-	-	-	-
Lemons	2 000	4 500	1 975	3 500	900	2 300
Garlic	-	-	-	-	3 300	3 000
Okra	-	-	-	-	2 500	3 500
Pears	-	-	-	-	1 500	2 000
Maize	-	-	-	-	250	800-1 000
Cabbages	-	-	-	-	200	400-500
Almonds	-	-	-	-	700	1 200-1 300
Broad beans	-	-	-	-	1 500	2 000-2 200
Oranges	-	-	-	-	300	650
Carrots	-	-	-	-	500	850

Source: CFSAM, 2021.

The main problems remain the unavailability of markets where farmers can sell their products and the underdeveloped value chains. The Quneitra agriculture directorate estimated that the governorate produced up to 1 000 tonnes of mulberries from 100 hectares. Farmers were reported to sell them to traders at SYP 1 900/kg, who then resold them for further processing at SYP 3 500/kg (Enab Baladi, 2021h). Given the high fuel costs, large differences between farmgate prices and prices further down the supply chain are not unusual. Farmers suspect that local traders are monopolizing markets. Among the many challenges facing the marketing of fruits are the high cost of packaging, 1 kg of higher quality bags at SYP 3 500, lower quality at SYP 2 500 (Enab Baladi, 2021i), the high transportation costs, the closure of border crossings with consequent no access to export markets and the long marketing chain from intermediaries and brokers. Vegetable growers used to export most of their produce to neighbouring countries, especially to Iraq and Lebanon. Such exports financially benefited growers and greatly reduced waste. Unfortunately, except for Kurdish-held areas, the borders now appear to be closed bilaterally for the movement of fruits and vegetables. Even when borders are opened, exports of agricultural products remain limited in an effort to protect domestic producers from foreign competition.

The country used to have some reasonably-sized commercial processing factories for fruits and vegetables, which provided another waste-saving outlet for surplus production. Currently, only few small processors remain, pulses, tomato paste and olive oil, and the price they offer to producers is usually unattractive. A number of factories serve as re-packaging hubs.

Cotton

In the past, difficulties in marketing and transferring the cotton crop from the production areas to ginneries were forcing some farmers to sell their production to private sector traders in their fields at low prices. This season, the Kurdish Authority paid SYP 1 950/kg of cotton, compared to SYP 1 500/kg, up from SYP 700/kg in 2020, offered by the government. Later in the season, the government adjusted the purchase price of cotton from farmers from to SYP 2 500/kg. Farmers residing in areas controlled by the Syrian Democratic Forces (SDF), the military arm of the Autonomous Administration of North and East Syria (AANES), which bans the selling of any quantity of cotton to regime areas through its checkpoints unless with the approval by the AANES-affiliate Agricultural Community Development Company. In past years, farmers were allowed to sell to government authorities (Enab Baladi, 2021b). According to farmers, even the purchasing price of SYP 1 950/kg does not fully cover the cost of production. As there is no government-sponsored cotton collection point in Hasakeh, MAAR offered to bear the costs of transportation for farmers wanting to sell their cotton crop to government authorities to the nearest government collection point in Raqqa or Deir-ez-Zor. Textile millers reportedly pay SYP 2 100/kg with delivery, transport and packaging fees. Given shortages of raw material, the public sector and industries were allowed to import ginned cotton for six months starting from 1 July 2021.

In 2019, there were three operational ginneries in the government-controlled areas and all of them are in Hama Governorate. Ginneries in Deir-ez-Zor, Raqqa and Qamishli were damaged and are not currently operational, but an operational one survives in Hasakeh under Kurdish control. Producers in Deir-ez-Zor, where yields this year are expected to be good, transport their seed cotton to Hama for ginning. In 2021, only the Maharda ginnery in Hama Governorate was reported to be operational.

Livestock markets

More than 90 percent of the national livestock production is marketed through the private sector without any government involvement. The major sheep and cattle domestic markets are in Aleppo and Hama. The conflict and economic crisis increased feed and fuel costs that, coupled with marketing challenges, have considerably disrupted the performance of the livestock sector. Prior to the crisis, with a well-developed road and communication infrastructure as well as relatively

short distances between markets, traders were able to compete in markets at national level. From March to May 2020, the period in which the markets were almost completely closed and the curfew to contain the spread of COVID-19 limited the movement between governorates, private slaughterhouses were closed and the movement of livestock and herds restricted. This slowed down the supply chains for meat and livestock products, as well as access to pastures and fodder, making the livestock sector one of the worst affected sectors.

Although security conditions improved compared to earlier in the crisis, the number of livestock markets has decreased and access to them is often difficult, aggravated by expensive fuel costs. This has a negative impact on livelihoods of livestock producers and traders as well as on consumers' access to livestock products. The value chain does not seem to be fully functioning and the lack of an adequate cold supply chain prevents transportation of meat and dairy products over longer distances and creates regional differences in prices and availability. Dairy products are processed traditionally and are often sold only in the area of production for fresh consumption.

Live animal prices

As a general rule in livestock economics, following a poor cereal harvest and a decline in pasture availability, farmers facing high feed costs try to destock part of their animals to secure funds for sufficient care and nutrition for the rest of the herd. Usually buyers are few, putting a downward pressure on prices of live animals. Destocking is not unusual during the winter months as feed prices seasonally increase, but this year farmers started selling animal earlier and in higher numbers. Consequently, prices of milk and dairy products have generally increased as their availability was limited, but prices of meat decreased because more animals were sold. Despite decreasing meat prices, animal protein remains out of regular reach for many segments of the population, given the low purchasing power, leading to high wastage.

In Hasakeh, prices of live livestock decreased in the current season by 50-75 percent compared to the previous season due to the increase in the number of livestock offered for sale, while prices of animal products increased by 75-100 percent due to the high costs of production and limited availability. In 2020, an average sheep fetched SYP 400 000, roughly equivalent to 1 tonne of barley, but in 2021, 1 tonne of barley costs about SYP 1.2 million, equivalent to the price of four sheep. In Deir-ez-Zor, a decrease in livestock prices by 30-40 percent was reported. In Dara'a, the price of a kilogramme of live sheep decreased from SYP 10 000 to SYP 7 000. In Hama, prices of sheep and cows have decreased, particularly since April 2021. The price of live sheep decreased to SYP 8 000 from SYP 11 000/kg, while the price of live calf decreased to SYP 6 700 from SYP 9 000/kg. In Tartous, the price of a pregnant cow this year is SYP 5 million, while it was about SYP 7 million last year. Similar price movements were reported also in Aleppo, Hama and Sweida. Table 19 illustrates the prices of live animals in Hasakeh in 2019/20 and 2020/21.

Table 19: Syrian Arab Republic - Prices of live animals in Hasakeh, 2019/20 vs. 2020/21 (SYP/head)

Animal	Average price 2019/20	Average price 2020/21
Sheep (ram)	1 000 000	450 000-500 000
Sheep (ewe)	600 000	230 000-250 000
Sheep (lamb)	400 000-300 000	130 000-150 000
Cow (adult)	4 500 000	3 000 000
Cow (one-year old)	3 000 000	1 500 000
Calf	4 000 000	2 000 000

Source: CFSAM, 2021.

Transporting live animals to other markets to obtain a better price is hindered by high transportation costs. In 2020, the cost to transport a single head of livestock from Hama to Latakia was SYP 2 500 and the cost to rent a truck was SYP 50 000, while in 2021, with fuel shortages, these costs increased to SYP 8 000 and SYP 150 000-SYP 200 000, respectively.

At the moment, the trend of declining prices of live animals as farmers consider destocking, has not yet fully materialized and destocking is likely to continue as feed becomes more expensive. In August 2021, the national average price of a two-year old live male sheep was SYP 515 448, with an increase by 36 percent one year before. The highest average price was recorded in Homs where a two-year old live male sheep was traded at SYP 627 429, while the lowest price of SYP 433 333/head was recorded in Deir-ez-Zor (WFP/VAM, 2021).

Unless mitigating policies are implemented, destocking is likely to continue as the cost of keeping livestock, including feed, fuel for pumping, fuel for transportation, limited purchasing power of the population, increases and farmers are forced to sell some animals either to other breeders, but it may be unlikely, given the difficult situation in the sector, or to slaughtering houses in order to feed the rest of the herd. Smaller breeders, having exhausted their resilience capacity, are more prone to be excluded from any recovery process in case the terms of trade improve. In order to secure better prices, livestock could also be smuggled out to neighbouring countries.

Livestock product prices

Most milk is produced mainly from small herds in the peri-urban areas to supply urban centres and, even before the crisis, milk productivity per cow is low compared to other countries. The low productivity level is attributed mostly to local animal husbandry practices, inconsistent feed quality and lack of genetic improvement. With the ongoing destocking process, prices of dairy and eggs increased due to the lower supply on the markets or, in some cases, they remained stable, despite the high energy costs that hinder production, processing and distribution.

Despite the increases in prices of animal products, although not uniform across the country, farmers claim that they are often unable to cover production costs, with minimal profit margins for farmers/breeders selling animal products. In the coastal governorates of Tartous and Latakia, the price of milk in early 2021 was SYP 800/litre at farmgate and SYP 1 000/litre in retail markets, compared to SYP 400/litre in 2020. In Dara'a, the milk price increased from SYP 300 to SYP 900 to SYP 1 000/litre within a year, while the cost of feed increased by ten times and the cost of Mastitis treatment increased from SYP 7 000 to SYP 30 000. In Homs, the average milk price increased from SYP 400-SYP 1 050. In some areas of Homs, cattle farmers complained of market monopolization by a few traders as there is no milk processing unit in the area and milk price remained stable at SYP 700-800/kg. In Hama, the price of milk is between SYP 800-SYP 900/litre, with a milk production per cow ranging between 15-20 kg/day. Most milk not sold fresh appears to be processed using traditional methods as large-scale industrial processing factories are not operational. In Tartous, production of a dairy cow last year reached about 20 kg/day, but this season it is less than 10 kg as a consequence of the weak nutritional status of animals. Examples of price increases of dairy products in Hasakeh are

Table 20: Syrian Arab Republic (Hasakeh) - Changes in prices of livestock products, 2019/20 and 2020/21 (SYP/kg)

Product	Average price in 2019/20	Average price in 2020/21
Cow milk	700	1 000
Cheese	2 500	3 500-5 000
Ghee	13 000	25 000-30 000
Meat	12 000	15 000

Source: CFSAM, 2021.

shown in Table 20. Similar increases prevailed in other governorates.

In Idleb, livestock breeders faced difficulties in marketing their animal products due to the lack of marketing centres in the areas controlled by the government. The lack of electricity prevented the storage of products, forcing breeders to sell them in neighbouring areas to traders and brokers, with a very low profit due to increased costs of production. The lack of markets was also reported from Quneitra where traders monopolize the markets or the farmers need to transport their products to Damascus at very high costs. Transportation costs for both products and live animals are high, adding to the total cost of production. Transportation costs from internal to coastal governorates of Latakia and Tartous are very high and are estimated at about SYP 8 000/head.

Although more animals are being sold, retail prices have not significantly decreased as the retail sector strived to cope with other increased costs. In Dara'a, the price of lamb decreased from SYP 11 000/kg in mid-April 2021 to SYP 8 500/kg at the end of May 2021, while the price of veal decreased from SYP 9 000 to SYP 7 000/kg (Enab Baladi, 2021e). However, the limited purchasing power of the population puts a downward pressure on demand, while energy costs for butchers to maintain the meat refrigerated are mounting.

Poultry prices increased. The cost of producing 1 kg of broiler meat is about SYP 5 000, while the selling price is about SYP 3 900. In Homs, the price of a plate of 30 eggs increased from SYP 2 440 in 2020 to SYP 7 525 in 2021.

Credit availability

The ACB continues to finance farmers, who are not in debt, by up to 60 percent of the value of their production requirements, seeds, fertilizers and cash payment, during the season. Worth to note that the ACB financed farmers with SYP 20 billion in the 2019/20 season and with SYP 30 billion in the 2020/21 season. The ACB grants loans to farmers, who are not in debt, at an interest rate of 9 percent for short-term loans, 11 percent for medium-term loans and 13 percent for long-term loans. In the livestock sector, the ACB continues to support short- and medium-term loans to build feed lots and feed stores in addition to marketing activities and buying subsidized feedstuffs and other production inputs. However, the required guarantees and collaterals, coupled with complex procedures for compliance, licensing and administration, limit the ability of many small livestock producers to access credit.

However, the no-debt requirement excludes a large share of farmers and livestock producers. In the past, a significant informal credit system was running in parallel to the official ACB credit system, ranging from seasonal advances to sheep producers for cheese production to the provision of capital funds for agroprocessing investments. The ongoing economic crisis, in particular the rapid devaluation of the Syrian pound, likely discontinued the informal system or made it unfeasible given the high cost of credit and risk of repayment failures. In the past, credit was also granted by input dealers, but it does no longer appear to be the case.

Box 6: Summary results from the household survey - Financing services

In addition to their savings, less than 40 percent of the farmers were able to reach other sources of financing, such as from traders, relatives or banks. However, most of those who could access any external financing sources said that it was difficult to get and it is less available than in the previous seasons. Moreover, it is not clear the proportion of farmers who tried to lend/secure money to finance their activities from these sources and who could not. It is found that farmers in Idleb, Ar-Raqqa and Deir-ez-Zor governorates could not access any of these financing sources and had to purchase inputs with their own cash This is mainly due to the unstable security situation and the weakness of the private and governmental financing institutions and systems in these areas as well as due to the deteriorating economic situation in general, which is becoming more limited due to their losses and the deteriorated purchasing power.

Financing Source	% of Farmers Accessed it	Most Common in:
Inputs Dealers (on credit till the harvesting season)	17%	Al-Hasakeh, Lattakia, Tartous
Family and Friends (borrowing money)	15%	Aleppo, Homs
Agriculture Bank (by items not money)	8%	Quneitra, Hama
Agriculture Products Traders (sold in advance)	5%	Lattakia

CEREAL SUPPLY AND DEMAND SITUATION

Population

Given the population movements, coupled with the losses and uncertainty associated with a conflict situation, it is difficult to estimate the level of inward migration and population growth. Partly due to increasing insecurity in the country and partly due to declining economic conditions in neighbouring Lebanon, OCHA puts the number of registered voluntary returnees in the first five months of 2021 at 21 600. Since 2015 up to and including 2018, according to UNHCR, there have been an estimated 137 000 voluntary refugee returnees. In 2019, over 52 000 people officially returned, although the figure declined to about 13 000 as the economic environment in the country worsened in 2020. Although this is only a small fraction of the overall pool of refugees, it has added to the natural population growth rate and reversed the downward trend of recent years. However, OCHA, taking account also of the reduction in conflict-related mortality, estimates the population at 21.18 million people in May 2021, up from 20.4 million in April 2019.[xxii]

National cereal balance sheet

The national cereal balance sheet for the 2021/22 marketing year (July/June) is presented in Table 21. The following assumptions have been made:

- By the middle of the 2021/22 marketing year (31 December 2021), the population of the Syrian Arab Republic is estimated at 21.18 million.
- Cereal production in 2020/21 comprises 1 045 million tonnes of wheat and 268 000 tonnes of barley.

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- For strategic reasons, Hoboob does not publicly provide information on the amount of grains currently in its stocks. However, opening stocks of wheat and barley are estimated at 100 000 tonnes and 30 000 tonnes, respectively.
- Closing stocks of wheat by the end of June 2022 are expected to remain unchanged at 100 000 tonnes, while there will be no closing stocks of barley.
- Per capita wheat consumption is set at 170 kg/annum. A reduction of 10 kg/capita/annum from the previously assumed 180 kg/capita/annum has been used to reflect an increased consumption of other relatively accessible carbohydrates and the reduction of protein consumption as the economy continues to contract, exchange rate weakens and limited employment opportunities constrain the purchasing power of the population.
- Considering an increasing slaughtering rate due to the high costs of feed, the

[xxii] It should be noted, however, that other observers believe the population to be much lower. For instance, Worldometer (https://www.worldometres.info/world-population/syria-population/) puts the population at 18 million.

Table 21: Syrian Arab Republic - National cereal balance sheet, 2021/21 marketing year ('000 tonnes)

Product	Wheat	Barley
Total availability	**1 145**	**298**
Production	1 045	268
Opening stocks	100	30
Total utilization	**4 308**	**2 433**
Food use	3 601	0
Feed use	99	2 172
Seeds	352	221
Field and post-harvest losses	157	40
Closing stocks	100	0
Imports (forecast)	**1 276**	**50**
Anticipated government imports	1 000	50
Anticipated commercial imports	0	0
Food assistance (in grain equivalent)	276	0
Uncovered shortfall	**1 887**	**2 085**

Source: CFSAM, 2021.

livestock population is estimated at 14 million sheep/goats and 700 000 cattle.

- An average feed requirement of 0.25 kg of barley grain/sheep/day as part of a ration of 1 kg/animal/day of total feed, including bran, browse and crop residues. This represents a minimum physiological maintenance requirement for sheep. An average feed requirement of 3.5 kg of barley grain/bovine/day. Out of 11.65 million chickens, about 2.7 million are fed with 100 g of wheat/animal/day.
- The planned cereal area for the 2022 harvest is expected to be lower than the area planted in the past, approximately 1.6 million hectares of wheat and 1.3 million hectares of barley.
- Seed rates of 220 kg/hectare for wheat and 170 kg/hectare for barley.
- Harvest and storage losses are estimated at 15 percent of production for both wheat and barley.
- The government is expected to import 1 million tonnes of wheat and 50 000 tonnes of barley.
- No commercial imports to the country are expected to take place although, as of September 2021, there is no licensing requirement in place.[xxiii]
- For the 2021/22 (July/June) marketing year, about 168 000 tonnes of wheat flour and 48 000 tonnes of bulgur are planned to be received as in-kind food assistance by WFP[xxiv] plus about additional 10 000 tonnes of wheat flour imported by other international agencies. Depending on the extraction rate, the wheat grain equivalent of 178 000 tonnes of wheat flour is between 220 000 and 230 000 tonnes

[xxiii] On 29 March 2020, the Syrian Ministry of Economy and Foreign Trade issued a resolution eliminating the licensing requirement on the import of wheat flour. Previously, the import permission of wheat flour was only granted to the state entity Hoboob and the businesses producing pasta (https://www.globaltradealert.org/intervention/79666/import-licensing-requirement/syria-the-government-allows-the-imports-of-wheat-flour-to-all-importers-following-the-covid-19-outbreak).

[xxiv] WFP has been procuring bulgur locally between 2016 and 2020, and importing only wheat flour to the country. This is the first time since 2016 that WFP plans to import also bulgur.

of wheat, while bulgur is converted to grain equivalent using a one-to-one ratio. Therefore, about 276 000 tonnes of wheat are expected to be received as food assistance. Additional food assistance by other organizations would reduce the uncovered shortfall.

At country level, the cereal uncovered deficit is estimated at almost 4 million tonnes, including 1.89 million tonnes of wheat and 2.1 million tonnes of barley. However, the situation may deserve an additional analysis. Although Hoboob remains the exclusive institution in charge of purchasing locally produced wheat, in previous years and in some locations, Kurdish authorities and private traders were purchasing grain at least at the same price as Hoboob and, in addition, they were collecting the grain on farms and often were setting the price in hard currency, removing the risk of currency depreciation. In 2021, Kurdish authorities set the purchase price of wheat in their areas of control at SYP 1 050/kg, compared to SYP 900/kg offered by Hoboob. As of mid-2021, Syrian government forces were in control of southern, central and western parts of the country, corresponding to about two-thirds of the country's area. The rest of the country is controlled by the opposition forces. Given the price differential offered by non-Hoboob buyers, it is very likely that only the production harvested in government-held areas would be available for consumption in those areas. About 70 percent of the national production originates from areas out of government control. Since the main country's wheat producing area is in the north and northeast governorates of Hasakeh, Raqqa and in north Aleppo that are under control of Kurdish and other authorities, the rest of the country is likely to face a significant wheat deficit, as local demand exceeds local production.

Scenario analysis: Partial wheat availability

Therefore, in order to estimate the uncovered shortfall only in the areas under government control, the following assumptions have been made:

- The population in areas under government control is estimated at about 16.5 million and their food requirements are estimated at about 3 million tonnes.
- Through Hoboob, the government would be able to purchase only 313 000 tonnes of wheat, corresponding to about 30 percent of the national production.
- About 85 percent of the 2.7 million chickens that are fed with wheat at country level are in government-held areas and, feeding them with 100 g of wheat/animal/day, it is estimated that about 84 000 tonnes of locally produced wheat will be used as feed.
- The planned wheat area for the 2021 harvest in the areas under government control is estimated at about 557 207 hectares and, using a seed rate of 220 kg/hectare, about 123 000 tonnes of wheat.

In this scenario, taking into account decreased production (314 000 tonnes), food use (3 million tonnes), feed use (84 000 tonnes), seed use (123 000 tonnes) and losses (47 000 tonnes) after accounting for anticipated government imports and food assistance, the uncovered shortfall is 1.6 million tonnes of wheat. Additional food assistance provided by other organizations would reduce this uncovered shortfall.

Depending on the ability to source and finance imports, it is possible that the estimated uncovered wheat shortfall could exceed the shortfall calculated in the balance sheet presented in this report. In 2019/20, the country imported over 20 000 tonnes of wheat flour from Egypt, while wheat imports from the Russian Federation were officially reported to be less than 17 000 tonnes. In December 2020, about 100 000 tonnes of Russian wheat were provided as humanitarian aid. On 18 January 2021, the country tendered for 200 000 tonnes of milling wheat and a similar tender was issued later in February. In early June 2021, in an effort to reduce dependency from humanitarian shipments of grain and increase commercial imports, the Russian Federation extended a loan to the Syrian Arab Republic, of which the Syrian government allocated a share to food purchases. Interfax reported that the Russian Federation is expected to supply the Syrian Arab Republic with 1 million tonnes of wheat in 2021 under bilateral agreements and about 350 000 tonnes of grain were already supplied as of late May.


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FUTURE TRENDS

The constraining impact of expensive inputs in many cases was amplified by the lack of liquidity stemming from late payments of outstanding dues for the agricultural products delivered in the previous harvests, complicating agricultural activities, including field preparation and sowing. However, farmers lacking feasible economic livelihood alternatives given the economic collapse of the country continue working their lands, even if, in many cases, using less intensive production methods and lower amounts of inputs.

Given the high cost of production stemming from the high input costs, coupled with the low availability of water for irrigation and increasingly unreliable weather patterns, many farmers reported adjusting their cropping patterns to adopt to new realities already. For example, although both rainfed and irrigated areas planted with wheat increased in 2020 compared to 2019 as a response to "Year of Wheat" initiative, some farmers reported increasing the rainfed areas planted with winter cereals at the expense of the irrigated to reduce costs.

Similarly, trends to replace crops with high water requirements and uncertain returns with less water intensive crops and obtain better yields prevailed across the country. In Hasakeh, some farmers planted larger areas with summer and winter vegetables as well as aromatic plants to respond to consumer demand and recover larger shares of costs. Medicinal and aromatic crops also increased in Raqqa. In Deir-ez-Zor, farmers planted vegetables previously not cultivated in the region, such as cabbage and cauliflower, and expanded cultivation of other crops, including sesame seed, potatoes, gypsum and alfalfa, to obtain better returns. In Aleppo, the areas planted to water intensive yellow maize decreased. In Quneitra, the areas cultivated with sesame increased, due to its high economic feasibility and low production costs. Tobacco, anise and nigella started to be grown in very limited areas. In Latakia and Tartous, farmers increased the areas under tobacco as well as medicinal and

aromatic crops at the expense of other crops as profits are higher. In Sweida, in 2020/21, some areas were newly cultivated by sesame in addition to increasing the areas cultivated by fodder-legume crops. Similar trends are occurring across the country driven by the lack of water and expensive inputs.

Saving water is not the main consideration. Where the level of water table allows, such as in eastern Homs, some farmers switched from cultivating almonds to more economically lucrative pistachios, although pistachios need more care and have higher water requirements. In parts of Ghouta (Rural Damascus), many farmers are re-cultivating the destroyed apricot fields with olives as well as planting sunflowers at the expense of wheat and other crops.

Although the 2020/21 season was challenging, planning for the 2021/22 crops, preparation of which are currently underway, is likely to be constrained by unabated increases the costs of production and their limited availability.

If in the past farmers could rely on the seeds saved from the previous harvest to tap on to cover the shortages left by the insufficient provision by GOSM and high market prices, a well below-average

2021 production is unlikely to grant this option. In fact, the average price of wheat seed in July 2021 was SYP 1 082/kg, while in Deir-ez-Zor, the price increased by 50 percent (FAO, 2021). Worries about securing sufficient amounts of seeds are justified across the country.

Prices of subsidized diesel already increased from SYP 180 to SYP 500. Although the higher official price is likely to cap the increases on the parallel market, farmers will have to purchase a large share of their needs on the market.

Prices of urea on the markets already exceeded the effectively liberalized ACB price of SYP 1 400/kg; in July 2021, the national average was SYP 1 725/kg, exceeding its June 2021 values by 10 percent. Prices of liquid nitrogen fertilizer remained fairly stable. Likewise, price liberalization increased the prices of phosphate fertilizers from SYP 300 to SYP 1 103/kg. In July, the price of phosphate fertilizer on the market averaged SYP 1 530/kg and was not available across the country.

Although some farmers hope the financing mechanisms, particularly from the ACB, will be adjusted to better fit their needs, a broader adjustment is unlikely.

Given the lack of other feasible livelihood options and financing mechanisms, farmers, should the plans to adjust their crop portfolio with more profitable alternatives not be sufficient, are reading themselves to engage in further sales of productive assets, such as animal destocking, land, remaining machinery, etc. to ensure sufficient liquidity for routine crop maintenance expenditures. As a last resort, leaving agriculture is an option despite the grim prospects of gaining employment in other sectors, especially in areas that rely on a single source, such as the Euphrates River, for water.

The probabilistic seasonal climate forecast from the International Research Institute for Climate and Society (IRI, 2021) is based on a re-calibration of model output from various sources. The precipitation forecast for the October–December season shows enhanced probabilities of below-normal precipitation over the Middle East, with signals continuing throughout the January–March season.

Box 7: Summary results from the household survey - Crop pattern changes (long-term/five years)

About 5 percent of the farmers stated that they had completely or partially switched from cultivating traditional crops, such as wheat and barley, to other crops, such as chickpea, potato, cotton, maize, fennel flower (*Nigella sativa*), sesame, etc. Farmers are considering options other than wheat and barley due to poor yields of grain crops caused by erratic climatic conditions, low quality of agricultural inputs and their belief that alternative crops are more demanded and, therefore, profitable. Over 20 percent of the interviewed farmers replaced the varieties of the crops they traditionally cultivate, mostly cereals, legumes and vegetables, seeking higher output and profits depending on the available seed supply on the markets.

RECOMMENDATIONS

The majority of the recommendations of the 2019 Crop and Food Security Assessment Mission (last joint FAO/WFP assessment mission carried out in the country) remain valid as some of the achievements of the last two years have been eroded by the ongoing economic crisis. Although actions are needed to save the production of the next cropping season and ensure livelihoods and sustainability in the medium-term, in the absence of a broader structural reform in the economy addressing the root causes of the rapid currency depreciation, shortages of fuel and meagre purchasing power of the population, exacerbated by the COVID-19 pandemic, the proposed recommendations would not result in any major and lasting improvements of the agri-food sector.

Urgent needs

Although past crop assessment missions have advocated for a transition away from emergency and basic livelihood support and to early recovery and reconstruction of the agricultural sector, given the difficulties and challenges faced by farmers during the 2020/21 season, the main recommendation for immediate action is to better prepare the upcoming cropping season and prevent further erosion of productive assets by:

- Easing shortages of, and improving access to, quality inputs, seeds, fuel, fertilizers, etc., by targeting the most vulnerable groups in the vulnerable areas that failed to produce crops due to the erratic weather conditions during the 2020/21 season. Where inputs are available and markets accessible, assistance should be provided in the form of vouchers or similar in order to allow markets to function. Unconditional cash could be provided with inputs to cover the immediate purchasing needs specifically during the lean season allowing farmers to dedicate the needed time and effort to plant their lands.


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- Supporting agricultural households that lost their crop, with appropriate agricultural inputs, accompanied by food assistance during the winter, in order to return them to agricultural production.
- Ensuring sufficient supplies of diesel for farming operations at official rates, without any rationing as for the case of emergency vehicles. The same way fuel for emergency vehicles is not rationed, farmers should have access to sufficient amounts of fuel.
- Taking action to stop destocking of animals due to high feed costs by targeting emergency feed distribution in kind or, where markets function adequately and are accessible, by providing vouchers.
- Providing emergency veterinary care, such as diagnostic kits, that will enable farmers to diagnose possible illnesses in areas without sufficient coverage of veterinary services.
- Continuing to demine areas still with remnants of the war.
- Promoting and incorporating context-specific Climate Smart Agriculture (CSA) practices for

crop and livestock production, including water systems for agrifood systems to become more resilient to the effects of climate change.

Medium-term actions

In the medium-term, recommendations focus on the need to boost direct and indirect employment opportunities, particularly in rural areas, increase profitability of farming activities, to provide decent livelihoods for returnees and promote a more sustainable use and management of natural resources in agriculture. Production revitalization should be pursued taking into account environmental constraints, such as water scarcity and occurrence of drought, and all actions should be coordinated in order to achieve the expected benefits. For instance, it is not sufficient to restock livestock without providing at the same time veterinary services, fodder and feed, and supporting essential value chains.

- **Crop production:**
  - **Revitalize seed production**, focusing on the most frequently grown crops in the country, appropriate for various agro-ecological zones. Particular attention should be paid to wheat as yield potential is currently constrained by the lack of early generation quality seeds as well as first generation certified seeds. GOSM remains well placed to head this action and support could include financial resources to increase the number of contracted out-growers, to provide quality herbicides and fertilizers that many contract farmers must now purchase themselves, and to provide seed-cleaning equipment. GOSM's other activities, such as the multiplication of seed potatoes and the planned revival of vegetable seed production, should also be supported.
  - **Support community composting** of food waste and other suitable scraps to improve soil productivity.
  - **Support** farmers with the required training for better management of new crops adopted by farmers (medical and aromatic crops, legumes, etc.).
  - **Rehabilitate orchards** for economic and environmental sustainability reasons.
  - **Improve local fodder production** to support the seriously deteriorated livestock sector.
- **Irrigation:**
  - **Continue the rehabilitation of damaged infrastructure, while maintaining the existing infrastructure** before it falls in dismay. Cash-for-Work as utilized in many other contexts could serve as a dual purpose support mechanism, providing cash to cover the immediate needs and the labour required for basic infrastructure rehabilitation.
  - Continue effort for the country to obtain fair shares of the waters of the Euphrates and Tigris rivers, through international forums and relevant bodies.
  - **Support adaptation of modern irrigation methods** (drip, etc.). At the moment, a large number of farmers rely on flood irrigation, which is the most wasteful irrigation method. Although modern irrigation methods require significant investments, they contribute to the sustainability of water resources and have lower energy requirements, such as fuel for pumping.
  - Educate farmers about financial and production benefits of joining water-users associations (WUAs) and publicize effective WUA structures as a way of ensuring proper distribution of water resources.
  - **Build water treatment plants** to make wastewater suitable for irrigation, preventing farmers from using untreated wastewater.
- **Livestock:**
  - **Improve registration of animals** to gather accurate information on their geographic location in order to facilitate the programming and assistance for livestock development until the next census is carried out. Registration of animals is now being

undertaken, but progress is relatively slow. Financial support, for personnel, transport, etc., would hasten registration.

- **Revitalize veterinary services** to ensure higher rates of AI success, veterinarians and technicians should receive adequate training on the correct identification of oestrus in both local and exotic breeds of cattle.
- **Rehabilitate veterinary diagnostic laboratories, food safety laboratories and slaughterhouses** in order to improve the early identification of animal diseases and the presence of unhealthy and unsafe food that is unfit for human consumption; thus, enhancing not only the control of animal diseases but also food safety and public health.
- Strengthen and facilitate veterinary services for household holdings of livestock, chickens, rabbits, turkeys, etc., in order to diversify sources of income, increase household production and enhance the nutritional status and food security of families.
- **Revitalize hatchery centres** to restart the activities of industrial poultry units.
- Although the country suffers from water scarcity, where sustainable, consider aquaculture and fish farms as done in neighbouring Iraq (carp, catfish).

➢ **Credit:**

- Provide short-term small loans that can substitute credit previously provided by input suppliers.
- Extend guaranteed credit or introduce small credit schemes to allow farmers' planting for next year, build storage places, etc. As appropriate, small grants could be provided instead of credit facilities.

➢ **Marketing:**

- **Rehabilitate cold chains for perishable food products** which would also improve the distribution of vaccines, veterinary drugs and AI straws. The possibility of collaboration with refrigerated-transport companies should be explored.
- **Build accessible cold storage facilities on farms or in villages** so farmers can store products and move them to more distant markets, taking advantage of economies of scale. Cooperative arrangements might be a suitable option.
- **Rehabilitate food processing factories** to enhance value addition and reduce the significant waste of fruits and vegetables, especially in the main producing areas.
- **Consider shortening marketing channels** in areas close to urban centres and markets.
- **Although difficult to achieve from the fiscal point of view, consider building-in currency devaluation** into the procurement pricing schemes to allow farmers to make proper decisions about cropping.
- **Provide capacity development** on food storage, packaging and processing.
- **Adopt alternative, solar and wind, energy** to operate cold stores and food processing units, in order to overcome current and future fuel shortages.

➢ **Extension services:**

- Provide information and training about various aspects of crop and livestock production, including the correct use of agrochemicals, such as the proper timing of application, the correct concentration and dosage according to the manufacturers' instructions and safe usage practices, and veterinary medicines. A revitalized extension service will also be fundamental in dealing with climate change adaptation and mitigation, including scaling up training on relevant climate smart agriculture practices.

➢ **Information and provision of public goods:**

- **Improve market information systems** to assist producers in making the right and timely decisions and increase their profits as well as to reduce production losses.

Extension agents, well informed about the profitability of different crops, particularly highly perishable fresh produce, should advise producers accordingly.

- **Gather measurements of underground water** as part of the climate change adaptation and mitigation measures to allow better decisions.
- **Prepare a detailed study** on the effect of climate change on cropping patterns as an input for targeted programmes on climate change mitigation and adaptation. Although at the moment some farmers have been adjusting their cropping plans to changing weather patterns, the bulk of the agricultural sector remains hopeful that part of the erratic rainfall and temperatures is due to usual weather variability.
- **Strengthening monitoring and early warning systems** which help farmers prepare properly and face the risks of natural disasters on agricultural production in a systematic, scientific manner.

Long-term actions

- **Support cooperative arrangements:** Where appropriate and necessary, farmers should be advised about the financial advantages of cooperative purchase of inputs and marketing of produce as well as collective credit through the proper functioning and activation of existing peasant cooperatives to boost a community geographical approach. Cooperatives could also be used to secure cold storage, transportation, mechanization, etc.
- **Explore the feasibility of alternative energy sources, including solar**, to decrease the cost of running petrol-driven pumps for irrigation and other uses. Although solar pumps have been blamed for over-pumping of underground water, a more likely culprit is the high number of illegal wells.
- **Carry out a livestock census**, as soon as possible when conditions allow.
- **Re-establish various supply chains in the country** to allow a full recovery of the agricultural sector, including functioning cold chains that would allow the smooth transportation of agricultural products from surplus to deficit areas of the country. Functioning markets and supply chains will also contribute to a reduction of post-harvest losses in the field as well as losses in livestock production.
- **Consider introducing risk-management scheme** tools, such as weather-based insurance schemes to allow farmers to effectively hedge their risks.
- **Improve the general technical capacity of human resources** in the sector.
- **Boost investments to assist the reconstruction and recovery** of agricultural infrastructure.

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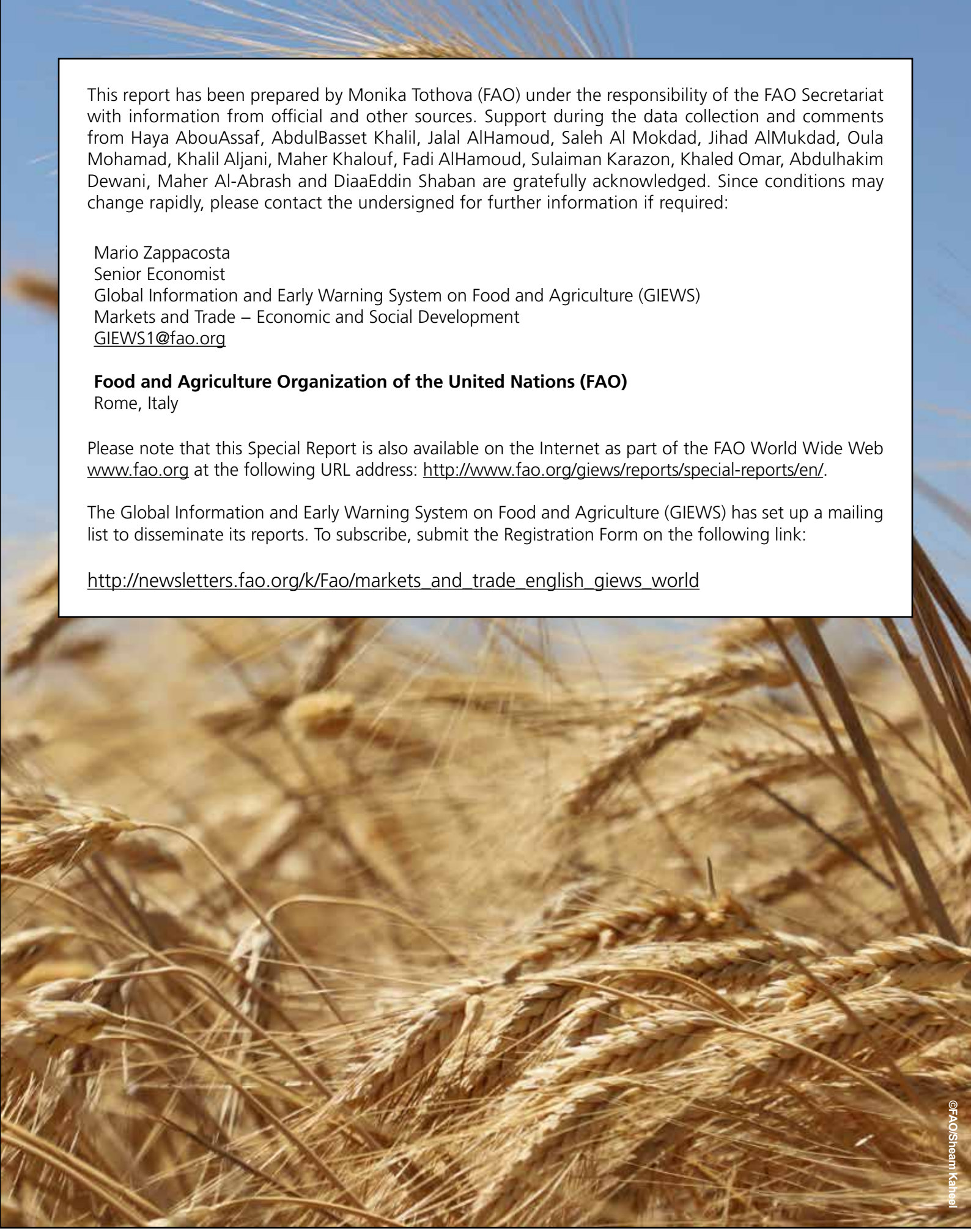

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