Food and Agriculture Organization of the United Nations

Syrian Arab Republic

Precipitation analysis

2020/21 agricultural season and long-term spatio-temporal trends

At a glance

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Contents

Crisis overview

In numbers

45% of population rely on agriculture for their livelihoods

1.4 million ha of land irrigated prior to the crisis

60% of land planted with wheat and **90%** planted with barley is rainfed

This technical paper provides an analysis of the spatio-temporal trends of precipitation in the Syrian Arab Republic from 1980 to 2021, an analysis of precipitation during the 2020/21 agricultural season by governorate, and the implications for agricultural production. It also provides key recommendations to address the impact of the erratic rainfall and water scarcity in order to build more effective food production systems that are resilient to climate-induced shocks. The recommendations also seek to prevent most crisis-affected farmers from sliding into food insecurity.

The impact of the poor harvest from the 2020/21 agricultural season on Syrian families is compounded by interrelated issues that include economic constraints, currency depreciation, poverty, conflict, population displacement and climate-induced factors. The consequences of uneven temporal distribution of rainfall combined with high temperatures will not only affect the current cropping season but the effects may also be felt in the next one to two years.

2020/21 agricultural season

In the Syrian Arab Republic, agriculture is a key economic sector and a primary source of livelihoods for most crisis-affected families, especially in rural areas where an estimated 45 percent of the population depend on agriculture. Although around 1.4 million ha of agricultural land was irrigated prior to the crisis, representing an estimated 30 percent of the total cultivated land, the majority of Syrian cereal cultivation is rainfed, thus, it is sensitive to weather shocks and climate volatility. It is important to note that 60 percent of the land planted with wheat is rainfed as is at least 90 percent of the land planted with barley.

The 2020/21 agricultural season has been characterized by a delayed onset of rainfall by at least two months across the country, with low rainfall prior to November 2020. Furthermore, many areas received no rain after March 2021, a much earlier onset to the dry season, which typically begins at the end of June.[1] This was accompanied by high temperatures that were above the long-term average (LTA) in most governorates, especially in April 2021[2], which caused heat stress on crops and affected grain filling. The high cost of agricultural inputs[3] was another factor that negatively affected the sector, with the cost and limited availability of fuel to power irrigation systems significantly impacting production.

The impact of climate change on the Syrian Arab Republic will be seen in the near term as more frequent and intense extreme weather events, and changing temperatures and precipitation patterns. Furthermore, an extrapolation of the climatic data and indicators suggest that in the long term there is a likelihood that the drier zones of the country will experience drought once every three years.

This analysis of the precipitation data covering the past 40 agricultural seasons finds that the most severe, widespread droughts occurred during the agricultural seasons of 1998/99, 1999/00, 2007/08 and 2008/09. It also highlights that drought is not limited to one season, but can extend to two or three consecutive seasons.

Table 1 in the Annex illustrates that the 2020/21 agricultural season was not one of the driest years on record, however, the data show that there was a significant delay in the onset of rainfall, with the first rains falling in November 2020. Furthermore, month-on-month analysis shows that rainfall ceased in April 2021, significantly impacting the grain filling stage and signaling the end of the 2020/21 wet season.

The cumulative rainfall during the 2020/21 season is considered acceptable-to-good in most governorates, however, the distribution over

1 **FAO.** 2021. Syria: Agriculture and Food Security Monitoring System (AFSMS), Bulletin, January–February 2021. In: *Food Security Cluster* [online]. Rome. [Cited 23 September 2021]. https://fscluster.org/syria/document/fao-agriculture-and-food-security

2 **Ministry of Agriculture and Agrarian Reform, Syrian Arab Republic.** 2021. *Monthly Drought Monitoring Bulletins: Drought Early Warning Project and Drought Monitor Bulletin for April 2021*. Damascus.

3 **FAO.** 2021. Syria: Agriculture Input and Commodity Bulletins, October 202 –June 2021. In: *Food Security Cluster* [online]. Rome. [Cited 23 September 2021]. https://fscluster.org/search?text=Syria+Agriculture+Input+and+Commodity+Bulletin

It is likely that the production in the current cropping season will be close to historic lows.

time was insufficient for cereal production in several key cereal-producing governorates, notably in Al-Hasakeh and Deir-Ez-Zor. This irregular timing of rainfall has had catastrophic effects on production. It is likely that the production of the current cropping season, particularly in Al-Hasakah, Ar-Raqqa and Deir-ez-Zor Governorates, will be close to the historic lows seen in the 2007/08 season. The situation in other governorates is relatively better, though all have been adversely affected by the climate conditions referred to above to some extent, especially in Rural Damascus, As-Sweida, Dara'a and Homs.

Despite the acceptable-to-good cumulative rainfall in most governorates of the Syrian Arab Republic during the 2020/21 season, the climate conditions are classified as moderate drought, as the onset of the rains was delayed, the dry season began early, and governorates in the northeast received lower than average cumulative rainfall. The negative effect on cereal production was compounded by additional crisis-induced factors, most notably the high cost and limited availability of agricultural inputs, especially diesel fuel, which impacted the capacity of farmers to provide supplementary irrigation to stressed crops. Additionally, farmers have not had the capacity to use the inputs efficiently (especially fertilizers and herbicides), further impacting production.


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Recommendations

- The failure of the 2020/21 harvest will not only affect the availability of grain, but is also expected to have a secondary impact on the availability of seed, especially wheat and barley, for the next season. Urgent action is needed to secure supplies of good quality seed for the most vulnerable farmers.

- There is a need to scale-up funding to support the rehabilitation of irrigation systems. Agricultural land should be linked with efficient systems for water delivery to crops, and the use of non-conventional water (i.e. treated water) in irrigation should be consider. Efficient irrigation techniques apply water when and where it is needed and, therefore, conserve water. Investment in irrigation needs to be targeted at the farm level.

- Conservation agriculture techniques should be implemented if and when possible to contribute to the development of a sustainable and profitable agriculture sector.

- Use of organic mulch from cut grass and crop residues, where available, will help retain soil moisture by limiting evaporation from the soil surface, especially during summer. Mulching has additional benefits, including preventing weed growth, improving soil structure and regulating soil temperature.

- Sector partners would benefit from strengthening the capacity of farmers on water conservation. Water conservation techniques include irrigation scheduling, which ensures that crops are irrigated based on their water requirements.

- Developing new drought tolerant varieties and promoting relatively drought tolerant crops in local farming systems is critical. Continued cultivation of crops with high water demands, including sugar beet and cotton, should be avoided in water-scarce areas.

- Initiatives are needed to plan water resource usage among the various users, including the agriculture sector, which is the main consumer of water, as well as communities who need drinking water. Community level planning to ensure sustainable water resource management will be even more important in the context of a changing climate. Where irrigations systems are out of order, it is essential to avoid drawing on scarce drinking water supplies for use in irrigation. Water User Associations will be key to achieving effective water resource management.

Annex – Precipitation in the Syrian Arab Republic (1980–2021)

The following tables show monthly and annual precipitation data compared to the long-term average (LTA) in governorates across the Syrian Arab Republic. The analysis covers data from 1980 to 2021, with the driest seasons in each governorate presented. Seasons that are classified as moderate or severe drought are highlighted (see legend below). The precipitation data are presented as a percent of the governorate LTA.

Source for all tables

Ministry of Agriculture and Agrarian Reform, Syrian Arab Republic. 2021. Series of Statistical Volumes (1980–2021). Chapter One: Precipitation and land uses: Table No. 1 Amounts of rainfall by governorates for the year (researched year). In: *Ministry of Agriculture and Agrarian Reform (1980–2021)* [online]. Damascus. [Cited 1 July 2021]. Internal database.

FAO. 2021. Syrian Arab Republic, Monthly Rainfall Bulletins (1980–2021). In: *Global Information and Early Warning System on Food and Agriculture* [online]. Rome. [Cited 23 September 2021]. www.fao.org/giews/earthobservation/country/index.jsp?code=SYR

Annex 1. Precipitation recorded during the driest seasons from 1980 to 2021 by governorate (% of the annual LTA for each governorate)

	Al-Hasakeh	Deir-ez-Zor	Ar-Raqqa	Aleppo	Idleb	Latakia	Tartous	Hama	Homs	Dara'a	As-Sweida	Rural Damascus
1983/84	58	68	48	51	72	100	94	89	83	74	91	64
1985/86	106	106	131	75	97	102	83	97	70	73	78	54
1986/87	85	36	47	89	129	95	111	101	109	114	128	84
1988/89	70	59	85	57	70	79	61	70	65	101	80	71
1989/90	78	83	81	67	75	72	65	54	57	123	113	76
1991/92	236	65	89	82	60	120	122	109	154	155	164	127
1992/93	161	124	130	76	92	83	80	110	57	83	96	146
1993/94	97	105	85	60	98	93	92	70	66	70	95	96
1998/99	48	27	46	84	95	93	83	78	58	39	40	36
1999/00	44	52	46	77	83	93	84	79	64	56	72	59
2007/08	31	38	42	130	103	95	99	84	116	82	59	57
2008/09	56	59	59	96	103	97	96	91	128	103	95	71
2009/10	67	103	51	119	94	88	96	83	99	104	109	96
2010/11	72	77	55	100	114	97	143	98	105	105	91	137
2011/12	61	59	74	147	151	164	119	136	116	114	127	63
2013/14	71	85	102	48	39	48	37	65	62	75	79	85
2015/16	157	105	106	80	49	47	68	73	86	99	110	52
2020/21	59	51	58	68	64	82	115	79	96	98	78	99

Moderate drought: Annual precipitation between 40–59% of the LTA

Severe to very severe drought: Annual precipitation below 40% of the LTA

Annex 2. Precipitation recorded by month in the driest seasons by governorate from 1980 to 2021 (% of LTA)

Al-Hasakeh Governorate

	Season (% of LTA month-by-month)					
	1983/84	1998/99	1999/00	2007/08	2008/09	2020/21
September	0	0	0	0	100	0
October	30	0	53	34	148	0
November	47	0	10	1	18	160
December	78	30	35	12	98	49
January	58	20	53	69	8	71
February	25	9	38	20	65	23
March	67	73	25	28	54	105
April	67	67	66	30	68	7
May	130	0	127	68	2	0
% of LTA of season	58	48	44	31	56	59

Note: LTA for Al-Hasakeh Governorate is 254.4 mm.

Deir-ez-Zor Governorate

	Season (% of LTA month-by-month)							
	1986/87	1988/89	1998/99	1999/00	2007/08	2008/09	2011/12	2020/21
September	600	0	0	0	0	3100	0	0
October	24	107	0	6	26	181	33	0
November	27	41	0	3	28	44	46	107
December	49	100	28	30	15	49	20	46
January	12	41	6	95	47	27	142	56
February	18	10	60	24	73	51	37	38
March	91	102	36	63	34	45	44	52
April	13	0	53	129	11	24	12	12
May	0	0	0	0	16	21	64	0
% of LTA of season	36	59	27	52	38	59	5	51

Note: LTA in Deir-ez-Zor Governorate is 148.6 mm.

Ar-Raqqa Governorate

	Season (% of LTA month-by-month)								
	1983/84	1986/87	1998/99	1999/00	2007/08	2008/09	2009/10	2010/11	2020/21
September	0	0	0	0	0	300	733	0	0
October	16	6	2	0	60	14	23	33	0
November	14	35	27	27	10	9	85	0	83
December	11	35	57	2	27	57	56	60	14
January	43	32	71	98	37	26	29	63	58
February	11	25	16	18	29	79	33	32	35
March	39	98	30	29	20	75	5	12	96
April	12	23	43	61	0	48	18	137	51
May	6	0	0	30	126	0	10	13	0
% of LTA of season	48	47	46	46	42	59	51	55	61

Note: The LTA in Ar-Raqqa Governorate is 176.1 mm.

Aleppo Governorate

	Season (% of LTA month-by-month)				
	1983/84	1988/89	1993/94	2013/14	2020/21
September	0	0	0	53	0
October	41	157	34	8	0
November	121	135	82	7	103
December	14	74	35	118	47
January	65	5	71	29	184
February	24	77	57	22	13
March	74	34	82	124	77
April	68	0	33	0	24
May	3	1	104	0	0
% of LTA of season	51	57	60	48	68

Note: LTA in Aleppo Governorate is 391.4 mm.

Idleb Governorate

	Season (% of LTA month-by-month)		
	2013/14	2015/16	2020/21
September	59	20	0
October	20	160	0
November	34	26	48
December	66	21	47
January	27	65	173
February	17	39	35
March	65	70	21
April	20	22	83
May	45	59	0
% of LTA of season	39	49	64

Note: The LTA in Idleb Governorate is 479.1 mm.

Latakia Governorate

	Season (% of LTA month-by-month)		
	2013/14	2015/16	2020/21
September	603	8	1
October	13	51	0
November	84	50	159
December	27	6	77
January	11	57	121
February	61	48	43
March	45	40	96
April	17	40	71
May	29	220	0
% of LTA of season	48	47	82

Note: The LTA in Latakia Governorate is 743.1 mm.

Tartous Governorate

	Season (% of LTA month-by-month)	
	2013/14	2020/21
September	118	0
October	28	0
November	11	202
December	58	130
January	9	195
February	29	46
March	67	62
April	34	97
May	191	0
% of LTA of season	37	115

Note: The LTA in Tartous Governorate is 888.3 mm.

Hama Governorate

	Season (% of LTA month-by-month)	
	1989/90	2020/21
September	0	0
October	64	0
November	74	115
December	62	50
January	52	200
February	50	18
March	21	56
April	62	37
May	79	0
% of LTA of season	54	79

Note: LTA in Hama Governorate is 340.2 mm.

Homs Governorate

	Season (% of LTA month-by-month)			
	1989/90	1992/93	1998/99	2020/21
September	93	7	16	0
October	20	0	10	0
November	20	46	82	144
December	27	45	83	84
January	22	53	60	183
February	103	64	50	38
March	100	105	76	69
April	100	49	18	92
May	100	77	0	0
% of LTA of season	57	57	58	96

Note: LTA in Homs Governorate is 385.8 mm.

Dara'a Governorate

	Season (% of LTA month-by-month))		
	1998/99	1999/00	2020/21
September	0	0	0
October	48	0	0
November	0	8	172
December	31	19	72
January	42	130	102
February	59	41	153
March	48	52	67
April	26	23	18
May	0	0	0
% of LTA of season	39	56	98

Note: LTA in Dara'a Governorate is 266.5 mm.

As-Sweida Governorate

	Season (% of LTA month-by-month)		
	1998/99	2007/08	2020/21
September	0	278	0
October	0	0	0
November	31	89	222
December	37	50	62
January	61	84	84
February	15	60	75
March	62	19	40
April	41	53	36
May	13	44	0
% of LTA of season	40	59	78

Note: LTA in As-Sweida Governorate is 322.5 mm.

Rural Damascus Governorate

	Season (% of LTA month-by-month)					
	1985/86	1998/99	1999/2000	2007/08	2015/2016	2020/2021
September	0	275	0	600	500	0
October	52	0	23	0	68	0
November	12	1	1	31	75	175
December	35	51	38	53	31	92
January	42	55	174	121	63	157
February	76	33	8	80	39	94
March	72	47	64	11	38	78
April	156	51	82	21	55	20
May	12	0	6	42	64	0
% of LTA of season	54	36	59	57	52	99

Note: The LTA in Rural Damascus Governorate is 153.6 mm.

Quneitra Governorate

	Season (% of LTA month-by-month)	
	2013/14	2020/21
September	45	0
October	20	0
November	21	241
December	98	58
January	10	143
February	25	44
March	92	76
April	10	89
May	327	0
% of LTA of season	53	92

Note: LTA in Quneitra Governorate is 603.5 mm and the LTA of precipitation data analyzed is from 2005 to 2021, the period in which rainfall was documented regularly.

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