Positive cereal campaign in most of the Maghreb

The 2017-2018 winter cereals campaign is finishing with auspicious yield forecasts in many regions of the Maghreb as a result of favourable growing conditions in Morocco, Algeria and northern coastal Tunisia. Yield forecasts in Egypt and Libya are close to the five-year average.

In Morocco and Algeria, the vast majority of agricultural areas benefited from mild temperatures and abundant and well-distributed rain between mid-March and May. This came at a very pertinent time, before flowering, and led to favourable stocks of soil water to sustain optimal water supply during this delicate phase of phenological development and for yield formation during the grain-filling period. Prospects are similarly positive in the major wheat-producing regions of northern coastal Tunisia, where growing conditions were favourable during most of the growing cycle. However, in the rest of Tunisia, the cereal harvest is expected to be poor because most of the season was marked by persistent rain scarcity.

Libya and Egypt experienced a much warmer-than-usual spring, which caused accelerated leaf ageing and shortening of the grain-filling period. The yield prospect in both countries — where most of the agriculture is irrigated — remains close to the five-year average.

### North-Africa yield forecast - July 2018 Bulletin

<table>
<thead>
<tr>
<th>Country</th>
<th>Crop</th>
<th>Yield (t/ha)</th>
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Sources: Ministère de l'agriculture Tunisie and DSASI-M ADR Algeria. 2018 yields from MARS CYFS. NA (no data)
1. Agro-meteorological overview

Morocco, Algeria and Tunisia

Temperatures in Morocco and Algeria fluctuated around the average during the review period (16 March to 30 June) while Tunisia was warmer than usual. Rainfall was well above average in the main crop-producing northern regions of Morocco, Algeria and northern coastal Tunisia until late May/early June, thus providing exceptionally good crop water supply conditions until the end of the growing season.

In the first half of March, beneficial precipitation occurred in Morocco, primarily in the Centre Nord Ouest and Centre Nord regions. In the second half of March, the abundant rainfall that was first experienced in Morocco extended eastwards, resulting in above-average rainfall totals in a broad belt along the entire Mediterranean coastline. This precipitation favourably increased or even fully replenished soil moisture levels. Temperatures remained 1-4°C below average in most agricultural areas. April was also wetter than usual in northern Morocco as well as in north-western and northern central Algeria. In these regions, rainfall exceeded the average by 20-120mm (locally up to 200mm). In north-eastern Algeria and northern Tunisia, rainfall was somewhat below the LTA, except in the northern coastal areas of Tunisia. Temperatures were predominantly above the LTA (by 1-3°C), except during the first half of this month, when the western Maghreb presented a small negative thermal anomaly.

In May, precipitation also exceeded the LTA in the Tensift, Centre and Centre Sud regions of Morocco, in north-eastern Algeria and in northern and eastern Tunisia. The Nord Ouest and Centre Nord territories of Morocco experienced somewhat below-average rainfall, and in other regions precipitation was more or less average. Temperatures during the first two dekads of May remained 1-5°C below the LTA. During the last dekad of May, perceptible warming started in the eastern half of the whole (Maghreb) region. In Morocco and northern Algeria, a relatively small number (<5) of hot days ($T_{max}$ >30°C) during this period was beneficial for grain filling. In Tunisia, the number of hot days was slightly higher than usual.

June was predominantly dry. Some rainy days occurred at the beginning of the month in north-western Algeria and some local precipitation events occurred in north-eastern Algeria and northern Tunisia. Thermal conditions followed a near-seasonal trend in June.
Libya and Egypt

Rainfall was below average in Libya, whereas northern and eastern parts of Egypt experienced slightly above-average precipitation, albeit with totals remaining below 40mm. Temperatures were predominantly above average in the littoral regions of Libya and Egypt, resulting in a 1-4°C positive thermal anomaly for the period as a whole.

Most rain was concentrated in the coastal areas. The rainfall totals during the review period remained 5-20mm below the LTA. In western Libya, cumulative precipitation reached 20-40mm in the western coastal regions of Tripolitania, but rainfall was sparse (1-10mm) in the eastern coastal regions of Tripolitania. In eastern Libya, the northern provinces of Cyrenaica received 10-40mm of rain, but the eastern coastal areas close to the border of Egypt (e.g. Tubruq) experienced less than 10mm.

In Egypt, the highest amounts of rainfall during the review period were recorded in the Nile Delta, along the eastern Mediterranean coastline of the country and in the northern half of the Sinai Peninsula. Precipitation sums in these regions exceeded the LTA by 5-20mm but remained in the 15-40mm range. Some precipitation, typically 10-20mm, was received along the western Mediterranean coastline of Egypt and the southern parts of the Sinai Peninsula. However, the majority of cereal production in Egypt is not influenced by rainfall variations, since it comes from the irrigated fields of the Nile Valley and Nile Delta regions.

Temperatures in both countries were higher than usual by 1-4°C. The most distinct temperature anomalies occurred in the coastal regions of Cyrenaica in Libya, the southern Nile Valley, the Nile Delta and north-eastern parts of Egypt. In these regions, daily temperatures almost continuously exceeded the average, with adverse effects on the crops. On the hottest days, the daily maximum temperatures reached 35-45°C even in the main regions of crop cultivation. During the review period, the number of hot days ($T_{\text{max}} >30^\circ\text{C}$) exceeded the LTA by 8-15 days in most of these regions, but by 25-40 days in the Nile Valley and Nile Delta. The longest hot spells had a duration of 10-18 days until the end of May, when the winter cereals cropping season finished.
2. Country analysis

Morocco

Excellent winter cereal harvest

Conditions for crop growth in Morocco have been very favourable during the period under review (16 March to 30 June) and, in fact, for most of the cropping season (since December). In terms of water supply, the period under review was the wettest period in the past 43 years in Nord Ouest (245mm of precipitation, i.e. +106% compared with the LTA). The other agricultural regions were also wetter than usual: 99mm in Centre 83mm in Tensif, 62mm in Centre Sud and 188mm in Centre Nord, i.e. +26%, +28%, +6% and +72% compared with the LTA respectively. Rainfall was fairly evenly distributed over the season, which helped to keep positive stocks of water during most of the phenological development.

Temperatures were predominantly below average in the majority of the agricultural regions. During spring, heatwaves were observed in Tensif only, where temperatures peaked at 31°C on 18 April. However, the duration was short and at that time soil water levels were sufficient to mitigate the impact of hot weather on crops at the end of the grain-filling stage. In the majority of agricultural regions in Morocco, the performance of winter cereals was very positive, as reflected in the positive anomaly of biomass accumulation in the fAPAR signal (see figure).

This all suggests well above-average yields for the 2017-2018 winter cereal campaign in Morocco. Local sources also report excellent harvests(1). Our yield forecast exceeds the five-year average by 14% for soft wheat, 17% for durum wheat and 34% for barley.

(1) http://www.agrimaroc.ma/cereales-100-millions/
Algeria

Abundant rain leads to positive yield outlook

As in Morocco, growing conditions in Algeria have been predominantly favourable during the period under review (16 March to 30 June), mainly because of the abundant and well-distributed rains.

In central and western Algeria, 100-325mm of rainfall was recorded over this period, which is more than 100% above the LTA and a historical maximum in Tiaret for this period. These rains are directly related to the good performance of winter cereal yields because they arrived at the beginning of flowering, causing a boost in crop growth and ensuring favourable soil moisture levels until crops reached maturity. In eastern Algeria, rainfall totals varied between 120mm and 230mm (i.e. 20-60% above the LTA). The timing and distribution of rainfall events were such that wheat and barley growth in many cereal-producing regions, such as Sidi Bel Abbès and Sétif, recovered from the water stress conditions during the first stages of vegetative growth observed in the March Bulletin. However, this was not the case in Oum El Bouaghi and Batna, where winter crops were already irreversibly affected by the persistent drought during vegetative growth. Apart from a cold mid-March, temperatures were within normal levels from March to mid-June, which encompassed the development stages from pre-flowering to maturity of winter cereals in most of Algeria. The highest temperature anomalies (6-8°C >LTA) were registered during the last days of June in central and eastern Algeria, where the intensity of heatwaves was higher ($T_{\text{max}} >40^\circ\text{C}$). However, winter cereals were practically mature at that time and no impact on yields is expected.

The above-mentioned positive conditions are clearly reflected in positive anomalies of the fAPAR indicator for biomass accumulation, observed by remote sensing imagery, as shown in the graphs representing central and western Algeria (Sidi Bel Abbès) and eastern Algeria (Sétif).

Consequently, Algerian farmers, currently in full harvest, are expected to reach above-average yields, except in Oum El Bouaghi and Batna. Our forecasts at the national level exceed the five-year average by 14% for soft wheat, 13% for durum wheat and 7% for barley.
Tunisia

Mediocre harvest, especially for barley

Cumulative rainfall over the period under review (16 March to 30 June) was above average in northern coastal regions. Rain was mostly concentrated in the second half of March, which was one of the wettest in our 43 years archive. This provided sufficient stocks of water to keep conditions favourable for grain filling in the major wheat-producing regions of Bizerte, Jendouba and northern Beja, as well as in northern areas of Le Kef and Nabeul.

Rains were scarcer and below average in the rest of the country. Therefore, in the remaining Tunisian crop land regions (e.g. Siliana, Kairouan) the remote sensing signal indicates early senescence, shortening the grain-filling period in winter cereals, and thus resulting in lower biomass accumulation.

Crop failures occurred in the centre-south regions (Kairouan, southern Le Kef, Kasserine Siliana), which faced drought during large parts of the growing cycle (October to May). This has a particularly high impact on barley production because a large proportion of this crop is produced in those regions.

At the country level, yield forecasts for all crops — barley, durum wheat and soft wheat — are below the five-year average.
Egypt

Yield outlook slightly revised downwards due to warm conditions

Weather conditions through the review period (16 March to 30 June) have been substantially warmer than usual in most of the Nile Valley and Nile Delta, where Egyptian agriculture is concentrated. Temperatures remained consistently 2-7°C above the LTA through the review period and, in fact, through most of the winter-cereal-growing season (December to May in Egypt). Numerous heatwaves occurred from early March until wheat and barley reached maturity in the first dekad of May. The intensity of heatwaves (with $T_{max} > 40°C$) was uniformly distributed over the country, but with higher frequency and longer duration in the interior parts of the Nile Delta, with more than 15 consecutive days with $T_{max} > 30°C$.

Owing to the hot temperatures, the grain-filling period of winter cereals started around one week earlier than usual (in the first dekad of March). The crop photosynthetic activity indicator (fAPAR) — as indicated by satellite imagery — suggests that early ripening was more marked in the interior regions (e.g. Gharbia, around two weeks early) than in coastal agricultural areas (e.g. northern Dakahlia, one week early). The fAPAR indicator started to drop in the first dekad of March and remained lower than average until the first dekad of May, followed by the above-average signal throughout June, which is likely to indicate an early start and advanced growth of summer crops.

The cooling effect of irrigation, which characterises the vast majority of cropping systems in Egypt, mitigated a more serious impact on crop yields. Yield forecasts were revised downwards slightly to just below the five-year average.
Libya

Yield expectations average

Overall, weather conditions in spring have been warmer than usual in the two main agricultural areas of Libya: Tripolitania in the west (Tripoli) and Cyrenaica in the east (Al Fatah, Darnah). In both regions, average temperatures were persistently 3-4°C above seasonal values from 1 March to 1 April (see graph). The beginning of this period coincided with the end of flowering and the start of the grain-filling process, which occurred around one week earlier than usual owing to the hot conditions. Ripening also started earlier than usual and cereals reached maturity in the last dekad of April, as clearly reflected in the drop of the remote sensing indicator (fAPAR) at the end of flowering (at the end of February), which was followed by a shorter grain-filling period. Nevertheless, the overall yield expectations for wheat and barley are average, mainly thanks to a favourable start to the season, from December to February, when vegetative growth was advanced and above an average year.

3. Remote sensing map

Cumulated fAPAR relative anomalies for Morocco, Algeria and Tunisia

Data source: MARS remote sensing database / fAPAR - METOP product
## 4. Crop yields forecast

### North-Africa yield forecasts for wheat - July 2018 Bulletin

<table>
<thead>
<tr>
<th>Country</th>
<th>Avg 5yrs</th>
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<th>MARS 2018 forecasts</th>
<th>%18/5yrs</th>
<th>%18/17</th>
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Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources:

2013-2017 data come from FAO, INRA Maroc, Ministère de l’Agriculture et de la Pêche Maritime Maroc, CNCT Tunisie, Ministère de l’agriculture des ressources hydrauliques et de la pêche Tunisie and DSASI-MADR Algeria

2018 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/06/2018). NA (no data)

### North-Africa yield forecasts for barley - July 2018 Bulletin

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Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources:

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2018 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/06/2018). NA (no data)

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Note: Yields are forecast for crops with more than 10000 ha per country; figures are rounded to 10 kg

Sources:

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2018 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/06/2018)

### North-Africa yield forecasts for durum wheat - July 2018 Bulletin

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2018 yields from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 30/06/2018)
5. Atlas
Morocco, Algeria, Tunisia

Temperatures and precipitation regime
Libya, Egypt

Temperatures and precipitation regime
The current **JRC MARS Bulletin – Crop monitoring European Neighbourhood** is a JRC – EC publication from MARS4CAST (JRC D5 unit – Directorate Sustainable Resources)

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MARS stands for Monitoring Agricultural Resources

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