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JRC MARS Bulletin Vol 27 No 9

European Commission

# JRC MARS Bulletin

# Crop monitoring in Europe

*September 2019*

## Reduced yield outlook for maize and sunflowers

### Grain maize yield forecast now on average

*Hot and regionally dry conditions negatively impacted the final part of the – hitherto very positive - summer crops growing season in south-eastern Europe. This, combined with the poor condition of crops in large parts of central and western Europe has resulted in an overall mediocre yield outlook for summer crops at EU level.*

Since 20 August – the end of the review period of the August issue of the Bulletin – most parts of Europe experienced at least one heatwave.

The high temperatures in south-eastern Europe - in several regions combined with a marked rain deficit - resulted in a substantial reduction of the hitherto very high yield expectations in Hungary, Romania and Bulgaria.

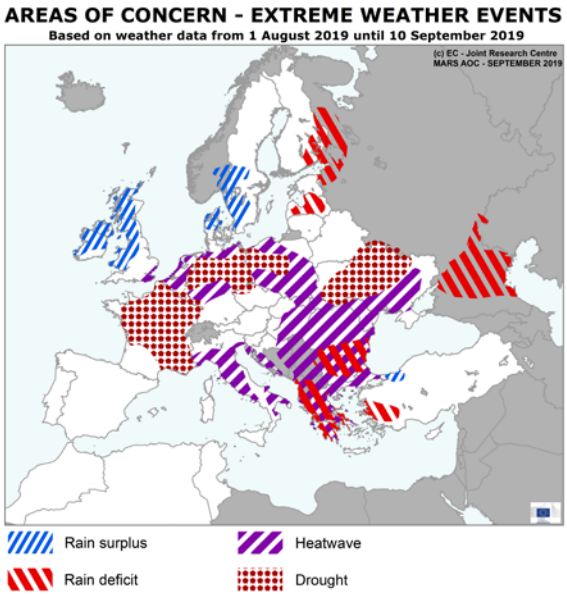
Drought conditions persisted in central and northern France, northern Germany, western Poland and north-western Czechia. Summer crops in these regions are significantly compromised, with yield expectations below the 5-year average. Pasture productivity has also been below-average in these regions.

The yield outlook for rice, as reported in section 4.2, is around average at EU level.

**Content:**



Covers the period from 1 August until 10 September



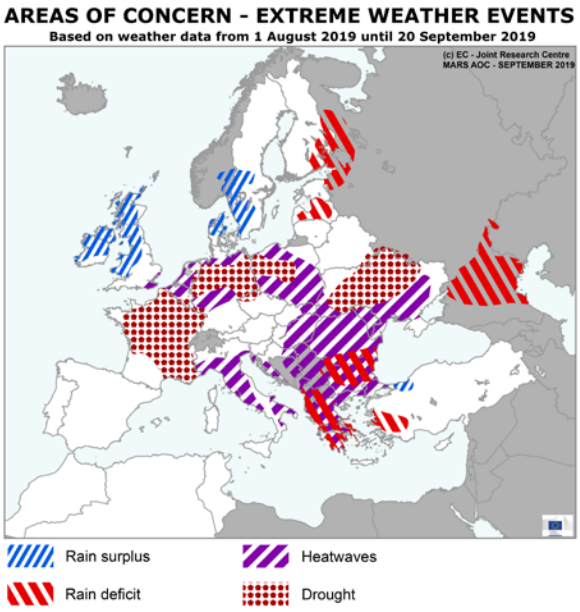

| Crop | Yield (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | August Bulletin | MARS 2019 forecasts | % Diff 19/5yrs | % Diff August |
| TOTAL CEREALS | 5.53 | 5.57 | 5.53 | -0.1 | -0.7 |
| Total Wheat | 5.71 | 5.82 | 5.82 | +1.9 | +0.0 |
| *soft wheat* | 5.94 | 6.03 | 6.03 | +1.5 | +0.0 |
| *durum wheat* | 3.46 | 3.60 | 3.59 | +3.9 | -0.3 |
| Total Barley | 4.86 | 4.92 | 4.92 | +1.1 | +0.0 |
| *spring barley* | 4.16 | 4.11 | 4.10 | -1.6 | -0.2 |
| *winter barley* | 5.79 | 6.01 | 6.01 | +3.8 | +0.0 |
| Grain maize | 7.62 | 7.93 | 7.63 | +0.2 | -3.8 |
| Rye | 3.79 | 3.76 | 3.77 | -0.5 | +0.3 |
| Triticale | 4.12 | 4.15 | 4.14 | +0.3 | -0.2 |
| Rape and turnip rape | 3.24 | 3.09 | 3.09 | -4.7 | +0.0 |
| Potato | 33.8 | 32.7 | 32.9 | -2.8 | +0.3 |
| Sugar beet | 75.2 | 71.5 | 72.2 | -4.0 | +1.0 |
| Sunflower | 2.21 | 2.39 | 2.29 | +3.8 | -4.2 |

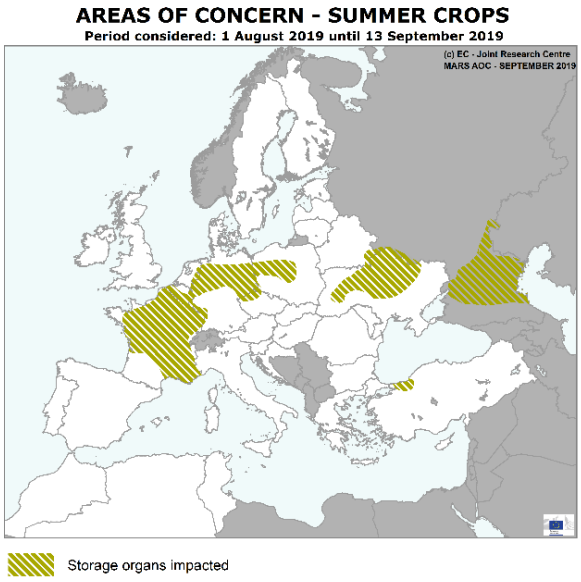
Issued: 13 September 2019

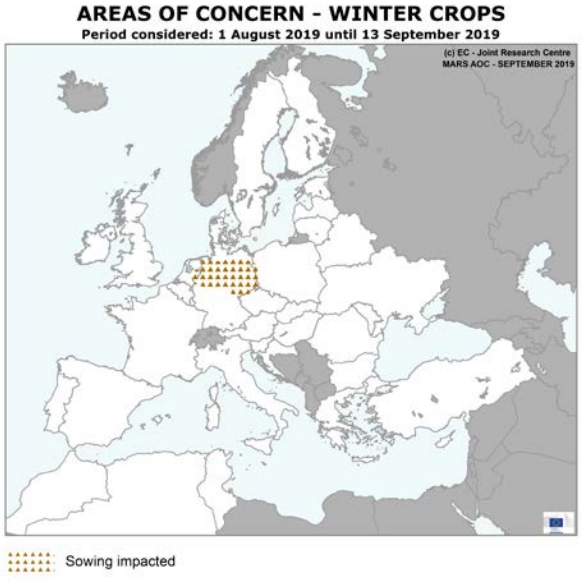
Joint Research Centre

# 1. Agrometeorological overview

## 1.1. Areas of concern




Relevant weather events that occurred before 20 August, the impacts of which were already discussed in the August Bulletin, are not discussed here.

Since 20 August, France, the Benelux countries, south-eastern UK, northern Germany, Poland, south-eastern Ukraine and south-eastern Europe, Italy and Spain have experienced at least one heatwave. Maximum recorded temperatures reached above 34°C in central and southern France, central Italy, and regionally in south-eastern Europe. Unusually high maximum temperatures for the last dekad of August, reaching above 32°C, were recorded in the Benelux countries, northern Germany and Poland.

The high temperatures in south-eastern Europe contributed to shortening of the grain-filling period and increased senescence of summer crops. Impacts in several regions were aggravated by a rain deficit, resulting in substantially reduced yield expectations in Hungary, Romania and Bulgaria.

Continued lack of rainfall deepened soil moisture deficits in central and northern France, large parts of Ukraine and north-western Germany, amplifying drought conditions in these areas. Even though some beneficial rainfall arrived in north-eastern Germany, western Poland and north-western Czechia, drought in these regions still persists. Summer crops in these regions are significantly compromised, with yield expectations below the 5-year average.

Substantial rain surplus has been recorded in Ireland, western and northern parts of the UK, Denmark and southern Scandinavia, however with only limited effects on summer crop harvests up to now. Additionally, abundant rainfall after 20 August could have further hampered the harvesting activities of spring cereals in the British Isles and Denmark, which was already already affected during the preceding period.

Drought in northern Germany created poor conditions for the sowing and emergence of winter rapeseed.

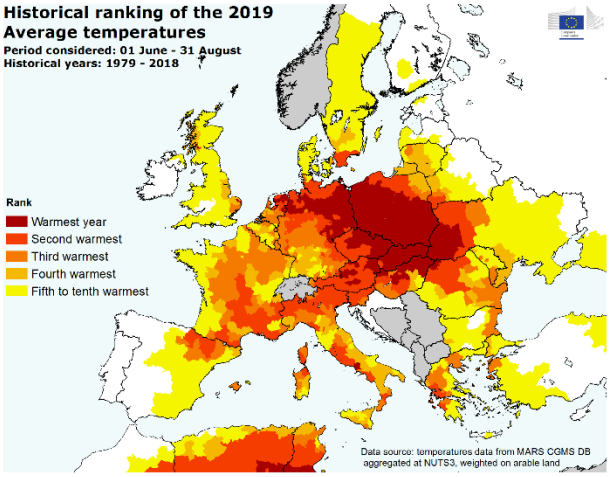
# 1.2. Summer 2019 (June, July, August)

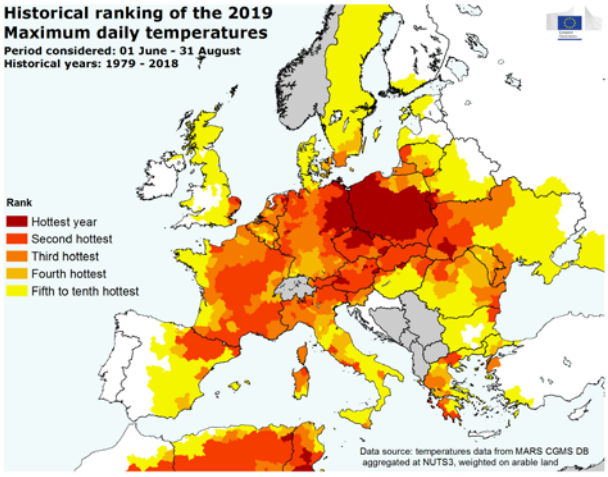
**Warmer-than-usual conditions** were observed in a large area of central-eastern Europe, with daily mean temperature anomalies between 2°C and 4°C above the long-term average (LTA). There were **slightly warmer-than-usual** conditions in the rest of Europe, except for the western part of the Iberian Peninsula, with positive daily mean temperature anomalies less than 2°C above the LTA. In most of central and eastern Europe, daily maximum temperatures were higher than usual, with anomalies between 2°C and 4°C above the LTA. In most of Europe, this summer was among the **three warmest summers on record,** both in terms of seasonal mean and maximum daily temperatures. It was **the warmest on record** in a large region of eastern Europe.

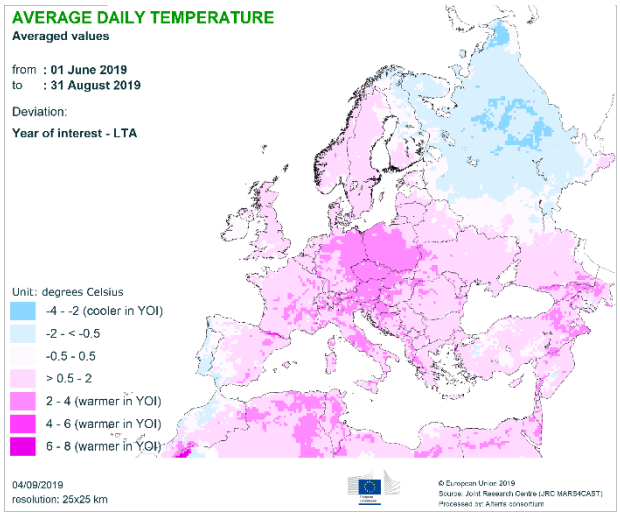
**Severe heatwaves** were observed in June and July in large regions of Europe, with record-breaking temperatures above 40°C.

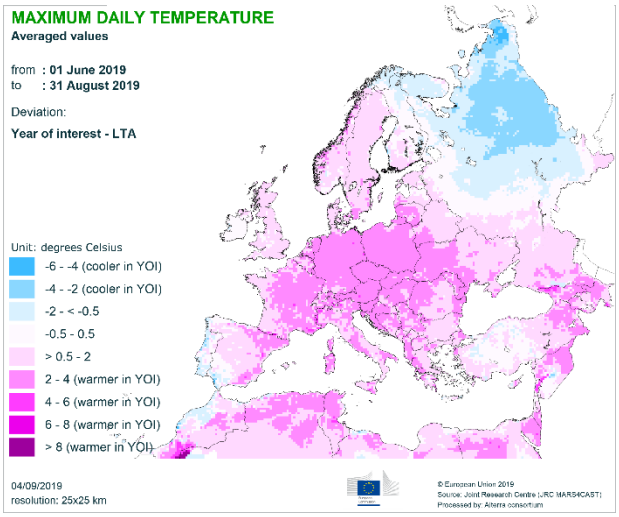
**Drier-than-usual conditions** were observed in the south-western part of the Iberian Peninsula, with total precipitation anomalies of 100% to 80% below the LTA. Drier-than-usual conditions were also recorded in large regions of central and eastern Europe, with anomalies mainly between 50% and 30% below the LTA.

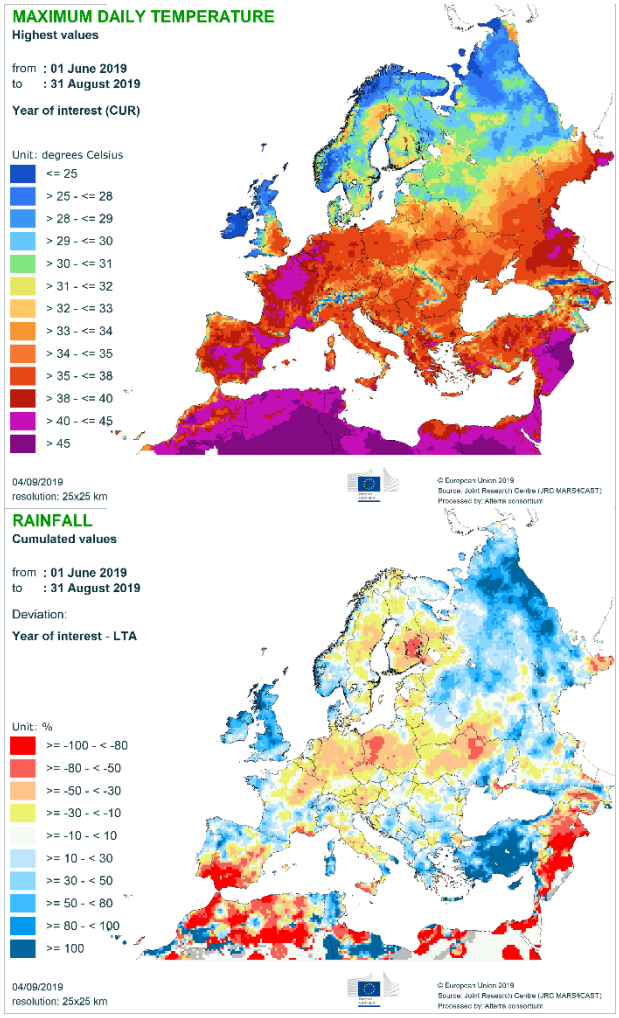
**Wetter-than-usual conditions** were recorded in Turkey and the United Kingdom, with respective precipitation anomalies of over 100%, and mainly between 50% and 80%, above the LTA.

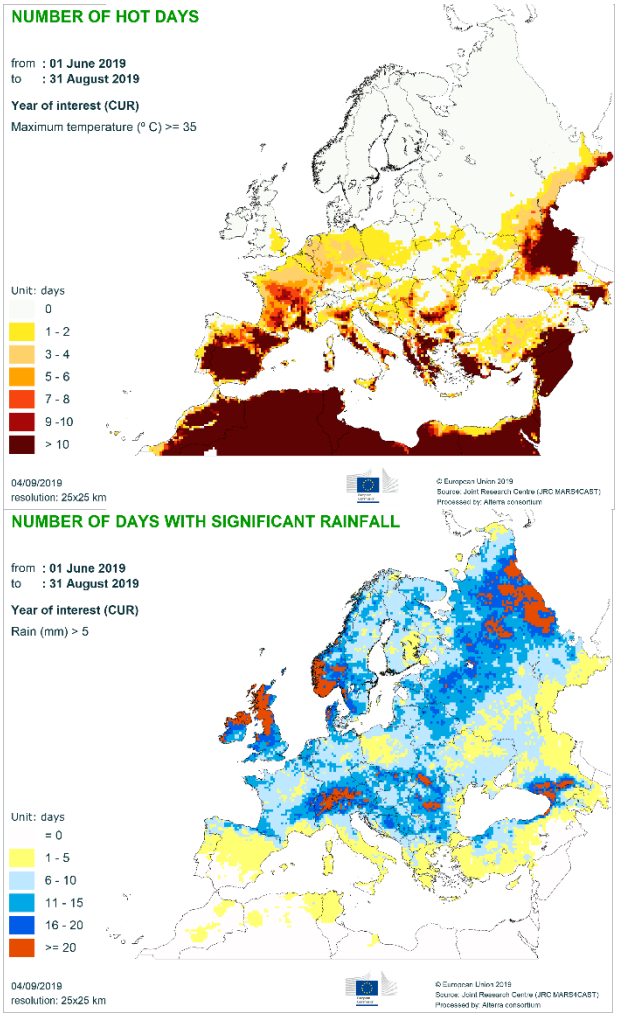



MAXIMUM DAILY TEMPERATURE
Highest values
from : 01 June 2019
to : 31 August 2019
Year of interest (CUR)
Unit: degrees Celsius
<= 25
> 25 - <= 28
> 28 - <= 29
> 29 - <= 30
> 30 - <= 31
> 31 - <= 32
> 32 - <= 33
> 33 - <= 34
> 34 - <= 35
> 35 - <= 38
> 38 - <= 40
> 40 - <= 45
> 45
04/09/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC MARS4CAST)
Processed by: Altamira consortium


NUMBER OF HOT DAYS
from : 01 June 2019
to : 31 August 2019
Year of interest (CUR)
Maximum temperature (° C) >= 35
Unit: days
0
1 - 2
3 - 4
5 - 6
7 - 8
9 -10
> 10
04/09/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC MARS4CAST)
Processed by: Altamira consortium


RAINFALL
Cumulated values
from : 01 June 2019
to : 31 August 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
04/09/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC MARS4CAST)
Processed by: Altamira consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 June 2019
to : 31 August 2019
Year of interest (CUR)
Rain (mm) > 5
Unit: days
= 0
1 - 5
6 - 10
11 - 15
16 - 20
>= 20
04/09/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC MARS4CAST)
Processed by: Altamira consortium

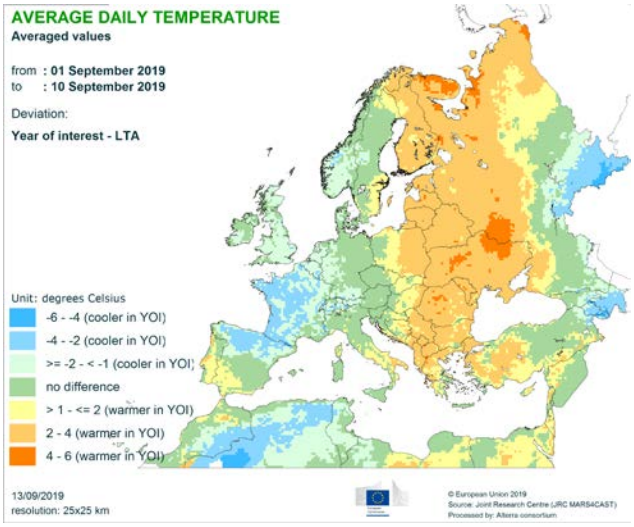
# 1.3. Meteorological review (1 – 10 September)

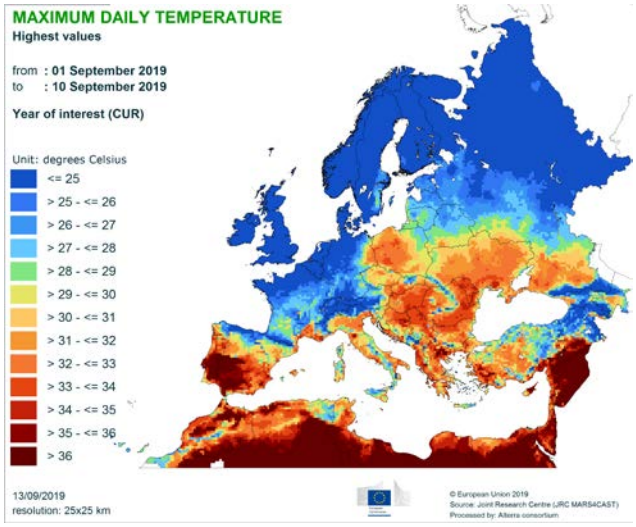
**Warm weather anomaly** with temperatures up to 6°C above the LTA characterised eastern Europe. Maximum temperatures during a heatwave in parts of Poland, southern Ukraine and south-eastern Europe reached above 34°C. Western Black Sea regions recorded more than 4 hot days with maximum daily temperature above 30°C.

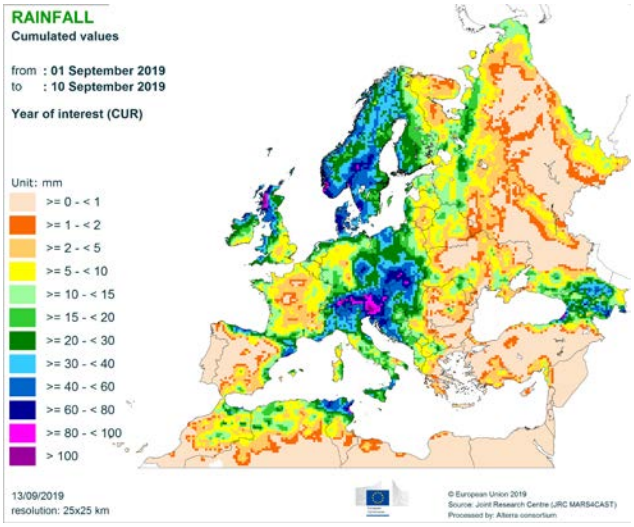
**Colder-than-usual conditions** with temperature anomalies between 2 and 4°C below the LTA prevailed in France and northern Spain.

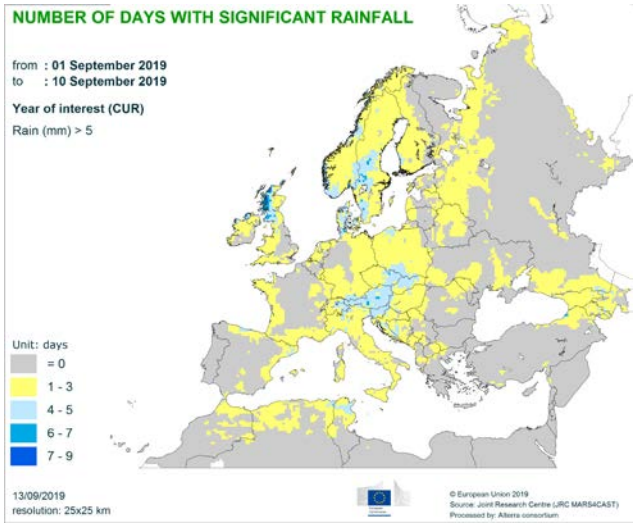
**Dry conditions** prevailed in a large part of the Iberian Peninsula, central and south-eastern France, and a major part of eastern Europe and Turkey.

**Abundant rainfall** was recorded in southern Scandinavia, the northern part of the British Isles, eastern and northern Alpine regions, eastern Czechia and the central part of Slovakia. Rainfall cumulates in these regions locally exceeded 80 mm.



# 1.4. Weather forecast (13-20 September)

*Current anticyclonic circulation over large parts of central and southern Europe will extend summer temperature conditions over southern and eastern Europe. These conditions are expected to change towards the middle of the forecast period (around 17 September), when atmospheric circulation could favour an inflow of colder air masses from north-eastern Europe towards central and south-eastern Europe.*

**Warmer-than-usual conditions** are forecast for eastern and southern Europe and France. Southern France and the central part of European Russia will experience the strongest warm anomaly, with temperatures 4-6°C above the LTA. Positive temperature anomalies of up to 4°C are expected elsewhere. Maximum temperatures could reach 32°C (even higher regionally) in south-western France, the western part of the Iberian Peninsula, Italy, south-eastern Europe, the southern part of European Russia, and Turkey.

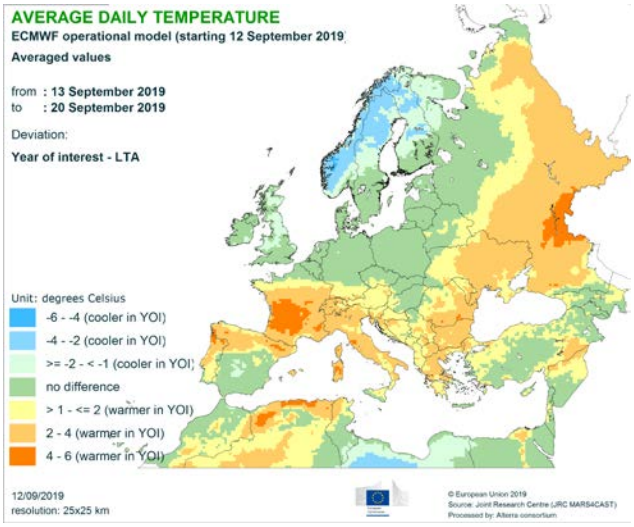
**Colder-than-usual** weather, with temperatures down to 4°C below the LTA, is expected in Scandinavia.

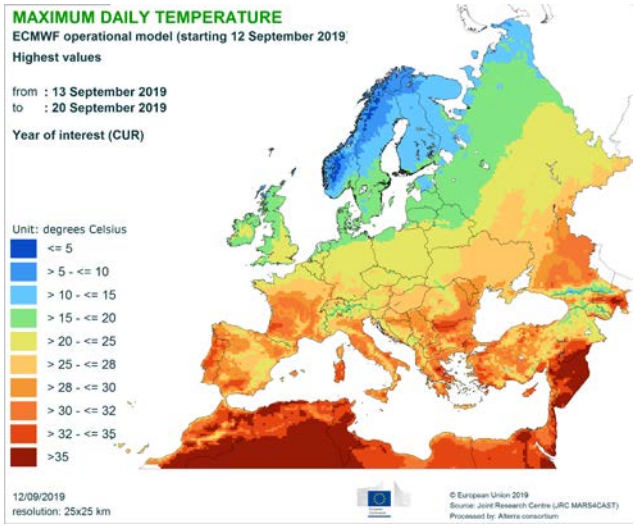
**Dry conditions** will prevail in France, large parts of Italy, central Turkey, and regionally in the central Balkans.

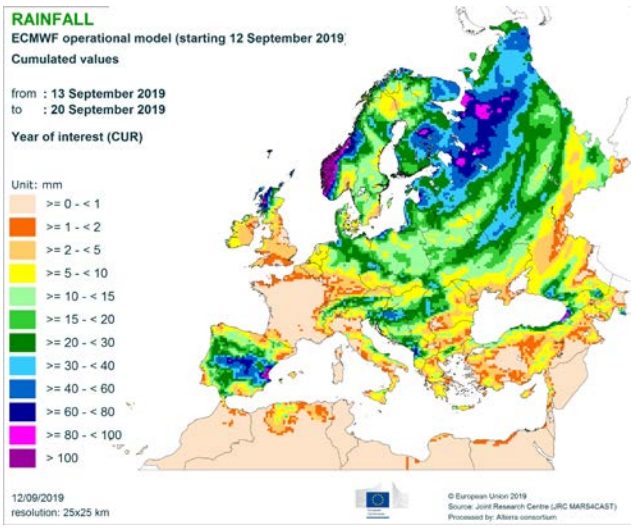
**Rainfall cumulates below 10 mm** are foreseen during the forecast period for the British Isles, the regions surrounding the Black Sea, and Turkey.

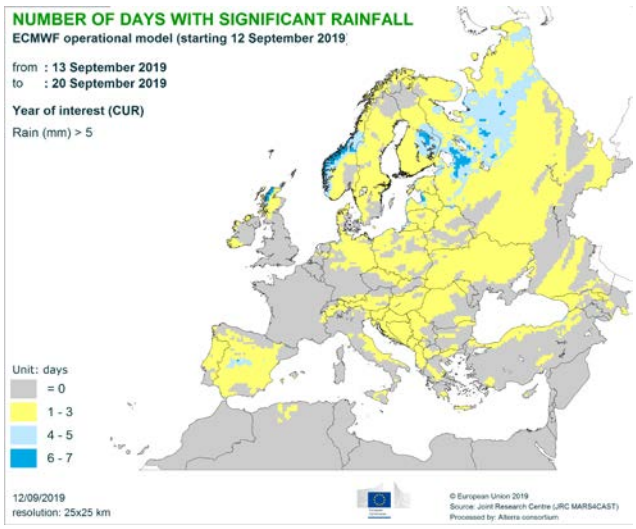
**Significant rainfall with cumulates above 40 mm** is foreseen for the centre of the Iberian Peninsula, the northern Balkans, south-western Scandinavia, Finland and the northern part of European Russia. Cumulative rainfall of 10-40 mm is expected for much of central and eastern Europe.

**The long-range weather forecast** for the period between September and November indicates that warmer-than-usual conditions are more likely than not to occur in Europe. Warmer-than-usual conditions are likely to occur in the Mediterranean region.



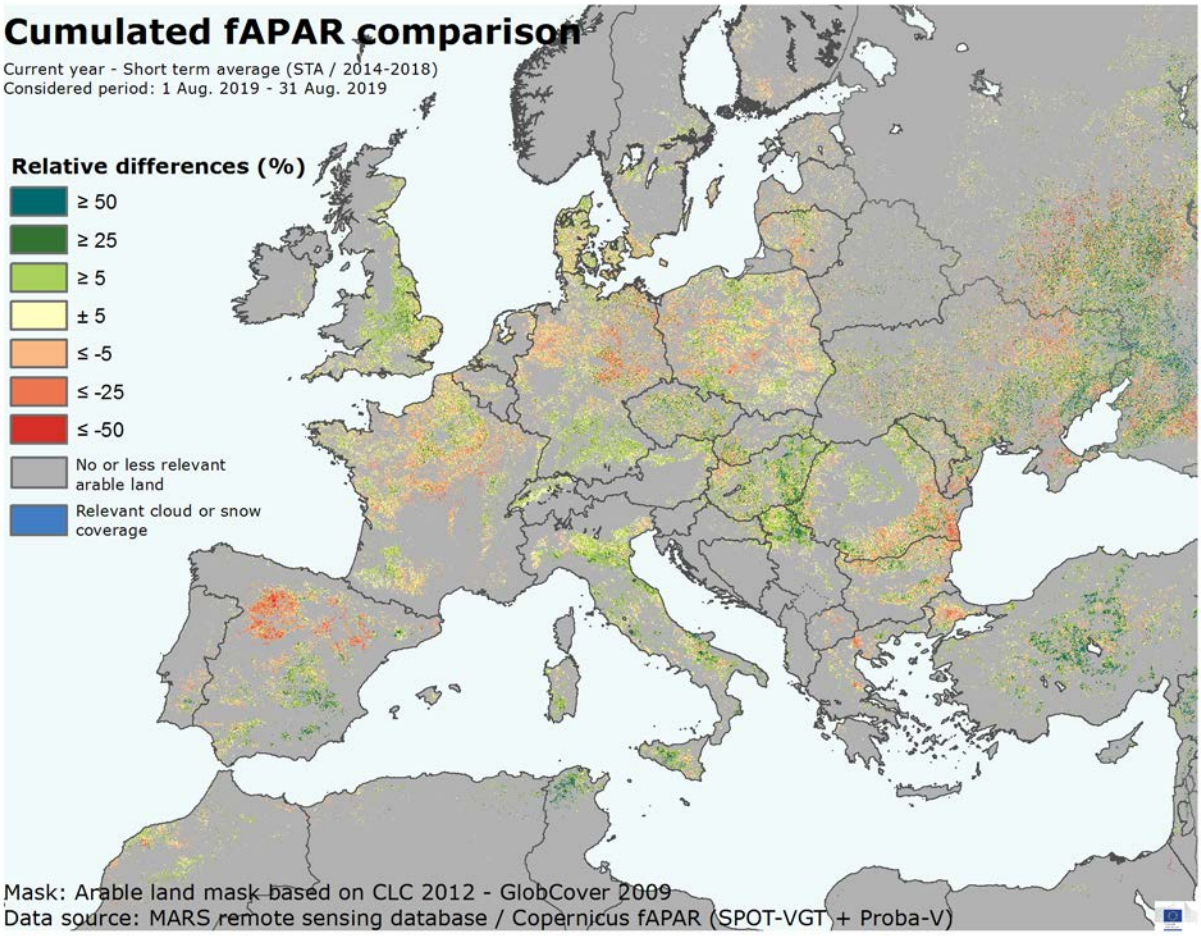



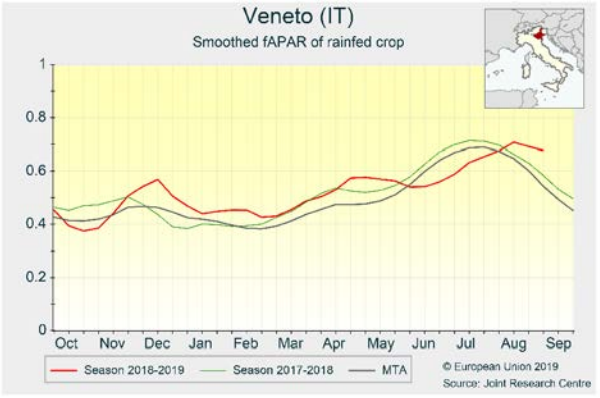
# 2. Remote sensing - observed canopy conditions

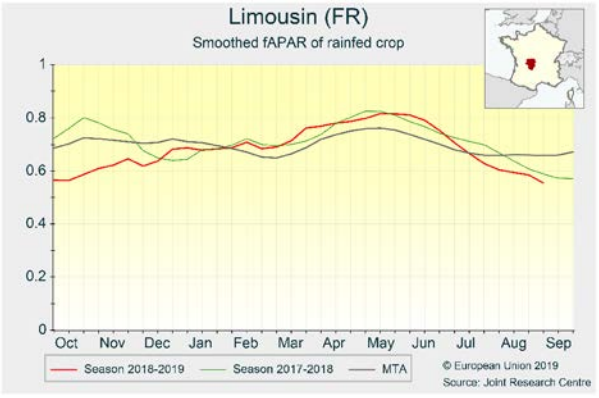
## Most of Europe negatively affected by hot or dry conditions

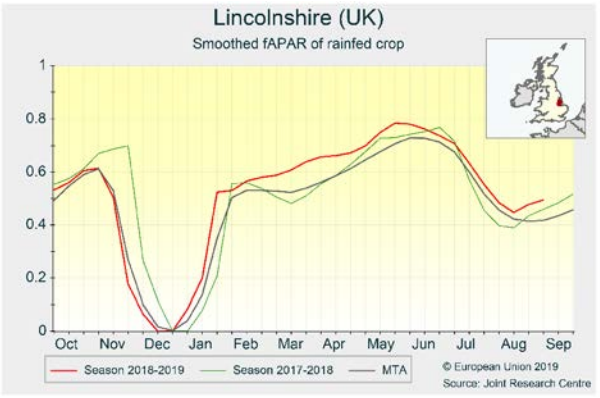


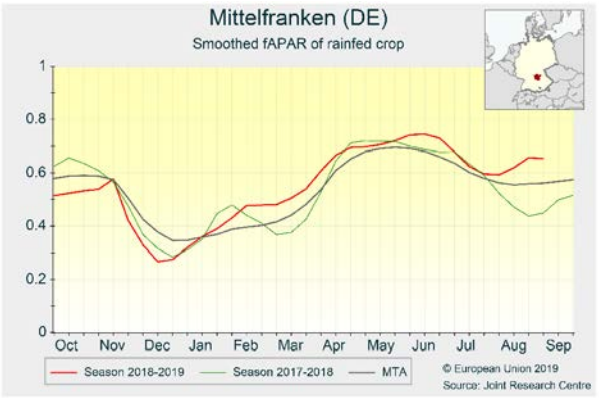

*The map displays differences between the fraction of absorbed photosynthetically active radiation (fAPAR), computed from remote sensing imagery between 1 August and 31 August 2019, and the short-term average (2014-2018) of fAPAR for the same period. Positive anomalies (in shades of green) reflect above-average canopy density, while negative anomalies (in shades of red) reflect below-average biomass accumulation.*

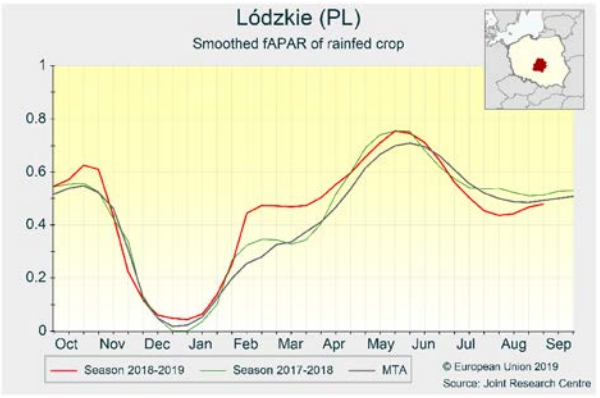
In **Italy**, summer crops in northern regions (*Piemonte*, *Lombardia*, *Emilia-Romagna*) benefited from warmer-than-usual weather conditions, while in north-eastern regions (e.g. *Veneto, Friuli Venezia Giulia*) slightly positive anomalies are related to delayed development of summer crops (in particular grain maize and soybean), which in an average year would be reaching the end of the growth cycle. In **France,** despite the rain in August, summer crops were not able to recover from the negative impacts caused by the previous month's heatwaves. As a consequence, crop biomass accumulation has been below average, especially in northern and central (e.g. *Centre*) agricultural areas. Above-average biomass accumulation is indicated in the **United Kingdom** and **Ireland**, where adequate water supply and warmer-than-usual temperatures in August favoured growth of summer crops such as sugar beet and potatoes (e.g. in *Lincolnshire*). In the southern regions of **Germany**, summer crops showed above-average biomass production in August, thanks to fewer hot days than usual and sufficient rain (e.g. in *Mittelfranken*). In large parts of northern Germany, and most of central, north-eastern and north-western **Poland,** drought conditions continued. Despite some improvement to soil moisture conditions during August, the general expectations for summer crops are negative (e.g. in *Lodzkie*). Average to positive biomass accumulation of summer crops is indicated in **Austria**, **Slovakia**, **Czechia** and **Hungary** (especially in western Hungarian regions, e.g. *Del-Alfold* where part of the positive fAPAR signal is due to increased weed pressure), due to high temperatures and adequate level of rainfall. In **Romania** (e.g. *Sud-Est*) and **Bulgaria,** summer crop biomass accumulation (mainly for maize and sunflowers) was negatively affected in August by both heat and water stress. Similarly, central and eastern regions of **Ukraine** (e.g. *Kharkivs'ka*), where summer crops such as soybean, maize and sunflowers prevail, show below-average biomass accumulation during August.

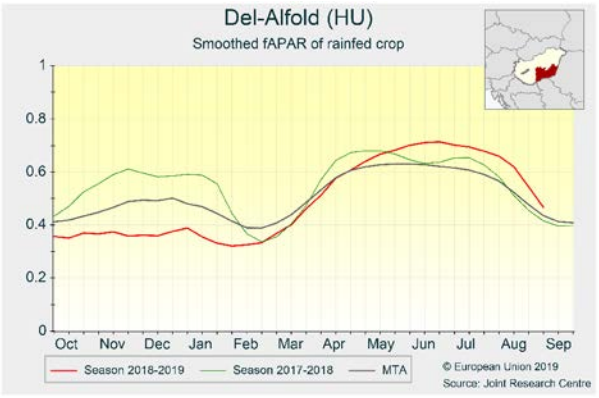

Veneto (IT)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre

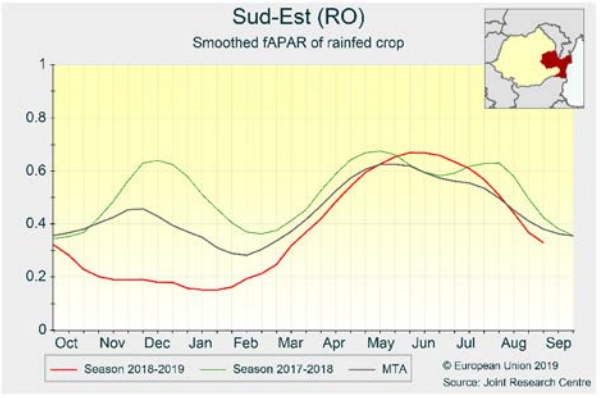

Limousin (FR)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre

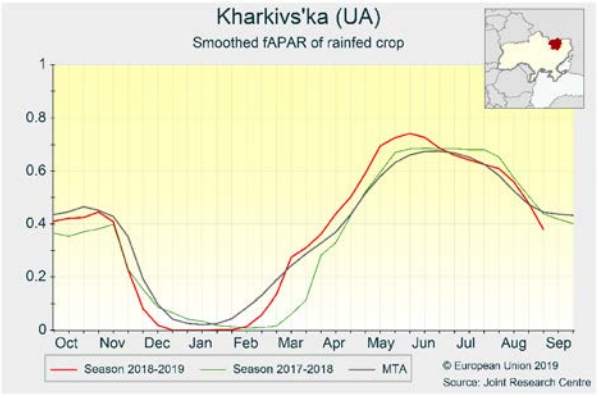

Lincolnshire (UK)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre


Mittelfranken (DE)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre


Lódzkie (PL)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre

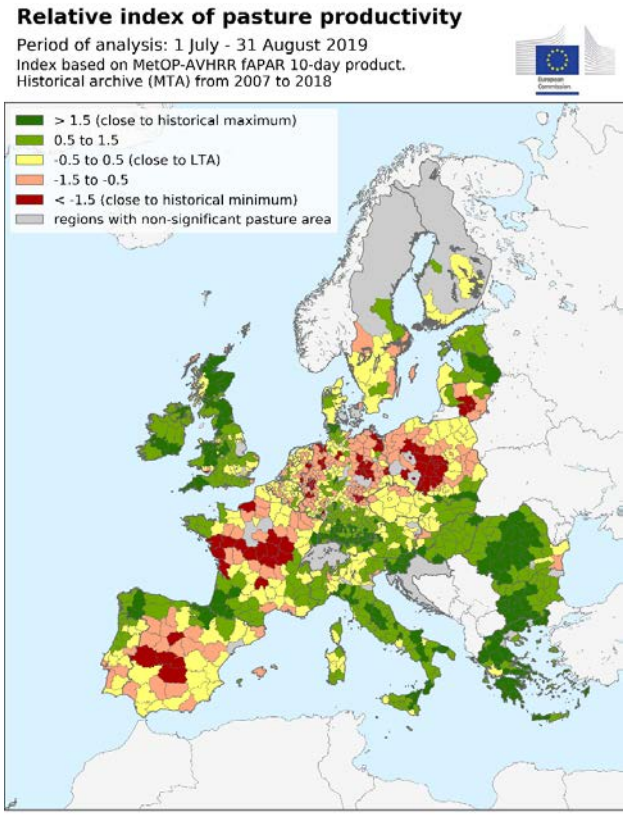

Del-Alfold (HU)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre

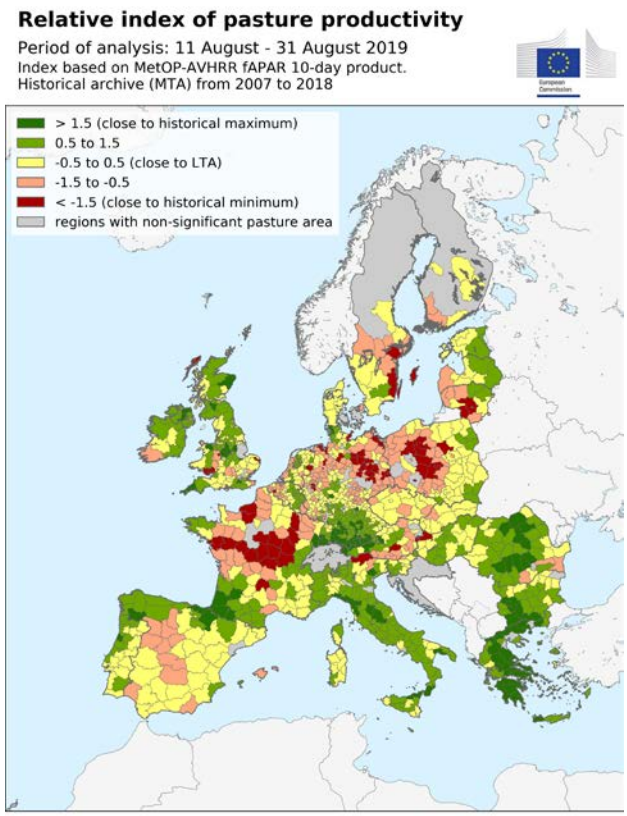

Sud-Est (RO)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre


Kharkivs'ka (UA)
Smoothed fAPAR of rainfed crop
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
Season 2018-2019
Season 2017-2018
MTA
© European Union 2019
Source: Joint Research Centre

# 3. Pastures in Europe – regional monitoring

## Some recovery of pasture conditions




The map above left gives the overall pasture productivity index (PPI) for July and August, and thus an indication of the availability of biomass. The map above right gives the PPI for the last two dekads of August only, thus reflecting recent conditions for pasture growth.

In July and August, temperatures were warmer than usual, while rainfall was below average in large parts of Europe. As a result, grassland growth has been constrained in many parts of Europe. Considering this period as a whole, the most affected countries/regions were **France**, the **Benelux** countries, northern and central **Germany**, north-western **Poland**, **Lithuania**, and to a lesser extent northern **Italy**, **Czechia**, part of **Austria** and part of **Slovakia**.

Favourable conditions prevailed in central and southern **Italy**, **Greece**, **Bulgaria**, **Romania**, **Hungary**, **Slovakia**, **Sweden**, **Ireland** and the **United Kingdom**.

In the **Iberian Peninsula**, the long period of unusually hot and dry conditions seems to have come to an end, with the main central/southern part returning to average canopy conditions for this time of the year (see graph *Extremedura*, below).

After a very hot end to July, northern **Germany** and western **Poland** had a normal temperature regime in August, with the exception of a short heatwave towards the end of the month. The rain deficit persisted in northern Poland and in eastern Germany as well as in parts of *Nordrhein-Westfalen* and *Niedersachsen*, where the condition of grasslands shows some recovery but is still below average. This is contrasting to areas along the northern German coastline and in *Schleswig Holstein,* where recent weather conditions have been very favourable. In southern Germany (*Bayern* and parts of *Baden Württemberg*), biomass formation is above average levels thanks to average or above-average precipitation.

Conditions in **France** are also heterogeneous. In the east, northwest, and in *Bourgogne*, the rainfall observed in early August was insufficient for soil moisture to replenish (see graph). In the south, weather conditions were more favourable but the soils were too dry for grasslands to recover in the most impacted regions (*Auvergne* and *Poitou-Charentes*), where rain fell only in

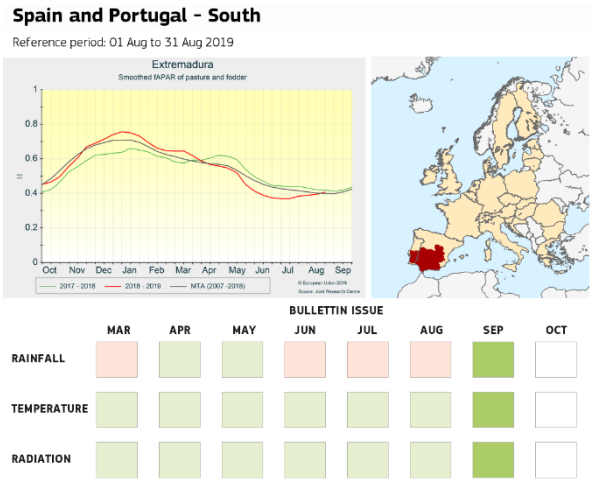
the first two dekads of August (see graph). Other southern regions received more rainfall during the period of analysis and grassland productivity was closer to the average. In northwestern France; August was dry and hot, parts of *Bretagn*e had stressed canopy conditions and some water balance deficit.

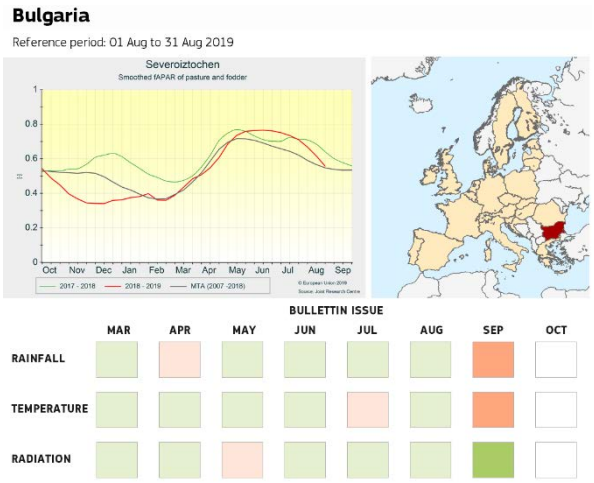
In **Ireland** and the **United Kingdom**, pasture conditions have been favourable throughout the July-August period (see graph).

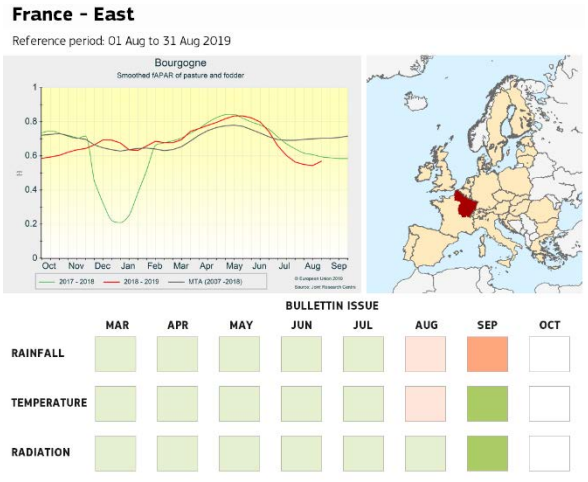
In southern-central and south-eastern Europe, weather conditions have generally been favourable, as reflected in above-average PPI for the July-August period as a whole, but some weakening is observed more recently. In **Bulgaria**, no significant precipitation has been observed after 5 August, and daily temperatures mostly exceeded the LTA, resulting in quick leaf senescence, especially in the northern and eastern regions of the country (see graphs). Central **Romania** was exceptionally warm, with 10-16 hot days ($T_{max}$ > 30°C) — more than usual — during August, yet with near-average to average rainfall sustaining good conditions. In the east, grasslands are in weaker condition in the areas close to the Black Sea due to scarce precipitation. Some improvement is visible northward along the Moldavian border where plants benefited from significant rainfall.

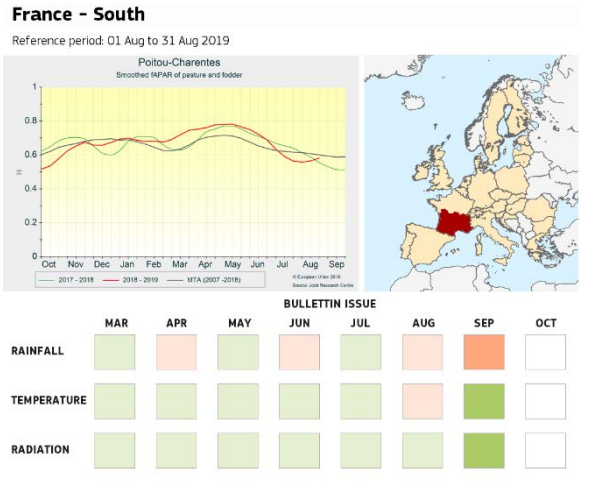
Rainfall, throughout the July-August period, was below average in **Lithuania** and **Latvia**, while above average in **Estonia**, **Finland**, **Denmark** and **Sweden**. Cumulative radiation is well above average in the Baltics, giving overall average canopy conditions, with the exception of Lithuania with some lower-than-average conditions. In Finland, the second grass harvest was low, but the third cut in autumn is expected to be high in rainy western areas of Finland. In Denmark and Sweden, pasture productivity was close to average; the negative anomalies at the end of the period of analysis are mainly the consequence of a lack of remote sensing observations due to cloud cover.

Below, some regions are highlighted, together with a brief description of the main meteorological drivers related to pasture growth.



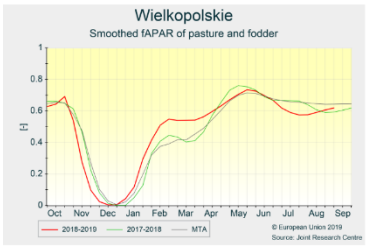



## Poland

Reference period: 01 Aug to 31 Aug 2019

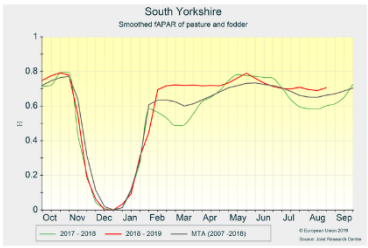



BULLETTIN ISSUE

| | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT |
|---|---|---|---|---|---|---|---|---|
| RAINFALL | | | | | | | | |
| TEMPERATURE | | | | | | | | |
| RADIATION | | | | | | | | |

## United Kingdom - South and Central

Reference period: 01 Aug to 31 Aug 2019




BULLETTIN ISSUE

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# 4. Country analysis

## 4.1. European Union

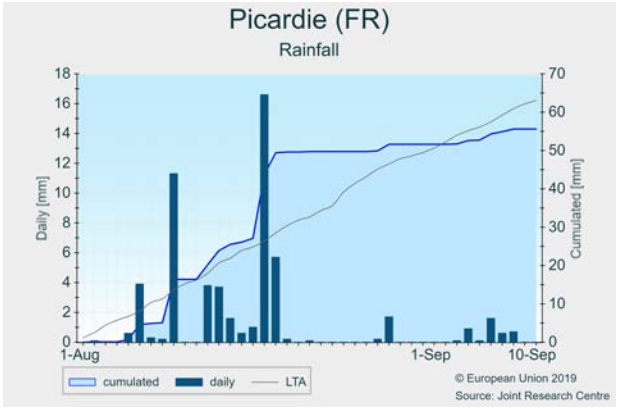
## France

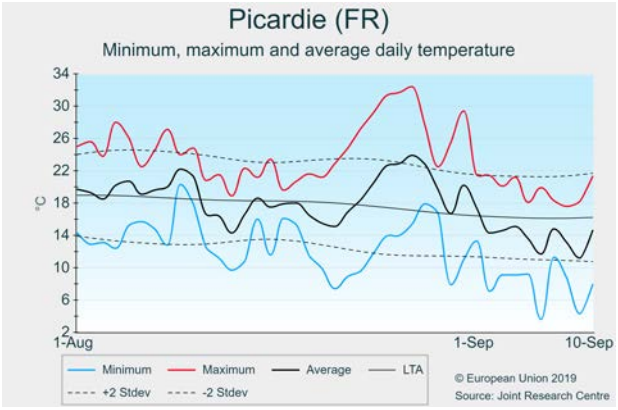
### Weather conditions improved too late for summer crops to recover

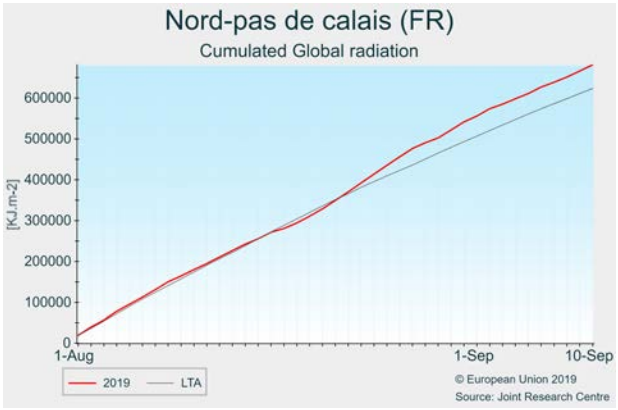
*The first half of August was particularly rainy, but crops did not recover from the dry conditions mainly caused by the heatwaves observed at the end of June and end of July. The yield forecasts for all summer crops remain close to the lowest observed in the last 10 years.*

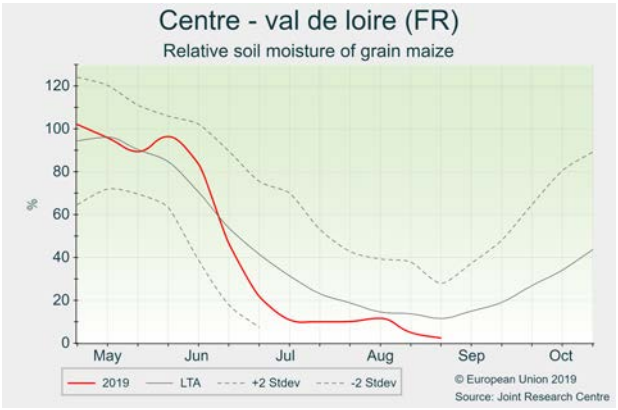
Cumulative rainfall was close to the average for the period of analysis, except in Bourgogne, Auvergne, Limousin and Provence-Alpes-Côte d'Azur, where a substantial rain deficit (20-35% below the LTA) was observed. Most of the rain came during the first half of August in all regions. Cumulative radiation was above the average for the period of analysis, thanks to particularly sunny weather during the last dekad of August and the beginning of September. Temperatures were above the LTA during the first and last dekads of August, thus increasing evapotranspiration and limiting the benefits of the rainfall observed during the first half of August.

Grain maize and sunflower did not recover from the dry conditions reported previously, as the rain came too late, largely after the start of flowering. Grain maize and sunflower yields are expected to be below average in all regions except the south-west, Aquitaine and the western part of Midi-Pyrénées, where no irrigation restrictions were ongoing in July. Added to the dry conditions, the early-sown grain maize was heat-impacted at flowering, which coincided with the heatwave at the end of July. Sugar beet and potatoes recovered very slightly, thanks to the rain, but no major changes are expected; our forecast remains nearly unchanged. An exceptionally low yield is expected for starch potatoes. The yield of consumption potatoes is expected to be substantially below average, but the quality is expected to be high in light of the low disease pressure.



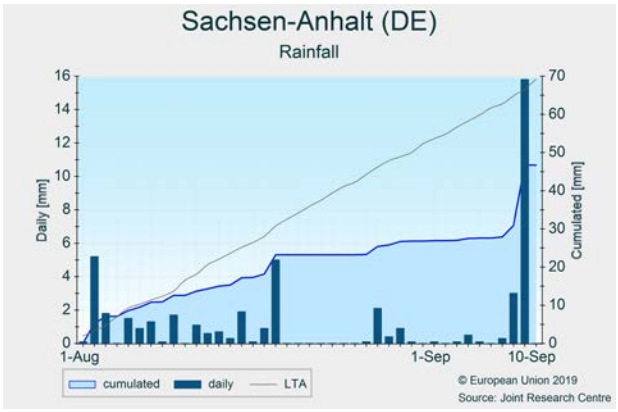
# Germany

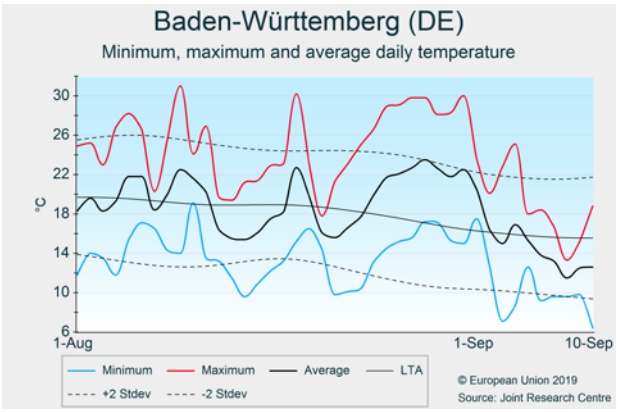
## Persistent rain deficit in the east

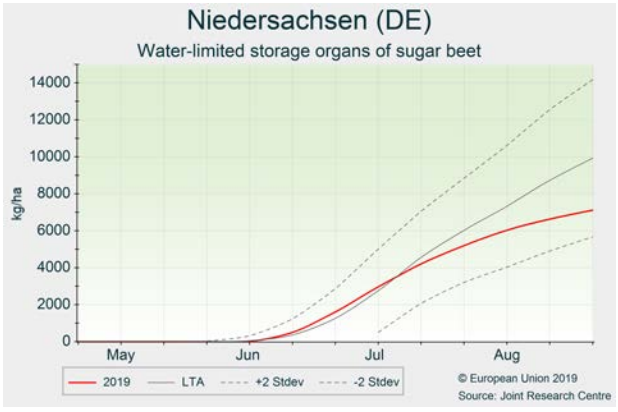
*Despite somewhat better growing conditions in August, summer crops have not fully recovered as the rain deficit continues to persist in large parts of Germany and soils are too dry. Maize and potatoes are forecast below their respective five-year average, sugar beet close to the five-year average.*

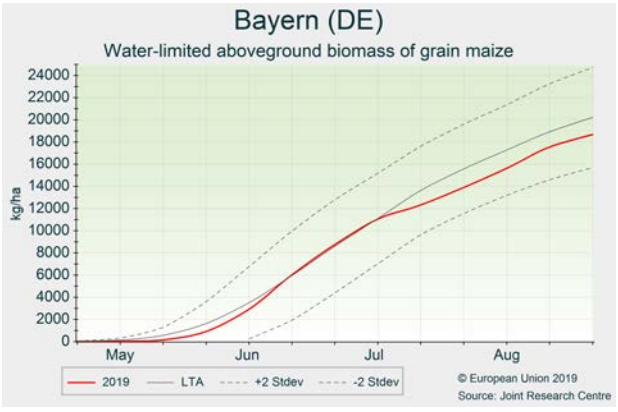
The period under review was characterised by unsettled weather, bringing much needed rain and mostly seasonal temperatures, with the exception of a pronounced heatwave towards the end of August. However, the persistent rain deficit in eastern Germany did not ease sufficiently to help summer crops to recover substantially. Soils are still very dry, especially deeper soil horizons. This is also true for large parts of Nordrhein-Westfalen, as well as Niedersachsen – the most important region for production of potatoes and sugar beet. Our crop simulation results show clearly underperforming crops, due to the dry and hot conditions earlier in the crop cycle. This even applies to sugar beet, which has very good water use efficiency and better capacity for recovery than potatoes. Maize in eastern and north-western Germany is also not doing well, with storage organ weights simulated below average, although somewhat better than in 2018. By contrast, maize is faring relatively well in Bayern and Baden-Württemberg, where fewer hot days than usual and sufficient rain provided positive crop growth conditions. The yield forecast is at the same level as in the August issue of the Bulletin.

The harvest of winter cereals was completed with average yields below the 5-year average. Particularly low yields in the east were partially compensated by southern and central regions. Rapeseed exhibited the fourth consecutive year with low yields. Rapeseed sowing for the 2019/2020 season has also made a poor start: as in late summer / autumn 2018, soils have again been partially too dry for successful sowing and germination.



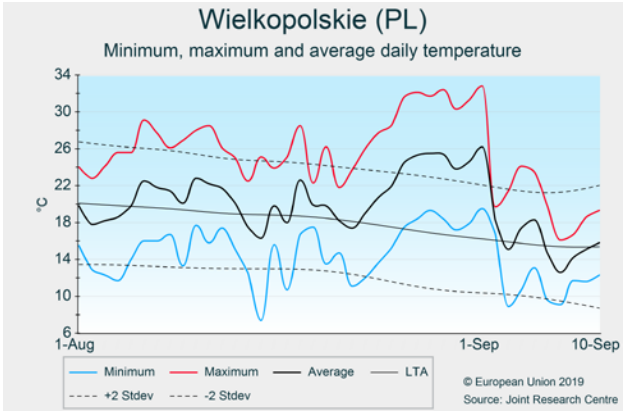
# Poland

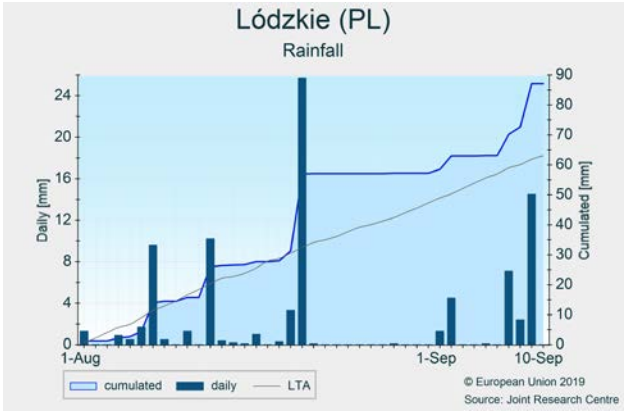
## Continued below-average yield outlook for summer crops

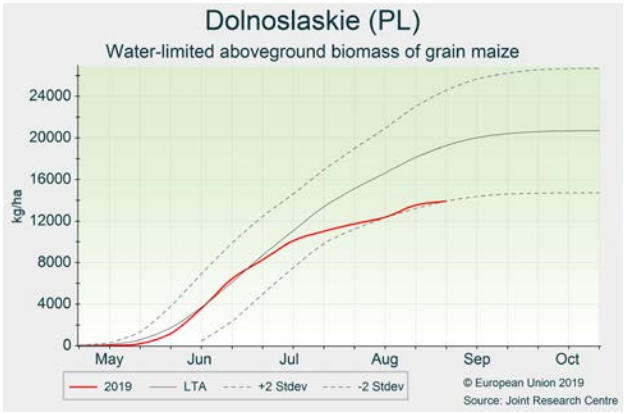
*Rainy weather in August improved soil moisture conditions. However, yield potentials of summer crops had already been reduced and are not expected to improve significantly.*

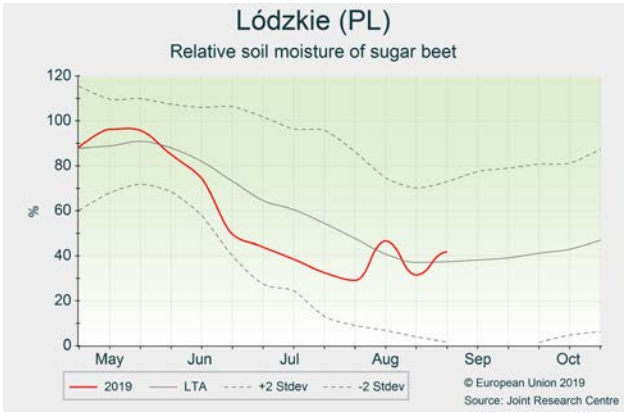
The analysis period was slightly warmer than usual, with a particularly warm last dekad of August (4°C above average). Precipitation was variable across the country: significantly above average in south-eastern and western regions, significantly below average in north-western regions, and close to average in the centre. Soil water conditions were improved by the August rains in most of the country, except in the north-eastern regions (in particular *Lubelskie* and *Wielkopolskie*), where dry conditions still prevail.

Sowing of rapeseed was completed. The sugar beet harvest campaign has already begun, with initial reports indicating below average yields, as a consequence of the unfavourable conditions along the season as described in earlier issues of the Bulletin. As soil moisture conditions for sugar beet have improved in August, yields may still increase somewhat, if conditions remain favourable during the coming weeks. Potato crops also benefited from the recently improved soil moisture conditions, but yield expectations are still below the five-year average. The condition of maize is highly variable across regions and fields. At country level, our model indicates very low maize biomass compared with an average season. The harvest of green maize has already started (earlier than usual) as plants have very low water content. Our yield forecasts remain below average for all summer crops, most distinctly for green maize and grain maize.



# Ireland and United Kingdom

## Continued positive outlook despite wet conditions during harvesting in the north

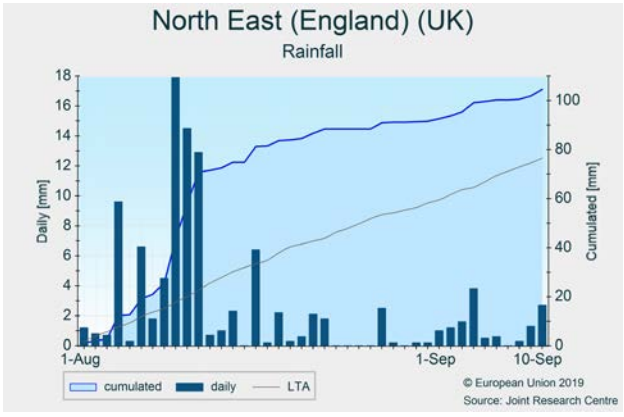
*Improved weather conditions at the end of August enabled good progress with the harvest, including in northern areas. Conditions were favourable for the growth of sugar beet and potatoes, but a high incidence of diseases was reported for these crops.*

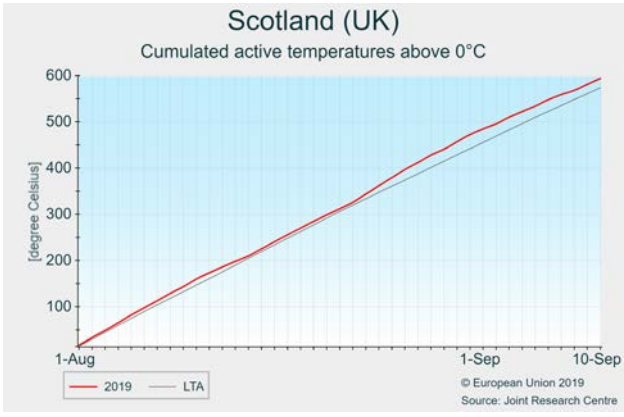
Warmer-than-usual weather prevailed during the review period, with the exception of a few colder days around mid-August and at the beginning of September. Rainfall was generally well above average in both countries but the last dekad of August was relatively dry. Precipitation was slightly below the LTA in the South East and East regions of the UK.

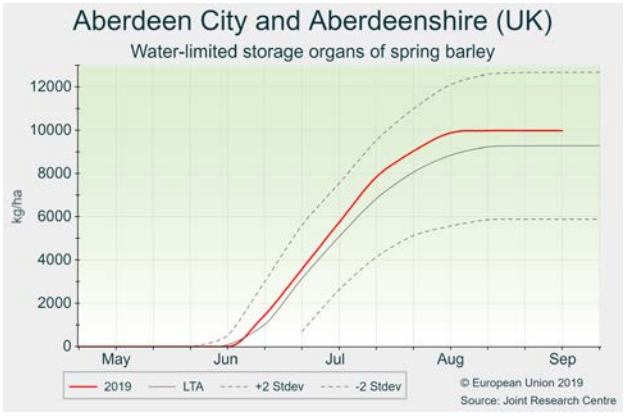
In most regions, harvesting of winter barley and rapeseed was completed at the end of August, while the harvesting of wheat and spring barley continued in northern UK and Ireland. Field reports are mixed for northern UK, mentioning cereal yields from below-average to very good. Wet weather conditions in the northern regions, which delayed harvesting and caused lodging (as reported in our August Bulletin) generally had no significant negative effects on winter and spring cereal yields.

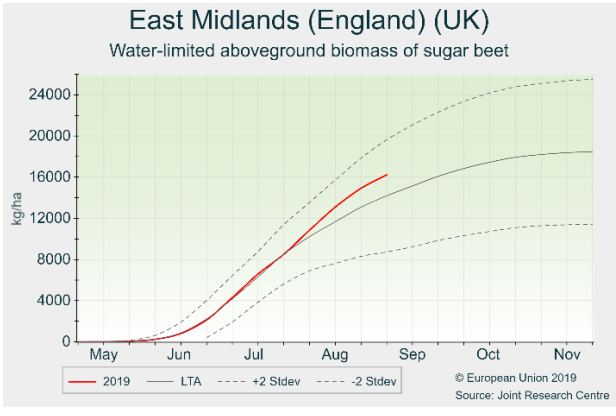
Conditions were favourable for the growth of sugar beet and potatoes but a high incidence of diseases was reported for these crops: potato blight was observed in many potato crops in Ireland[1] and northern UK[2], and an increasing occurrence of rust and cercospora was reported for sugar beet in the UK[3]. Winter rapeseed drilling started at the end of August in both countries. The potato harvest started at the end of August.

The positive yield forecasts of last month's Bulletin were maintained.




[1] www.teagasc.ie/media/website/publications/2019/Crop-Report-27-Aug-2019.pdf

[2] www.sruc.ac.uk/info/120118/crop_clinic/510/

[3] https://bbro.co.uk/media/50107/19-advisory-bulletin-no-18.pdf

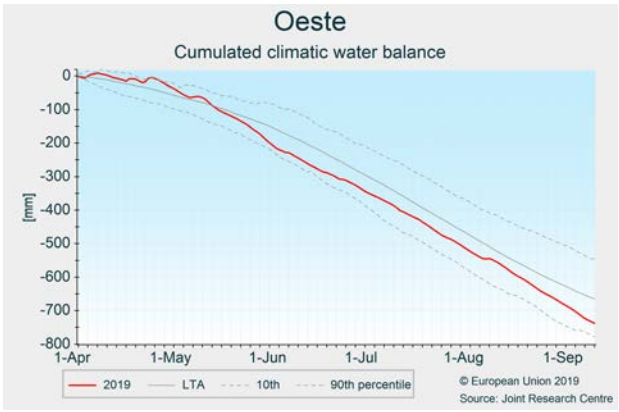
# Spain and Portugal

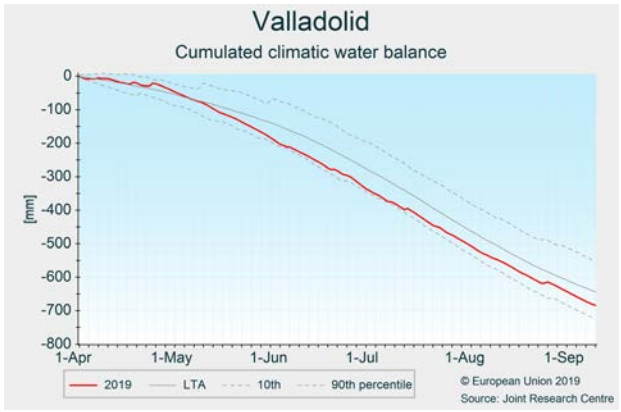
## South still dry; favourable conditions in the north

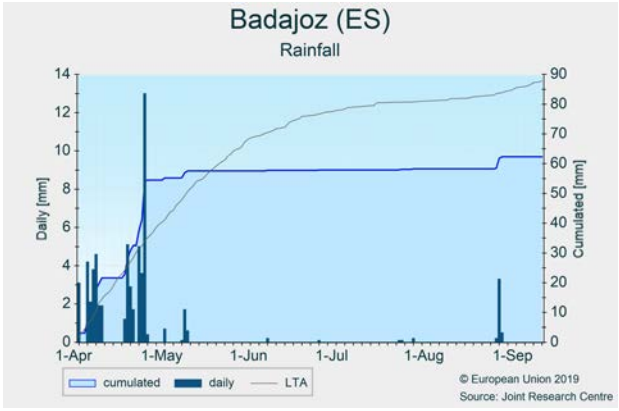
The northern part of the Iberian Peninsula received average levels of rainfall during the review period, or above-average like in *Cantabria*. Southern and central regions had no effective rainfall since mid-May (see figure for *Badajoz*), coupled with persistently high radiation and temperature levels, giving above-average potential evapotranspiration and exceptionally negative water balances in the beginning of summer in most of Portugal (see figure for *Oeste*) and throughout summer in southern Spain (see figure *Valladolid*).

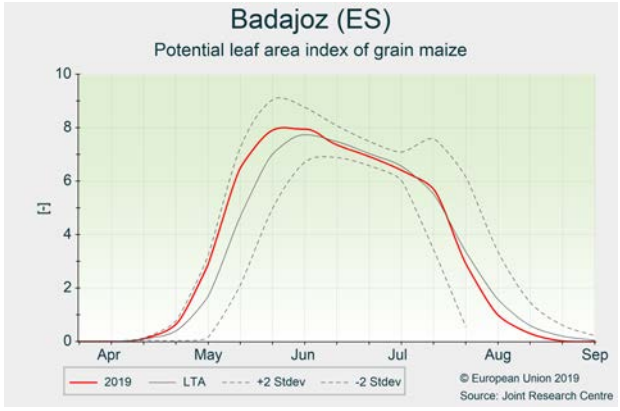
The water reserves continue to decrease in most reservoirs, in *Extremadura,* the Guadian basin reservoirs are lower than the 2017 and 2018 minima, now reaching critical low levels. Similar low conditions are presented for Segura, Tajo and Tinto, Odiel y Piedras *(source: www.embalses.net)*.

The yield outlook is positive for potatoes and sugar beet in Spain, and average in Portugal. The maize yield forecast in Portugal is around average and unchanged, in Spain, heat stress has impacted part of the production areas (e.g. *Aragón*, see figure for *Badajoz*) and was slightly reduced further. For sunflowers, which are usually not irrigated, the yield outlook is slightly below average, due to the unusually hot and dry conditions which reduced the potential of the crop, unchanged outlook.



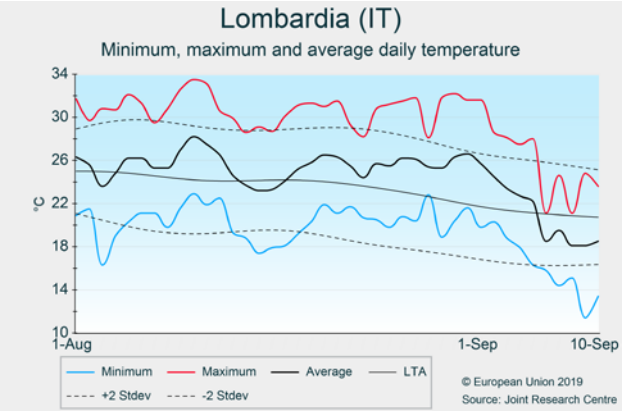
# Italy

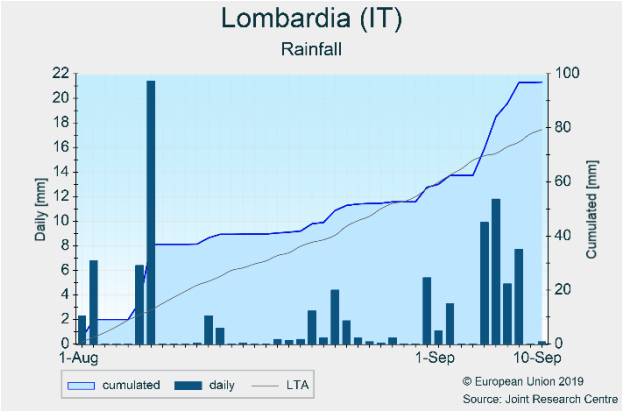
## Below-average yield outlook for summer crops, except for sunflower and potato

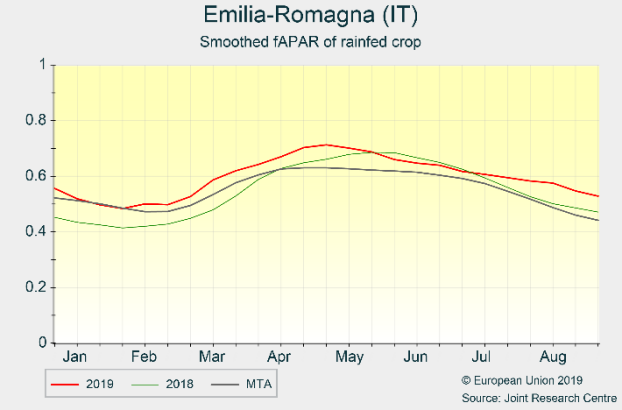
*Warmer-than-usual weather conditions prevailed in most summer crop production regions. A heatwave in August caused some stress to summer crops in northern regions. Green maize and sunflower harvests are almost completed; grain maize and soybean crops are ripening.*

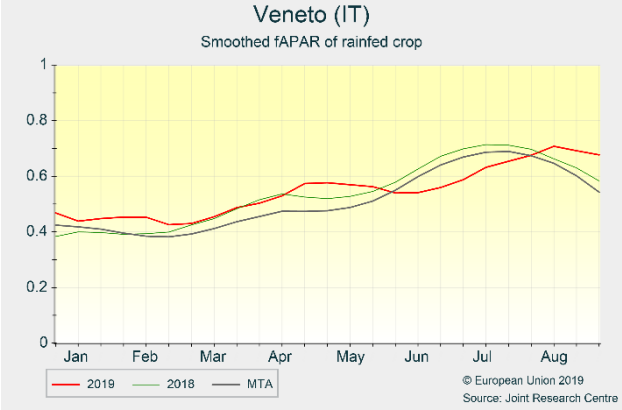
From 10 August to 15 August, a heatwave occurred in northern and central agricultural regions of Italy. Hot temperatures caused some (limited) damage to green maize, grain maize, soybean and sugar beet in the Po valley (mainly eastern parts) and accelerated sunflower ripening in central regions (*Marche, Toscana* and *Umbria).* Temperatures gradually returned to seasonal values from the second dekad of August onward. Rain favoured agricultural areas of the upper Po Valley; rain events prevailing at the beginning of August and beginning of September attenuated the effects of the hot conditions in August. Remote-sensing indicators suggest close-to-average biomass accumulation for summer crops in north-western regions (*Piemonte* and *Lombardia,* which account for about 45% of national green maize and grain maize production) and for those in *Emilia-Romagna* (55% of sugar beet production). North-eastern regions show delays in crop development of 10-20 days, and fairly above-average biomass accumulation (*Veneto* and *Friuli Venezia Giulia* - 25% of green maize and grain maize production; 65% of soybean production). Above-average biomass levels are observed in *Marche* (35% of sunflower production).

Our yield forecasts for grain maize, green maize and soybean were revised slightly downwards. The forecasts for potatoes, sugar beet and sunflowers remained essentially the same.



# Hungary

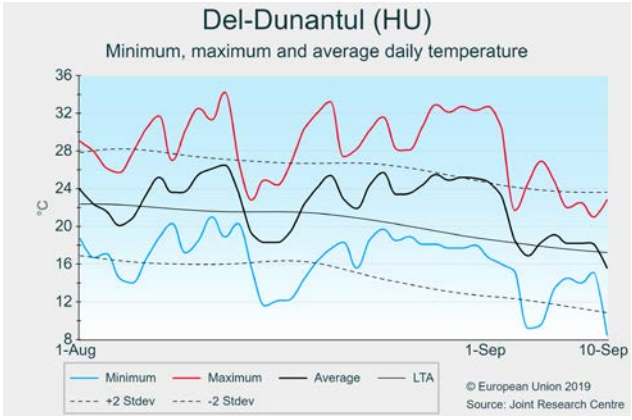
## Yield expectations for summer crops reduced by a series of heatwaves

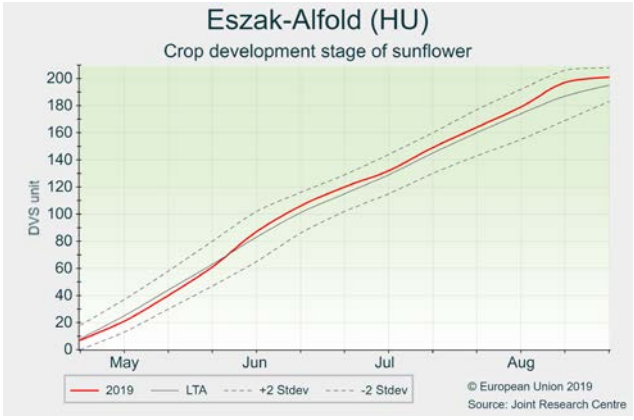
*This review period (1 August – 10 September) was among the hottest in our climatological archive. High temperatures and dry soil moisture conditions compromised biomass accumulation for all summer crops, reducing the yield outlook from very positive to moderately above-average levels.*

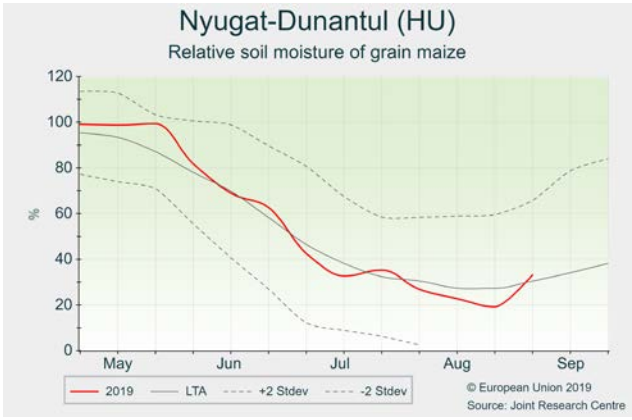
For the review period as a whole, temperatures exceeded the LTA by 1-3°C. Two to six heatwaves have been experienced since the beginning of August, with 10-25 hot days ($T_{max}$ >30°C) in total, exceeding the usual incidence by 3-15 days.

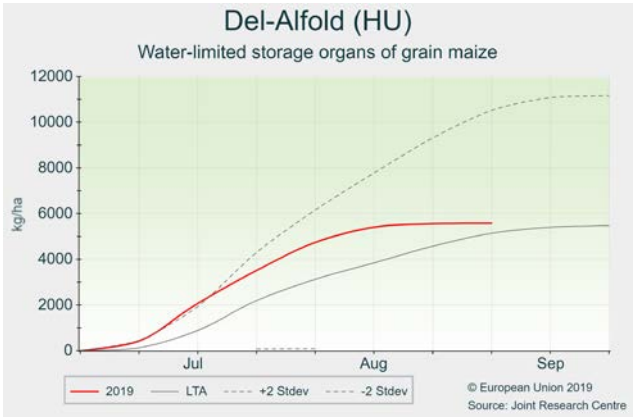
In western and central Hungary, precipitation totals reached around average levels (40-100 mm). However, considerable areas along the eastern border received only 15-30 mm (30-50% of the LTA). The last dekad of August was particularly dry and hot, causing delay to the start of rapeseed sowing.

High temperatures led to accelerated summer crop development and unfavourably shortened the grain-filling stage for maize and sunflower crops, as reflected in premature senescence of the leaf area. From late July to early August, soil moisture content decreased under summer crops, to average or (in north-western and eastern regions) below-average level. Biomass accumulation practically stalled due to these unfavourable factors, and consequently our yield forecast was revised downwards to the trend level. The excessively warm conditions also compromised photosynthesis of less heat-stress-tolerant crops such as potato and sugar beet, for which the yield forecasts are now below the 5-year average.



# Romania

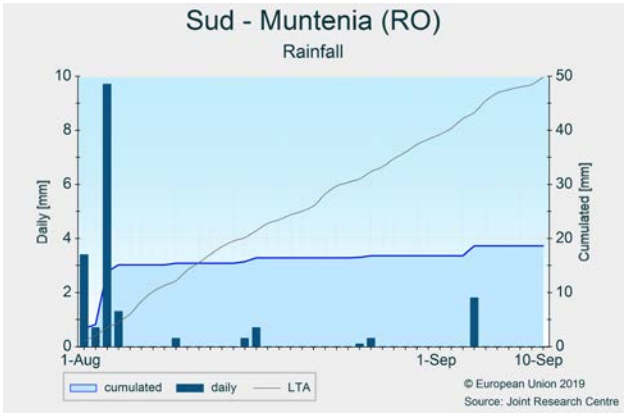
## Heatwaves and water deficit affected yield formation of summer crops

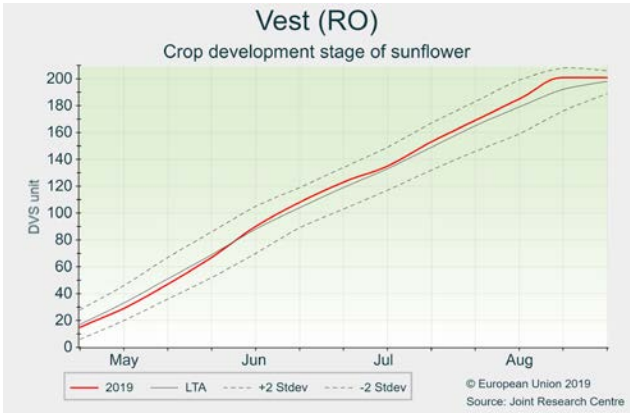
*Temperatures fluctuated above the LTA most of the time. Rainfall was well below average, especially in western and southern parts of the country. Yield formation of grain maize and sunflower was negatively affected by heat and water stress; consequently our yield forecasts were revised downwards.*

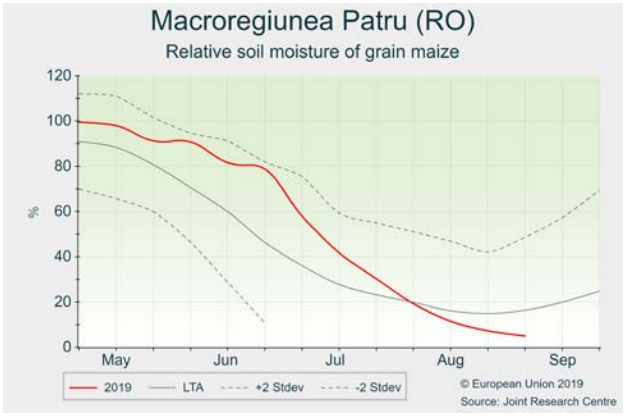
From the beginning of August, long significantly warmer-than-usual periods were interspersed with short breaks of milder spells, resulting in an overall positive thermal anomaly of 1-3°C. Daily maximum temperatures reached 35-38°C during the hottest days. The number of hot days (Tmax > 30°C) reached 20-30 in the agricultural areas (lowlands), exceeding the normal frequency by 10-15 days. The southern part of Romania, in particular, was exceptionally hot.

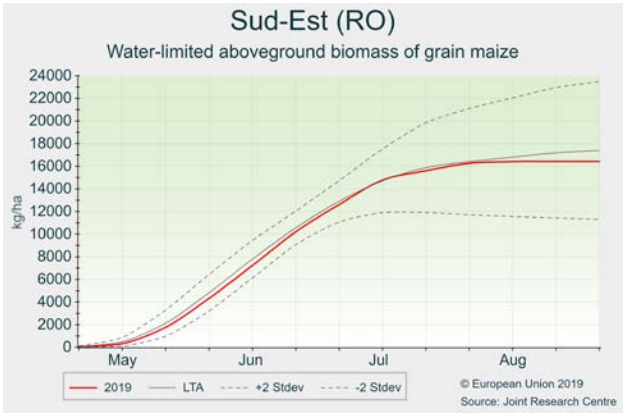
After the rains of early August, rainfall tendency decreased dramatically and hardly any precipitation (< 10 mm) was recorded until early September in the southern regions and along the Hungarian border. In contrast, the central and north-eastern regions experienced near-average precipitation.

Hot weather accelerated the phenological development of summer crops, shortening the period of yield formation, and is likely to result in an early harvest. Combined with limited water availability, according to our models, leaf area decreased sharply and biomass accumulation was negatively compromised, directly affecting yield formation. Consequently, our yield forecasts for grain maize and sunflowers were revised downwards. Our yield forecasts for sugar beet and potatoes were maintained, since the most important cultivation regions for these crops are in central, northern and north-eastern Romania.



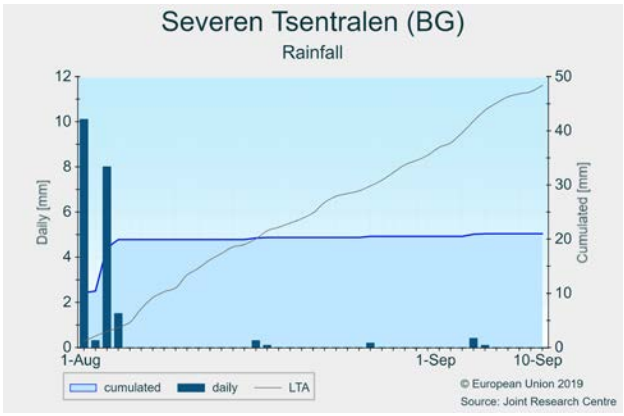
# Bulgaria

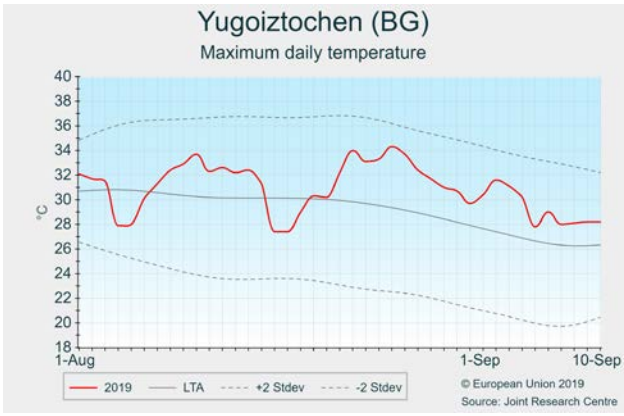
## Yield outlook lowered due to hot and dry weather

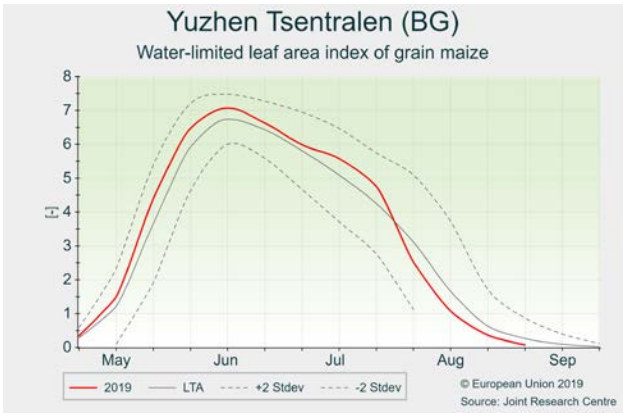
*Since early August, above-average temperatures and severe rainfall deficits have become typical across Bulgaria, resulting in early canopy senescence and reduced biomass accumulation. The previous yield forecast for grain maize and sunflower was revised downwards.*

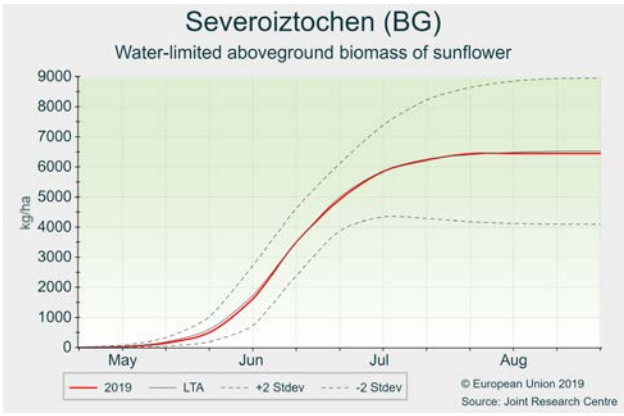
Except for two short periods around 5 August and 15 August, significantly warmer-than-usual thermal conditions prevailed in Bulgaria, with a positive thermal anomaly of 1-3°C. The number of hot days ($T_{max}$ >30°C) exceeded usual incidence by 10-15 days. After abundant rainfalls during late July and very early August, dry weather prevailed. No or hardly any precipitation (0-5 mm) was measured. Only the areas along the southern and eastern border received some rain (10-40 mm).

Crop development accelerated significantly, shortening the storage organ formation period. The quick senescence of leaves reduced photosynthetic activity. Soil moisture also decreased sharply and biomass accumulation was compromised further – lowering yield expectations. NDVI images also present a sharp decrease underpinning the decreased yield outlook. Our yield forecasts for grain maize and sunflower were revised downwards, but still correspond to yield trends and exceed the averages for the last five years.




# Czechia, Austria and Slovakia

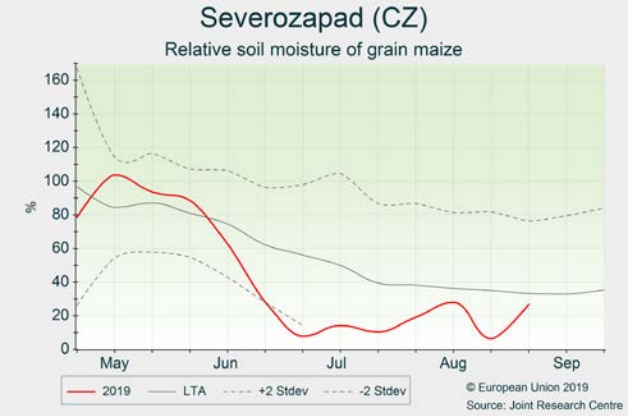
## Beneficial rainfall slightly improved the yield outlook for summer crops

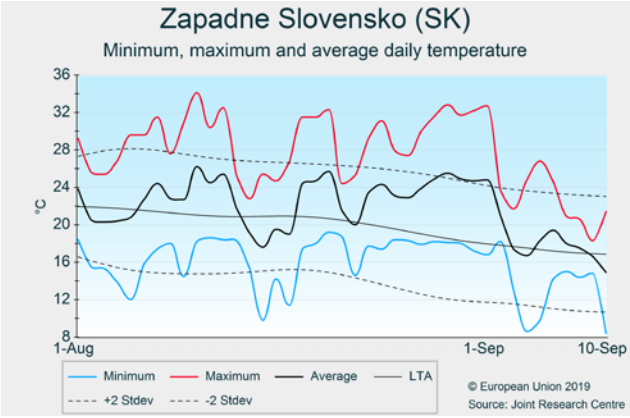
*Rainfall conditions during the analysis period generally improved growing conditions for summer crops for most of Austria, Czechia and Slovakia. The exception is north-western Czechia, where persistent drought conditions are negatively affecting crop growth.*

Since the beginning of August, the period of analysis has been warmer than usual, especially due to heatwave events that occurred at the beginning and end of August. The maximum observed temperatures reached 34°C (regionally even 36°C). The heatwaves did not affect

crops, as these were already past the most sensitive growth stages. North-western Czechia experienced a rainfall deficit, deepening drought conditions which have persisted since early spring. On the other hand, eastern Czechia, Slovakia, and western and north-eastern Austria have received above-seasonal rainfall cumulates during the period of analysis.

Slovakia, Czechia and Austria experienced the warmest or second warmest summer on our records. Consequently, the development stage of summer crops is advanced; grain maize has already reached (or is very close to) physiological maturity. The lack of rainfall in north-western Czechia deepened the soil moisture deficit, which has negatively affected summer crops in the region. Nevertheless, summer crops elsewhere benefited from rainfall, reducing the soil moisture deficit which had been regionally accumulating since the beginning of summer. Consequently, summer crop yields were revised slightly upwards, generally resulting in an outlook close to the 5-year average.



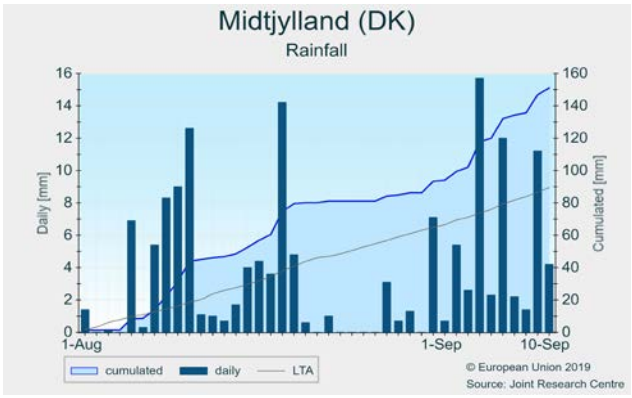



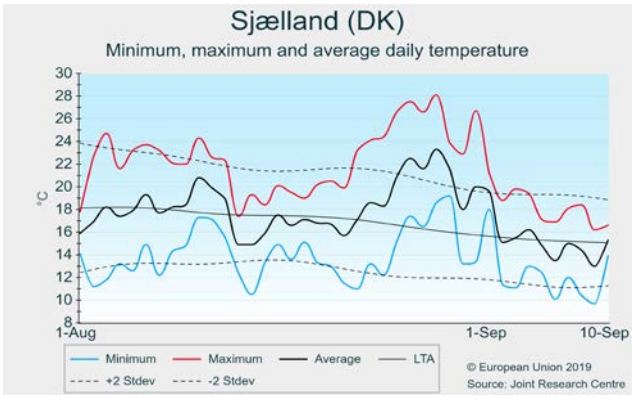

# Denmark and Sweden

## Rainy weather is hampering the harvest of winter cereals, but yields remain high

*Substantial rainfall has been observed for the period of analysis. The rain came when most of the winter and spring cereals were reaching maturity and nearing harvesting time. No losses due to delays in harvest are expected; thus yield forecasts are remaining largely above average for all crops.*

Rainfall was substantially above average for most parts of Denmark and Sweden during the period of analysis. Most of Denmark – except *Sjaelland*, which experienced average rainfall conditions – received over 30% more than the usual amount of rain. In Sweden, a rain surplus of 30% above average was recorded in the west. Eastern regions had slightly less rain, while *Kalmar Län* and *Gotlands Län* received less than 70% of expected levels. Temperatures were average, except for the last dekad of August which was 3-4°C above seasonal values. Radiation for the period of analysis was close to or slightly above average. A deficit observed during the second dekad of August was largely compensated during the last dekad of August. The substantial rainfall delayed part of the winter cereal harvest and is expected to affect quality. Nevertheless, yields are expected to be close to the record high. Summer crops benefited from the rainfall, but the wet conditions increased disease pressure, particularly for potatoes. Nevertheless, the yield of summer crops, particularly sugar beet and potatoes, is expected to be back to normal levels after last year's drought that affected both countries.




# Estonia, Lithuania, Latvia and Finland

## Good harvest for winter cereals

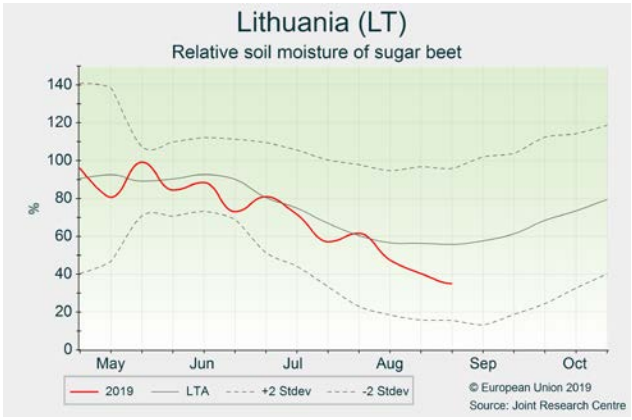
*The cereal harvest is nearly completed in Finland, with good results. Overall, it has been a good season for winter and spring crops in the Baltics, but with below-average yield expectations in Lithuania for cereals, sugar beet and potatoes.*

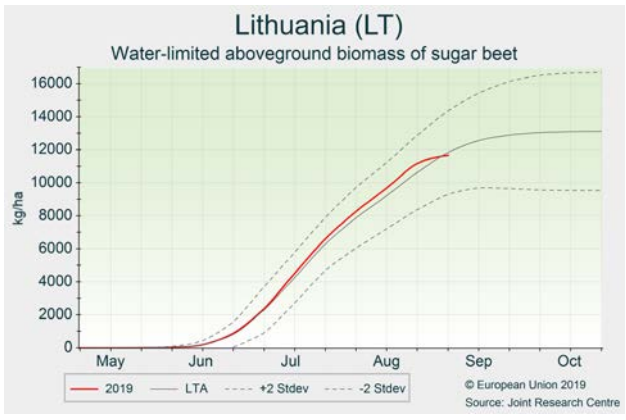
The review period started with below-average temperatures, which notably increased from mid-August to above the LTA; maximum values at the end of August reached 25°C in Finland and 29°C in Lithuania.

Rainfall was below average in the Baltic countries and in south-eastern Finland, but above average in western Finland.

The cereal harvest has been concluded in the Baltic countries. Winter drilling has started and the earliest rapeseed crops had already emerged at the end of August in Lithuania. Harvesting is still under way in Finland, with particularly good yield expectations for winter cereals and average protein values for wheat. The rapeseed harvest is estimated to be lower than average in Finland, as the crops were affected by drought and pests. Potato harvesting has not started yet, apart from early potatoes. In Lithuania, according to our models, continued dry conditions negatively affected potato and sugar beet growth.

Our yield forecasts remain practically unchanged, with the exception of the forecasts for sugar beet and potatoes in Lithuania, which were revised downwards.




# Belgium, Luxembourg and the Netherlands

## Continued mediocre yield outlook for summer crops

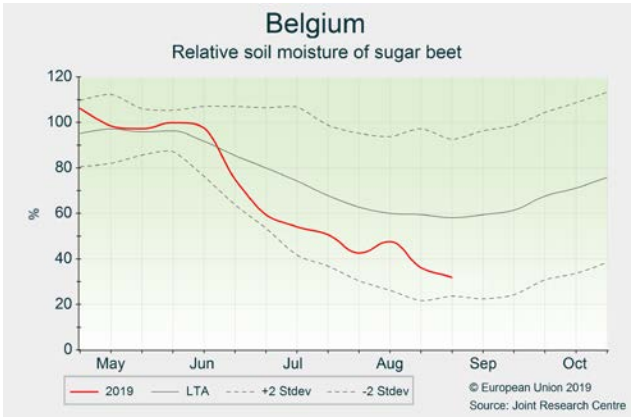
*Predominantly mild temperatures and fair amounts of precipitation were insufficient to improve the yield outlook for summer crops. Soil moisture levels are still very low in most crop producing regions.*

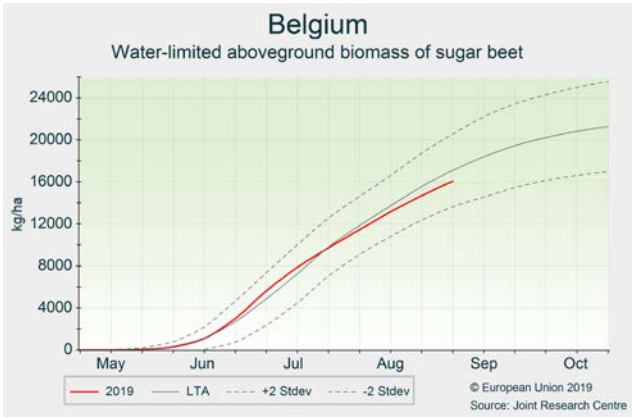
Temperatures fluctuated mostly close to the LTA during the review period, with the exception of a short, unusually late heatwave at the end of August, and several days with distinctly colder-than-usual temperatures in the first

dekad of September. Rainfall was somewhat below average in most regions, with the largest deficits in north-western Belgium.

These conditions as such were favourable for crops – the heatwave was too short and weak to cause significant damage – but not sufficiently so to improve the overall mediocre yield outlook of sugar beet, potatoes, grain maize, and green maize. In areas were water supply has been adequate, crops continue in good condition. In areas where this was not the case, yield expectations continue to be very low. As the climatic water balance continued to be negative, and most of the rainfall during the review period occurred during the first half of August, soil moisture levels are well below the LTA. This is most distinctly so in western and southern Belgium, and could further negatively impact (albeit only limited at this advanced stage of the season) yield potentials.

Our yield forecasts remain essentially unchanged, close to the 5-year average.




# Greece and Cyprus

## Grain maize yield potential weakened

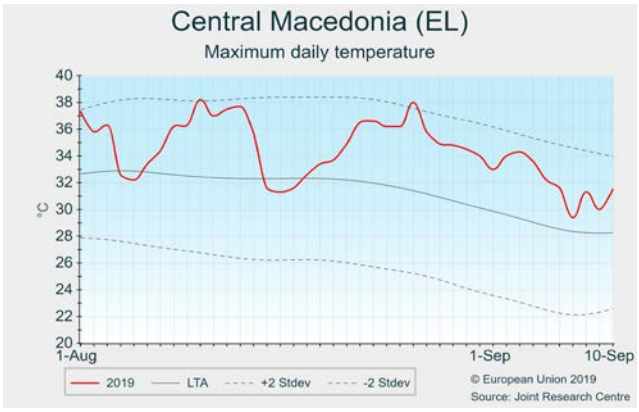
*High temperatures and scarce rainfall prevailed throughout the review period. Phenological development of summer crops became advanced and harvesting started early. Yield expectations for summer crops have been reduced.*

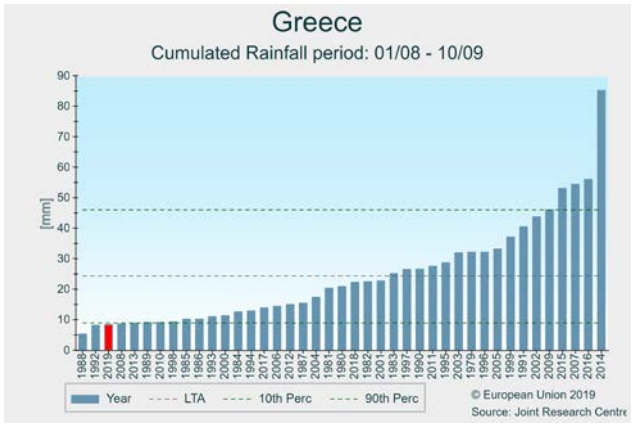
Temperatures during the review period fluctuated mostly above the average. In several regions, this 1 August to 10 September period was the hottest or one of the hottest in our weather archive (since 1979). Particularly high temperatures were recorded in northern and eastern regions (e.g *Kentrikí Makedonía*, *Thessalía*), where maximum temperatures reached 38-41°C on the hottest days. In contrast, south-eastern areas experienced mostly near-average thermal conditions.

Hot weather was accompanied by sparse precipitation. Only the north-eastern territories (e.g *Anatolikí Makedonía kai Thráki*), received mentionable (> 15 mm) rainfall. Dry weather conditions and accelerated summer crop development allowed an early start to the harvest campaign for summer crops.

Irrigation partially mitigated the negative effect of the heat stress on summer crops, but even with optimal water supply, biomass accumulation was negatively impacted and remains below average. Remote sensing images (fAPAR) confirm weaker-than-usual crop status. The yield forecast for summer crops (except rice) was revised downwards and is now below the 5-year average.

Cyprus also experienced a hot and dry period, with well above-average temperatures prevailing. Since the beginning of August, hardly any precipitation has been recorded, but this is normal for Cyprus in late summer.



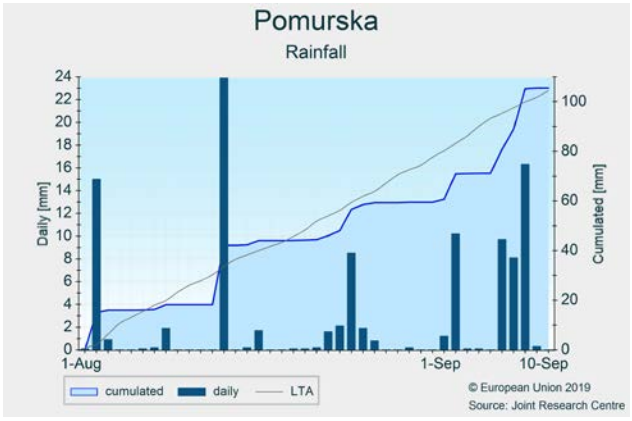

# Croatia and Slovenia

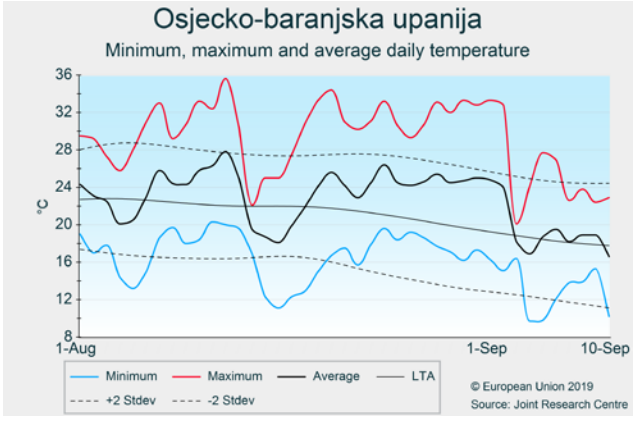
## Yield outlook for summer crops above 5-year average

*Heatwaves in August accelerated summer crop development and increased leaf senescence. These effects were most pronounced in Croatia. Nevertheless, the summer crop yield outlook generally remains above the 5-year average.*

With heatwave events occurring at the beginning and end of August, the analysis period was substantially warmer than usual. Maximum temperatures reached up to 36°C (locally in eastern and coastal parts of Croatia up to 40°C). Rainfall was above average in Slovenia and average in Croatia, except in central-northern Croatia where a rain deficit was recorded.

Higher-than-usual temperatures accelerated the development of summer crops. Grain maize has reached or is very close to physiological maturity. High temperatures during the heatwave events accelerated leaf senescence, which was more pronounced in Croatia where the highest temperatures were recorded. The grain maize yield forecast has therefore been revised slightly downwards in Croatia, but it remains still well above the 5-year average. In Slovenia, the yield forecast for grain maize has been revised slightly upwards, due to beneficial rainfall during the analysis period.



# 4.2. European Union – rice producing countries

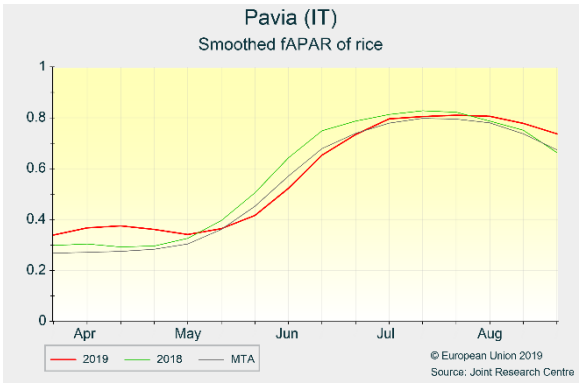
## Average forecast for the main rice-producing countries

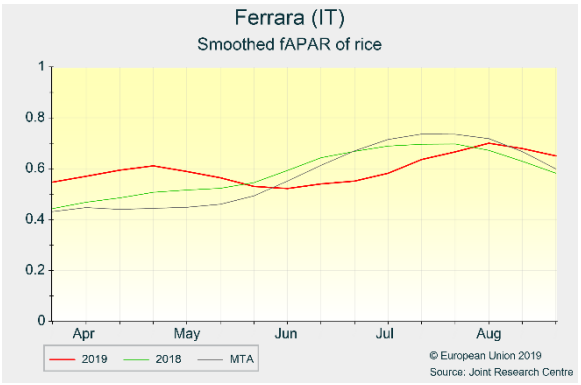
The seasonal yield forecasts for the main European rice-producing countries (Italy and Spain) is in line with the average for the past 5 years. Performance in other countries is mixed. In France, below-average temperatures at the beginning of the season, and poor stands caused by unfavourable windy weather, negatively impacted rice productivity, leading to a below-average (-11%) forecast. In Greece, our yield forecast is well above average (+9.8%), thanks to favourable weather conditions throughout the season. Overall, our yield forecast at EU level is 1% above the 5-year average, and 0.6% below last year's level.

# Italy

## Average rice season

Despite initial concerns around sowing and early development, as described in the June issue of the Bulletin, the 2019 rice campaign in Italy performed on average, in terms of both phenological response and biomass accumulation. In the provinces of *Pavia, Vercelli* and *Novara* (accounting for almost 80% of national rice production), analysis of satellite-based fAPAR profiles indicates crop recovery at the beginning of July, triggered by high temperatures (almost +5°C above the LTA). Flowering occurred between the end of July and in the first ten days of August, which corresponds to around average timing. Rice crops are now at the end of grain filling or beginning of ripening phase. Biomass accumulation is above average in all three rice-producing provinces. The rice campaign in the north-eastern rice districts of Italy (*Ferrara* and *Verona,* accounting for almost 2.5% of national production) was more seriously hampered in May and June, resulting in below-average yields. On balance, at national level, an average campaign was observed. No biotic stress or risks are observed. Our yield forecast is in line with the 5-year average.




# Spain and Portugal

## Crops in fair condition, overall

Temperatures in the Iberian Peninsula have been warmer than usual in the south and east. Rainfall was very low, or not registered at all, in the south throughout the rice-growing period. Nevertheless, heat damage has been limited and water supply has generally been sufficient.

High temperatures, with daily maxima near to or above 35°C, in *Badajoz*, *Cáceres* and *Oeste* in the last two dekads of August may have generated spikelet sterility.

Ripening is advanced in the rice areas of northern and eastern Spain, and has started in early September in the southern parts of *Andalucía, Extremadura* and *Baixo Alentejo*. In all these regions, crops are in good condition.

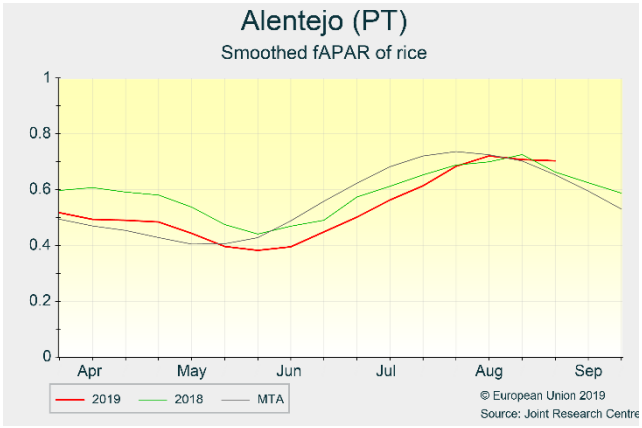
Although the hot and dry conditions resulted in high demand (and little supply) for water reservoirs, the availability of irrigation water for rice crops has generally been sufficient to sustain cultivation this year. Rice-cultivated fields in the *Cáceres* region (central-western Spain) may have more heterogeneous yields, and less area under production.

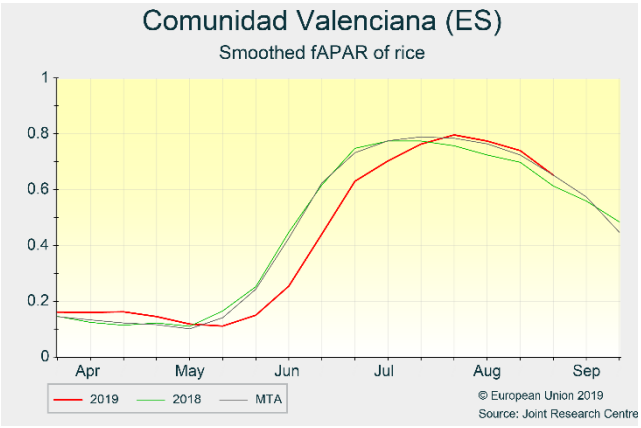
A crop delay of about 1-2 dekads, accumulated in the

eastern irrigated areas of Spain (*Comunidad Valenciana, Cataluña, Aragón*) since mid-June, is still persisting.

In Portugal, rice conditions are around average. Fields in southern regions present more yield variability than in central parts of the country. Southern Portugal had early delays in sowing due to a cold spell at the end of April; this may have resulted in delays to development and in forecast yield heterogeneity.

The yield outlook for Spain is above the 5-year average, but below the level of last year. In Portugal, however, it is slightly below the 5-year average but higher than last year.

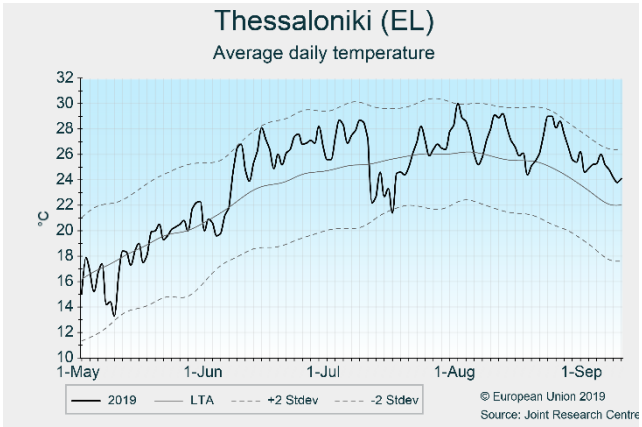


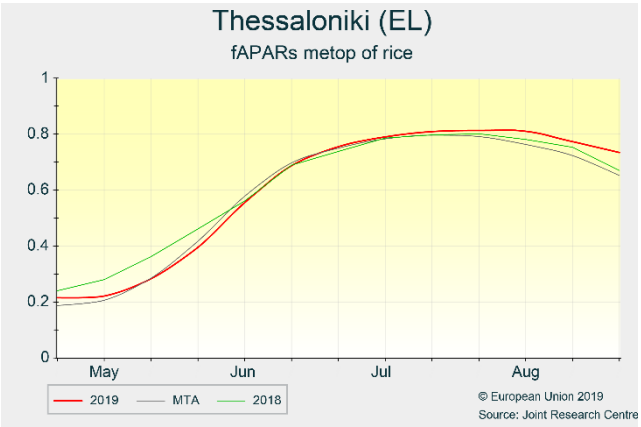




# Greece

## Above-average yield expectations

Rice districts in *Thessaloníki* and *Imathía* benefited from very favourable conditions throughout the season. Until 10 July, warm temperatures (on average 2-3°C above the LTA) and fairly well distributed rainfall adequately sustained crop growth and crop development during stem elongation and booting phases. Mild temperatures during the second and third dekads of July (mostly 2°C below the LTA), were beneficial to crop anthesis and flowering, with no risk of heat-induced spikelet sterility. From the beginning of August, concurrent with grain filling and also during ripening, temperatures rose again to 2-3°C above the LTA. The positive expectations for rice in Greece are also supported by the interpretation of remote sensing indicators, which indicate a more extended crop heading phase than usual. Our yield forecast for rice in Greece is above the 5-year average.



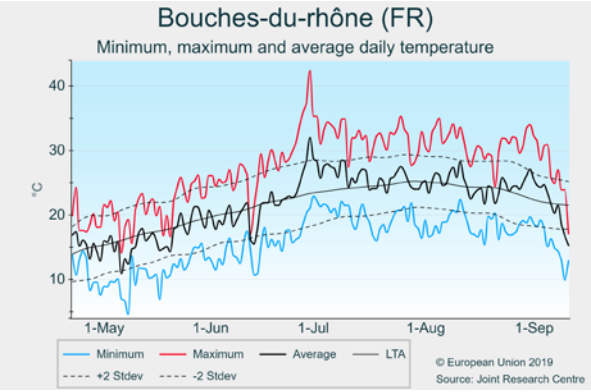



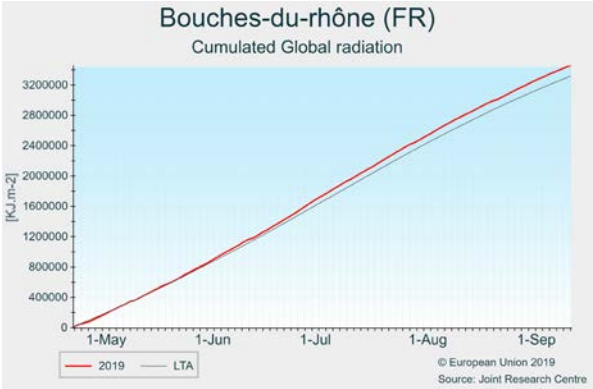

# France

## Below-average yield outlook due to a bad start to the season

Below-average temperatures until 20 May hampered growth of the earliest sown rice, while very windy weather negatively impacted plant density in part of the fields. The rest of the season was favourable, with temperatures above average, particularly during the heatwave at the end of June. This had no impact on rice growth, as japonica

rice is most sensitive to heat stress around flowering, which usually happens in July or August depending on sowing dates. Global radiation was also above average and beneficial for biomass accumulation. However, these favourable conditions were insufficient to compensate for the negative effects on yield potentials caused by lower and heterogeneous plant density at the start of the season, and our yield forecast was revised downwards to below the 5-year average.

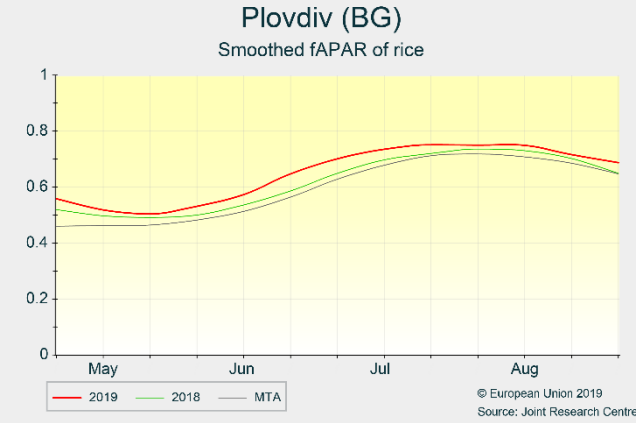


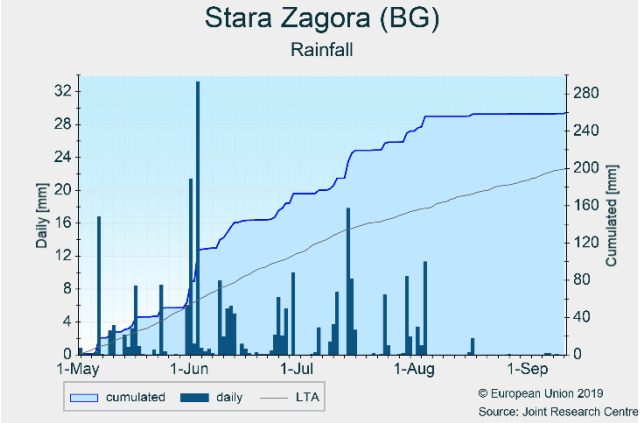




# Bulgaria

## Positive yield outlook

Until early July, warmer-than-usual weather conditions supported vegetative crop growth in the main rice-producing districts of Bulgaria (*Plovdiv, Pazardzhik* and *Stara Zagora*). During the flowering phase of rice in July, moderate daily temperatures prevailed, avoiding potential causes of abiotic stress to rice. A frequent incidence of rainy days occurring in June led to moderate biotic pressure: an increment of days with high infection risk were depicted by our model during this period. Remote sensing indicators registered above-average cumulates of biomass, and a similar course as the previous year through flowering and grain-filling periods. The yield forecast is above the 5-year average and similar to last year.




# Hungary and Romania

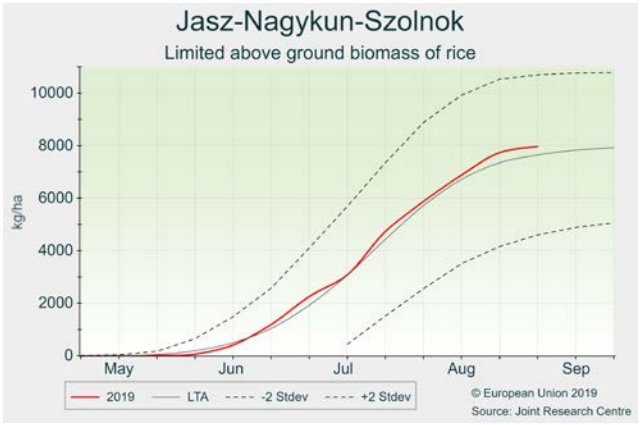
## Cold-induced spikelet sterility reduced rice yield expectations

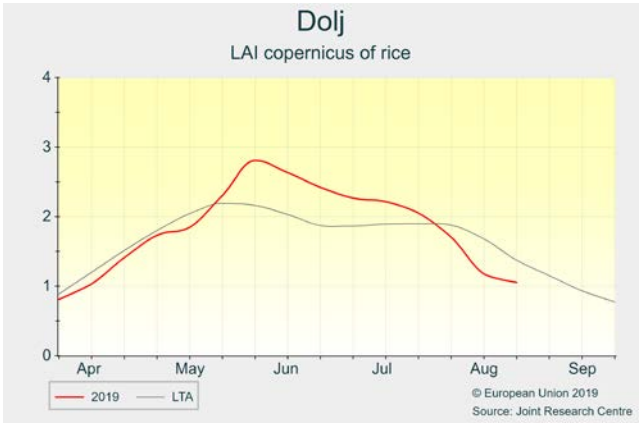
Until late May, colder-than-usual conditions prevailed in Hungary and Romania, hampering the early growth and development of rice, which is a thermophile crop. From the second dekad of June, significantly above-average temperatures (including several hot days with $T_{max}$>30°C) accelerated crop development to near average. In early July, temperatures dropped, eliminating the risk of heat damage to flowering, but to such an extent that cold-induced spikelet sterility may have occurred. Moreover, this period coincided with some rainfall events causing

increased pest and disease pressure.

Since the third dekad of July, hot weather has dominated again, resulting in accelerated crop development and a shortening of the yield formation period. According to our model simulations, despite the slow start to the growing season, potential biomass accumulation reached above-average levels in late August in Hungary. In south-eastern Romania, biotic and abiotic stress limited biomass; storage organ accumulation also remained below the levels of previous years, due to cold temperature conditions observed at the beginning of the growing season. Nevertheless, analysis of satellite imagery indicates adequate leaf area expansion and photosynthetic activity for rice in both countries in July and early August.

On balance, considering biotic and abiotic stresses for the main rice-producing regions, our yield forecast for both countries was maintained in line with the historical trend.



# 4.3. Black Sea Area

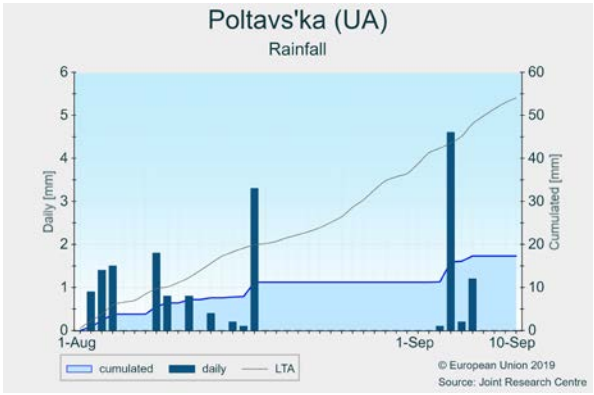
## Ukraine

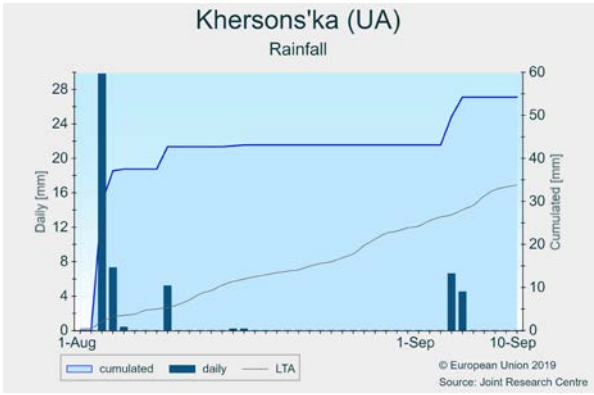
### A positive yield outlook, only slightly lowered for grain maize

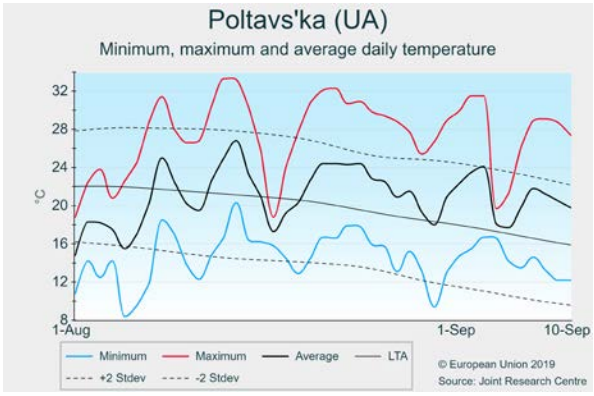
The rain deficit observed since June in central Ukraine (the main grain maize producing region) persisted. Grain maize yield, despite being forecast to be well above the 5-year average, is slightly down compared to last year. Sunflower, more tolerant to drought, benefited from favourable conditions, and soybean benefited from good conditions in western oblasts.

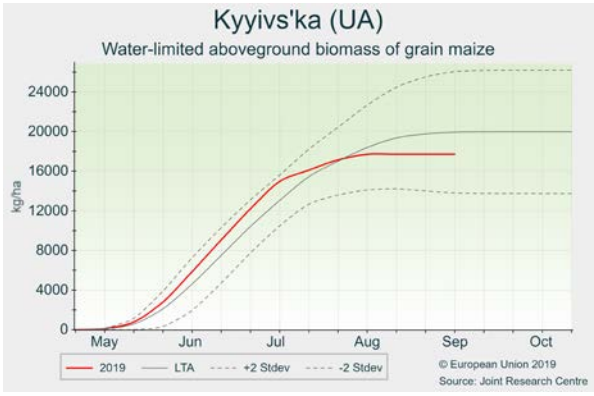
The weather was dry in western and central oblasts, with cumulative rainfall during the period of analysis being 50% below the usual amount in central Ukraine, thus extending the water deficit observed since June. In contrast, southern and eastern oblasts received more rainfall than usual, due to downpours at the beginning of August. Temperatures were substantially lower than usual during the first dekad of August, whereas warmer-than-usual weather was observed during the last dekad of August and the beginning of September. The last two dekads of the period of analysis have been sunny, with above-average radiation.

Most of the rain deficit was centred on the main producing regions for grain maize, where some sowing had been delayed, thus further exposing the plants to the dry conditions. The yield forecast for grain maize was revised slightly downwards but remains well above the 5-year average, albeit down compared with last year. Soybean yields are expected to be higher than the 5-year average in western oblasts, slightly impacted by the dry conditions in central Ukraine, and at an exceptionally high level for irrigated soybean in *Khersons'ka*. The yield forecast for sunflower is close to the record, thanks to a favourable start to the season and no impact from the dry conditions in central Ukraine due to the crop's tolerance to drought, leading to very high yields in central Ukraine.



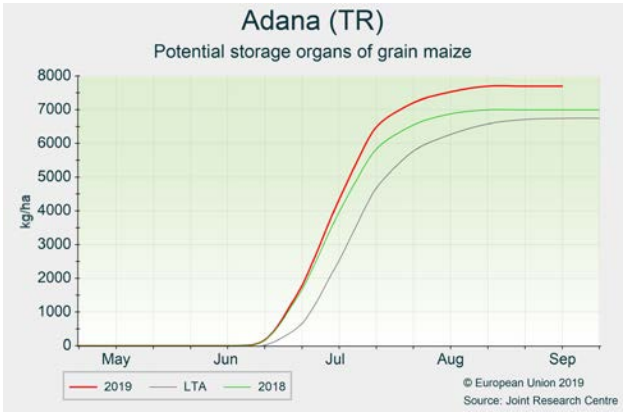
# Turkey

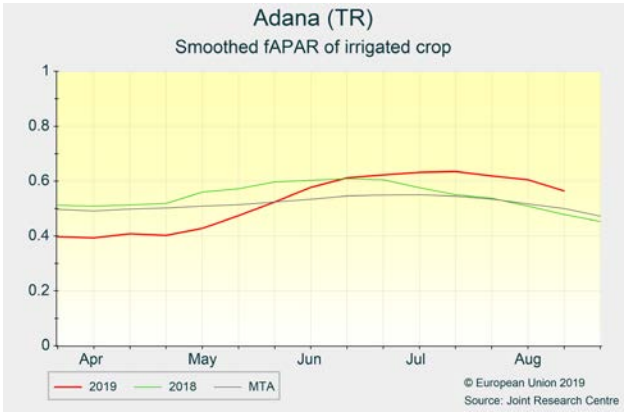
## Positive outlook for summer crops

*Summer crop flowering and grain filling occurred in August under favourable conditions. Crops fully recovered from the growth delay incurred in May. Irrigation mitigated hot temperatures, allowing high growth rates. Maize and soybean crops are now at ripening phase, while harvesting has started for sugar beet.*

The review period (1 August – 10 September) was characterised by warm temperature conditions of 1-3°C above the LTA. The highest temperature anomalies occurred in September. Temperature profiles sustained crop needs well during flowering and grain filling stages in both south-eastern (*Mardin, Sanliurfa, Gaziantep*) and Mediterranean (*Hatay, Adana, Antalya*) agricultural areas.

Irrigation was fundamental to maintain adequate soil moisture levels, as precipitation was close to zero throughout the review period in most regions (as usual for this period of the year). An exceptional rainfall event (50-55 mm) was observed in *Sakarya* and *Kocaeli* districts (north-western Turkey) on 17 August. The event is likely to have negatively impacted green maize, which here represents almost 10% of the country's production. Crop model simulations and remote sensing (fAPAR) analysis indicate above-average biomass accumulation for soybean and grain maize (e.g. in *Adana*, which is responsible for 60% of soybean production and 15% of grain maize production in Turkey). Our forecasts for all the summer crops are above the five-year average.



# 4.4. European Russia and Belarus

## European Russia

### Difficult harvesting conditions for winter and spring cereals

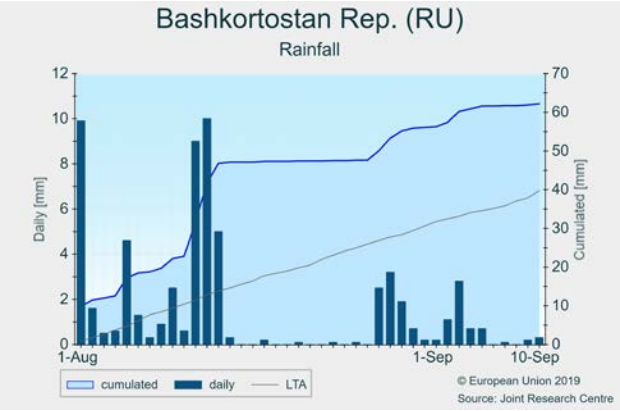
*Cold and rainy weather delayed the harvest in the first half of August in large parts of European Russia. The yield expectations for spring barley are above average. Grain maize benefited from the rains in July and August; yield expectations are on trend level and better than a year ago.*

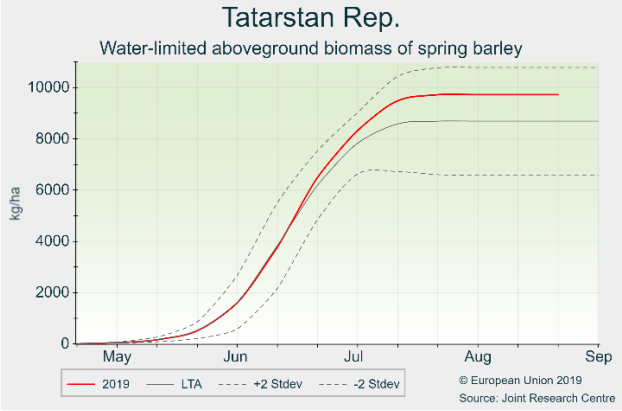
In the western half of European Russia, temperatures fluctuated around the average, while eastern regions were predominantly 1-2°C colder than usual. Thermal conditions varied strongly, with alternating periods of quite cold and very warm periods. In particular, the first half of August was exceptionally cold.

Precipitation mostly reached or exceeded the average in Russia, but rainfall was scarce in a considerable part of the Southern okrug, *Saratovskaya* oblast in Volga okrug, and a large area of the Central Black Earth Region. Until mid-August, frequent rains, low temperatures, high air humidity and overly wet top-soil conditions hampered the harvest of winter and spring cereals in numerous regions of the Central, Volga and North-Western okrugs, likely causing harvesting losses. Weather conditions became significantly drier from the last dekad of August, allowing harvesting operations to accelerate, except in the northern and easternmost regions of Russia, as well as some areas north of the Caucasus Mountains.

Simulated biomass accumulation for spring barley presents near-average or above-average levels in the main eastern and northern production areas, thanks to adequate water supply. The situation is less favourable in the western part of the Central okrug and in the southern regions of Russia. The overall yield outlook for spring barley is above average.

In southern regions, soil moisture content was below optimal for grain maize during the vegetative stage. Beneficial rains during the early grain-filling stage improved crop water supply and facilitated yield formation. In addition, milder weather conditions lengthened the grain-filling period. Grain maize yield expectations are significantly better than last year.




## Belarus

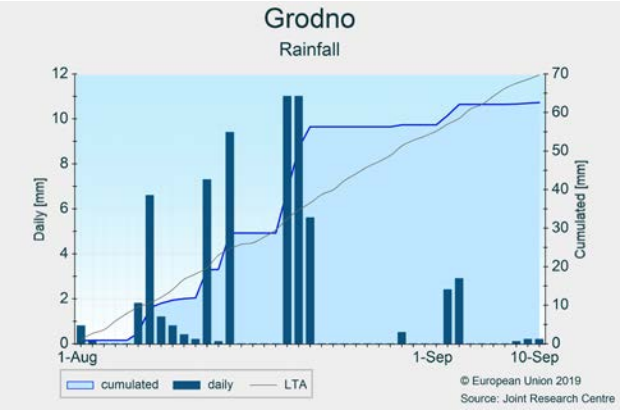
### Positive outlook for grain maize

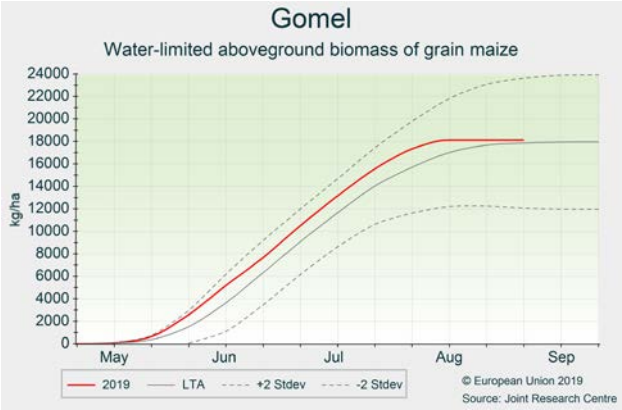
*Good conditions for the final stages of the grain maize season.*

Temperatures oscillated around the LTA during the period of analysis. Precipitation was significantly above average in the north-east part of the country (especially in the *Vitebsk* region), and below average along the south-west and south-east borders. Rainfall was concentrated during the first two dekads of August. The spatial patterns of rainfall were reflected in soil moisture levels that reached above-average values in north-east areas, and below-average values in some parts of south-west and south-east regions.

Weather conditions were favourable for the final stages of grain maize development. These conditions also

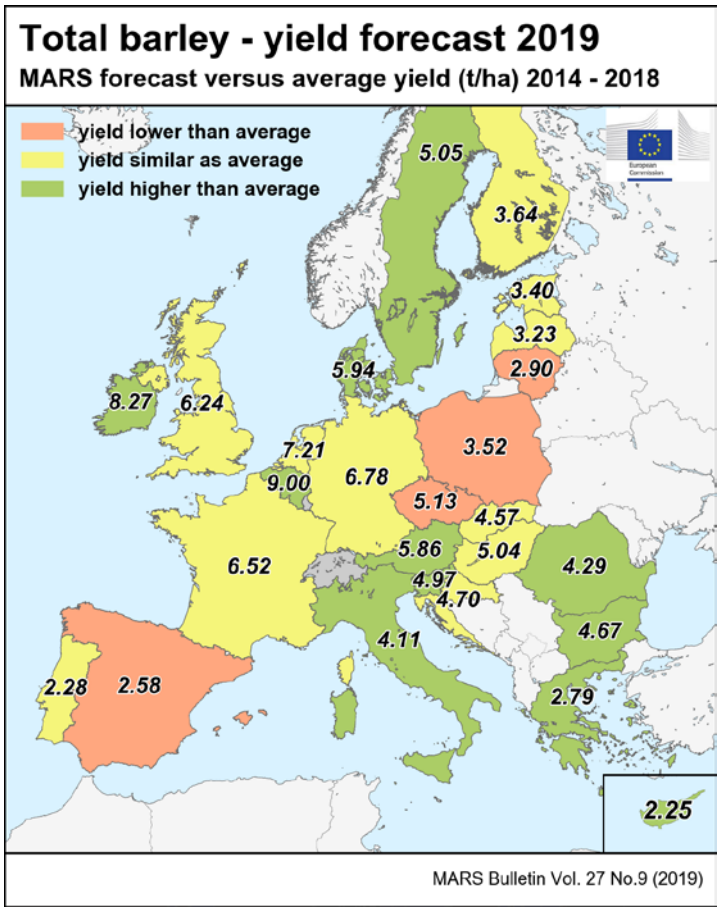
favoured ongoing fieldwork, including the sowing of winter crops. Grain maize reached maturity approximately 10 days ahead of the usual time. Nevertheless, the condition of the crop is generally good, with simulated biomass and storage organ accumulation above average. Hence, our grain maize forecast remains above the 5-year average.



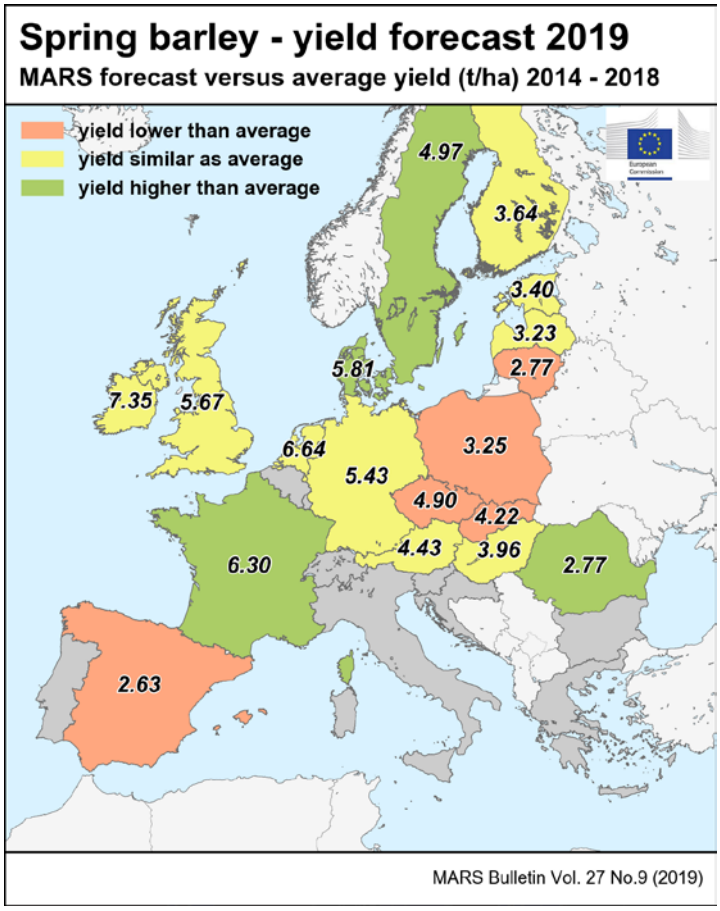



# 5. Crop yield forecasts

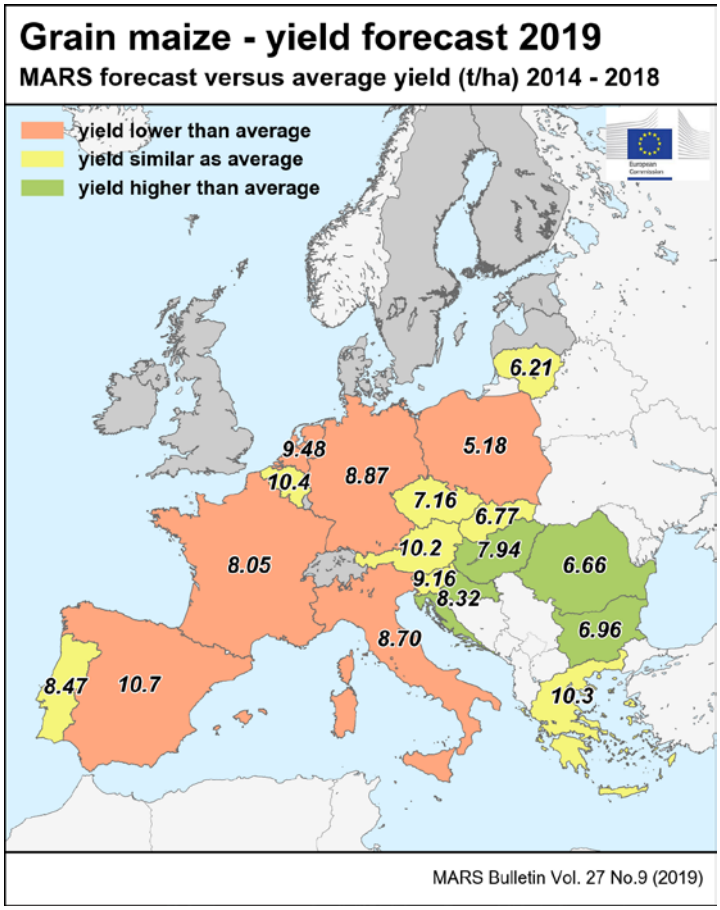
| Country | TOTAL BARLEY (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 4,86 | 4,60 | 4,92 | +1,1 | +6,9 |
| AT | 5,62 | 4,99 | 5,86 | +4,3 | +17 |
| BE | 8,20 | 7,78 | 9,00 | +9,7 | +16 |
| BG | 4,22 | 4,25 | 4,67 | +11 | +9,8 |
| CY | 1,43 | 1,81 | 2,25 | +58 | +24 |
| CZ | 5,38 | 4,95 | 5,13 | -4,6 | +3,8 |
| DE | 6,77 | 5,77 | 6,78 | +0,1 | +18 |
| DK | 5,53 | 4,38 | 5,94 | +7,3 | +35 |
| EE | 3,38 | 2,49 | 3,40 | +0,5 | +36 |
| ES | 2,87 | 3,51 | 2,58 | -10 | -26 |
| FI | 3,63 | 3,30 | 3,64 | +0,2 | +10 |
| FR | 6,37 | 6,33 | 6,52 | +2,3 | +2,9 |
| GR | 2,61 | 2,64 | 2,79 | +7,0 | +5,5 |
| HR | 4,52 | 4,53 | 4,70 | +4,0 | +3,6 |
| HU | 4,85 | 4,67 | 5,04 | +3,9 | +8,0 |
| IE | 7,89 | 6,61 | 8,27 | +4,9 | +25 |
| IT | 3,92 | 4,05 | 4,11 | +5,0 | +1,6 |
| LT | 3,48 | 2,74 | 2,90 | -17 | +5,6 |
| LU | - | - | - | - | - |
| LV | 3,24 | 2,58 | 3,23 | -0,3 | +25 |
| MT | - | - | - | - | - |
| NL | 6,96 | 6,86 | 7,21 | +3,6 | +5,1 |
| PL | 3,67 | 3,12 | 3,52 | -4,1 | +13 |
| PT | 2,22 | 2,48 | 2,28 | +2,6 | -8,1 |
| RO | 3,84 | 4,60 | 4,29 | +12 | -6,6 |
| SE | 4,59 | 3,04 | 5,05 | +10 | +66 |
| SI | 4,64 | 4,20 | 4,97 | +7,0 | +19 |
| SK | 4,67 | 3,98 | 4,57 | -2,1 | +15 |
| UK | 6,18 | 5,72 | 6,24 | +1,0 | +9,0 |



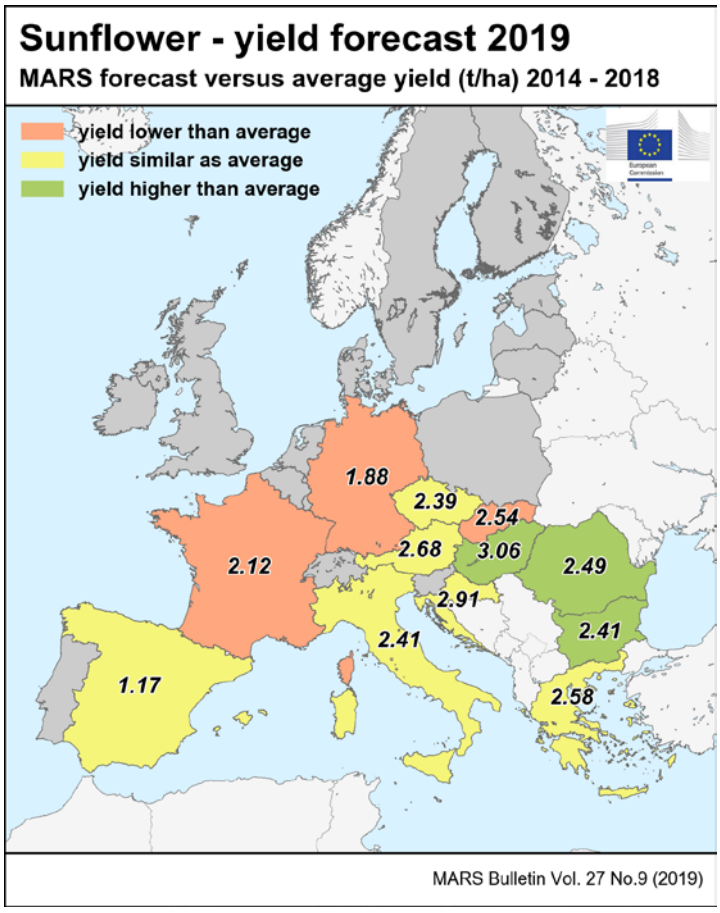

| Country | SPRING BARLEY (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 4,16 | 3,99 | 4,10 | -1,6 | +2,8 |
| AT | 4,53 | 3,44 | 4,43 | -2,1 | +29 |
| BE | - | - | - | - | - |
| BG | - | - | - | - | - |
| CY | - | - | - | - | - |
| CZ | 5,28 | 4,93 | 4,90 | -7,2 | -0,7 |
| DE | 5,38 | 4,95 | 5,43 | +1,1 | +10 |
| DK | 5,36 | 4,28 | 5,81 | +8,4 | +36 |
| EE | 3,38 | 2,49 | 3,40 | +0,5 | +36 |
| ES | 2,96 | 3,59 | 2,63 | -11 | -27 |
| FI | 3,63 | 3,30 | 3,64 | +0,2 | +10 |
| FR | 6,01 | 6,27 | 6,30 | +4,8 | +0,4 |
| GR | - | - | - | - | - |
| HR | - | - | - | - | - |
| HU | 3,87 | 2,69 | 3,96 | +2,5 | +47 |
| IE | 7,22 | 5,62 | 7,35 | +1,9 | +31 |
| IT | - | - | - | - | - |
| LT | 3,46 | 2,72 | 2,77 | -20 | +1,9 |
| LU | - | - | - | - | - |
| LV | 3,24 | 2,58 | 3,23 | -0,3 | +25 |
| MT | - | - | - | - | - |
| NL | 6,57 | 6,58 | 6,64 | +1,0 | +1,0 |
| PL | 3,48 | 2,95 | 3,25 | -6,7 | +10 |
| PT | - | - | - | - | - |
| RO | 2,65 | 2,56 | 2,77 | +4,6 | +8,2 |
| SE | 4,53 | 3,01 | 4,97 | +9,8 | +65 |
| SI | - | - | - | - | - |
| SK | 4,47 | 3,63 | 4,22 | -5,7 | +16 |
| UK | 5,66 | 5,17 | 5,67 | +0,2 | +10 |



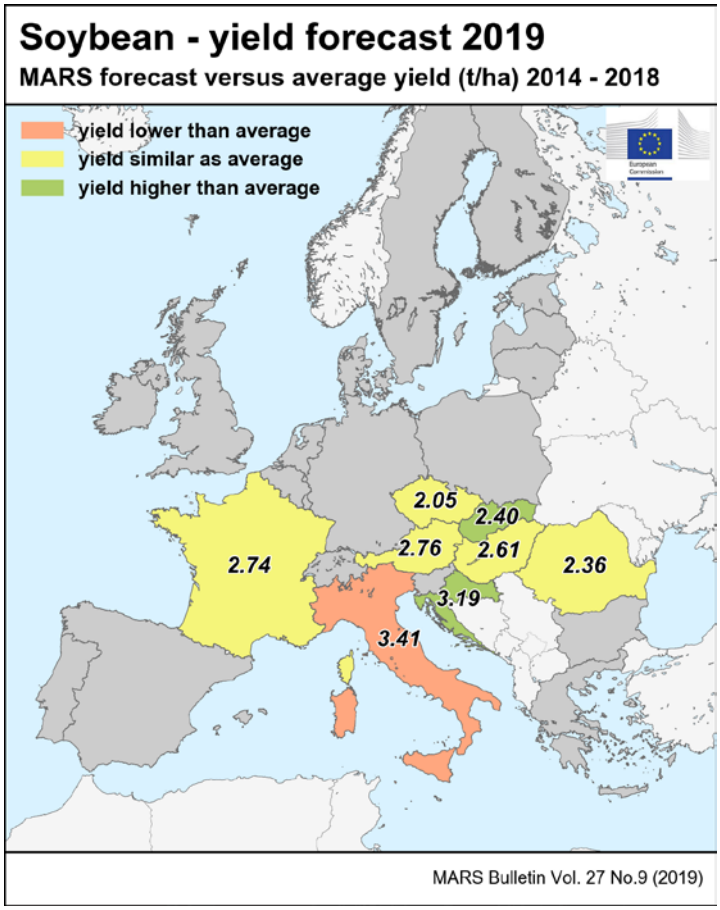
| Country | GRAIN MAIZE (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 7,62 | 8,35 | 7,63 | +0,2 | -8,6 |
| AT | 10,2 | 10,2 | 10,2 | +0,4 | +0,5 |
| BE | 10,5 | 8,23 | 10,4 | -0,4 | +26 |
| BG | 6,54 | 7,82 | 6,96 | +6,5 | -11 |
| CY | - | - | - | - | - |
| CZ | 7,39 | 5,98 | 7,16 | -3,1 | +20 |
| DE | 9,62 | 8,14 | 8,87 | -7,8 | +9,0 |
| DK | - | - | - | - | - |
| EE | - | - | - | - | - |
| ES | 11,2 | 10,8 | 10,7 | -5,0 | -1,7 |
| FI | - | - | - | - | - |
| FR | 9,17 | 8,86 | 8,05 | -12 | -9,1 |
| GR | 10,4 | 9,84 | 10,3 | -1,0 | +4,2 |
| HR | 7,68 | 9,13 | 8,32 | +8,4 | -8,8 |
| HU | 7,46 | 8,44 | 7,94 | +6,4 | -5,9 |
| IE | - | - | - | - | - |
| IT | 10,3 | 9,87 | 8,70 | -15 | -12 |
| LT | 6,05 | 6,54 | 6,21 | +2,5 | -5,1 |
| LU | - | - | - | - | - |
| LV | - | - | - | - | - |
| MT | - | - | - | - | - |
| NL | 9,92 | 7,76 | 9,48 | -4,5 | +22 |
| PL | 6,31 | 5,99 | 5,18 | -18 | -14 |
| PT | 8,33 | 8,24 | 8,47 | +1,7 | +2,8 |
| RO | 5,18 | 7,79 | 6,66 | +29 | -14 |
| SE | - | - | - | - | - |
| SI | 8,80 | 9,45 | 9,16 | +4,0 | -3,1 |
| SK | 6,93 | 8,49 | 6,77 | -2,4 | -20 |
| UK | - | - | - | - | - |



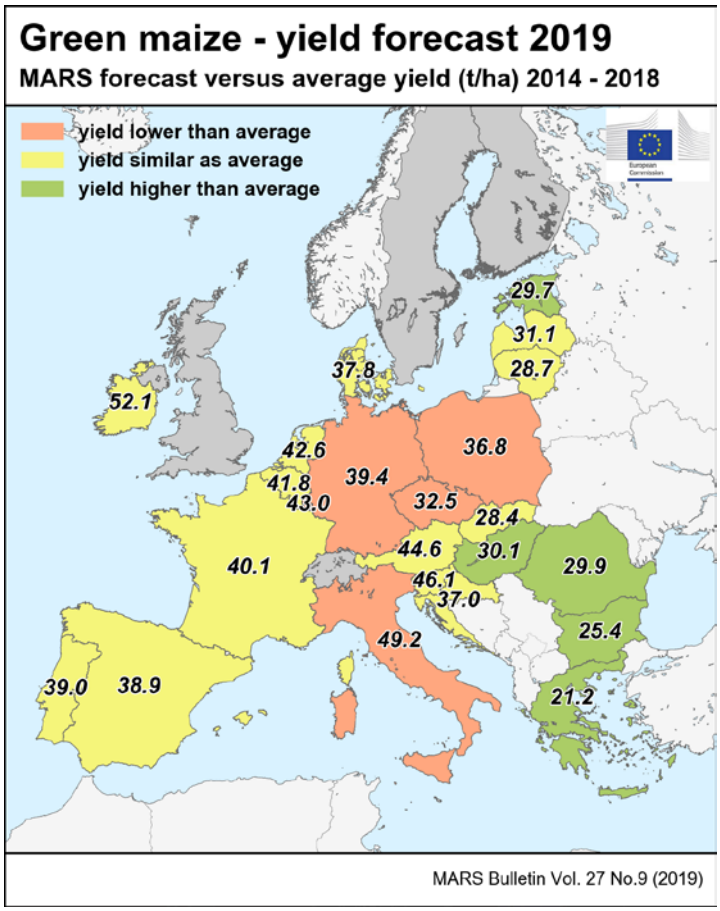

| Country | SUNFLOWER (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 2,21 | 2,42 | 2,29 | +3,8 | -5,3 |
| AT | 2,64 | 2,80 | 2,68 | +1,4 | -4,6 |
| BE | - | - | - | - | - |
| BG | 2,29 | 2,44 | 2,41 | +5,2 | -1,3 |
| CY | - | - | - | - | - |
| CZ | 2,40 | 2,36 | 2,39 | -0,2 | +1,5 |
| DE | 2,07 | 1,82 | 1,88 | -9,5 | +3,0 |
| DK | - | - | - | - | - |
| EE | - | - | - | - | - |
| ES | 1,16 | 1,34 | 1,17 | +0,8 | -13 |
| FI | - | - | - | - | - |
| FR | 2,32 | 2,26 | 2,12 | -8,4 | -6,2 |
| GR | 2,53 | 2,43 | 2,58 | +1,8 | +6,1 |
| HR | 2,88 | 2,99 | 2,91 | +1,0 | -2,7 |
| HU | 2,82 | 2,96 | 3,06 | +8,2 | +3,2 |
| IE | - | - | - | - | - |
| IT | 2,32 | 2,40 | 2,41 | +3,9 | +0,5 |
| LT | - | - | - | - | - |
| LU | - | - | - | - | - |
| LV | - | - | - | - | - |
| MT | - | - | - | - | - |
| NL | - | - | - | - | - |
| PL | - | - | - | - | - |
| PT | - | - | - | - | - |
| RO | 2,33 | 2,80 | 2,49 | +6,6 | -11 |
| SE | - | - | - | - | - |
| SI | - | - | - | - | - |
| SK | 2,67 | 2,93 | 2,54 | -4,6 | -13 |
| UK | - | - | - | - | - |



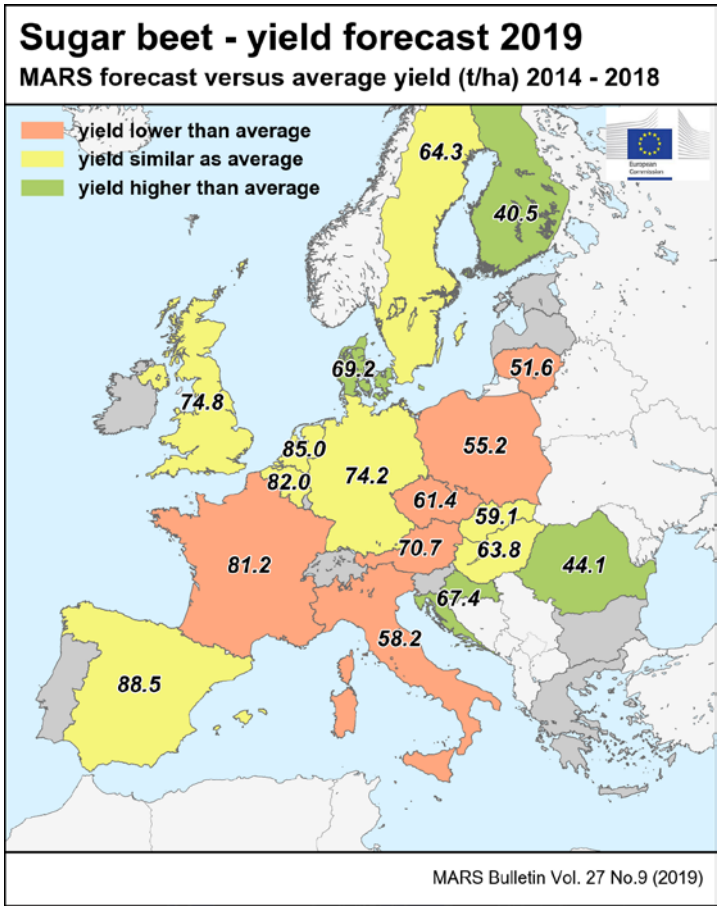
| Country | SOYBEAN (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 2,93 | 2,99 | 2,92 | -0,4 | -2,3 |
| AT | 2,78 | 2,73 | 2,76 | -0,6 | +1,2 |
| BE | - | - | - | - | - |
| BG | - | - | - | - | - |
| CY | - | - | - | - | - |
| CZ | 2,09 | 1,66 | 2,05 | -2,0 | +24 |
| DE | - | - | - | - | - |
| DK | - | - | - | - | - |
| EE | - | - | - | - | - |
| ES | - | - | - | - | - |
| FI | - | - | - | - | - |
| FR | 2,70 | 2,60 | 2,74 | +1,6 | +5,4 |
| GR | - | - | - | - | - |
| HR | 2,71 | 3,19 | 3,19 | +18 | +0,0 |
| HU | 2,56 | 2,83 | 2,61 | +2,3 | -7,6 |
| IE | - | - | - | - | - |
| IT | 3,59 | 3,49 | 3,41 | -4,9 | -2,2 |
| LT | - | - | - | - | - |
| LU | - | - | - | - | - |
| LV | - | - | - | - | - |
| MT | - | - | - | - | - |
| NL | - | - | - | - | - |
| PL | - | - | - | - | - |
| PT | - | - | - | - | - |
| RO | 2,37 | 2,75 | 2,36 | -0,5 | -14 |
| SE | - | - | - | - | - |
| SI | - | - | - | - | - |
| SK | 2,19 | 2,31 | 2,40 | +9,5 | +3,8 |
| UK | - | - | - | - | - |



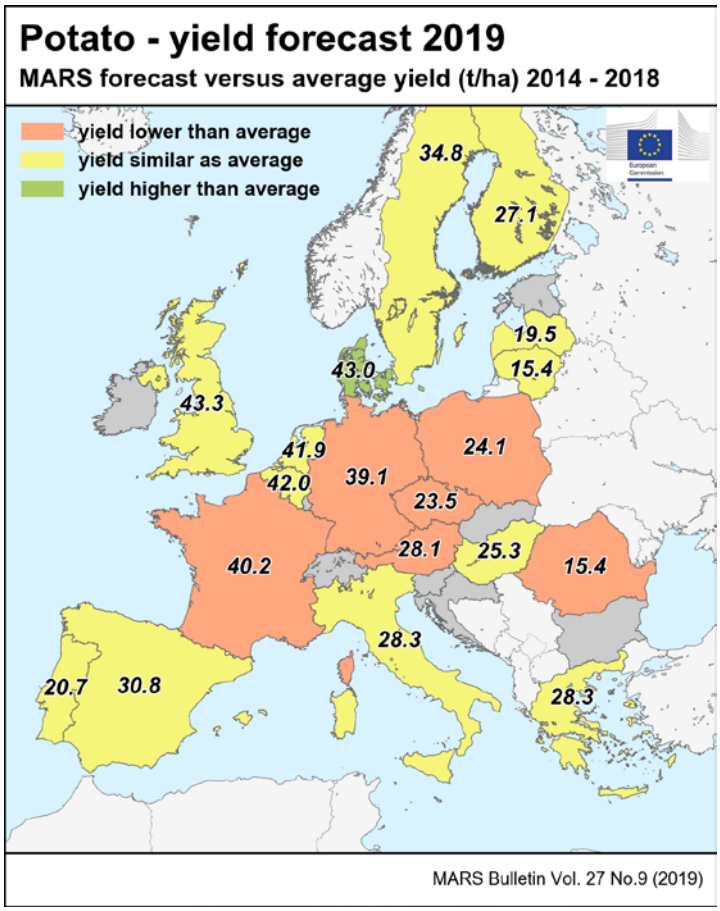

| Country | GREEN MAIZE (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 41,4 | 37,9 | 39,0 | -5,8 | +2,9 |
| AT | 45,9 | 45,3 | 44,6 | -2,8 | -1,6 |
| BE | 41,6 | 34,3 | 41,8 | +0,6 | +22 |
| BG | 22,3 | 25,5 | 25,4 | +14 | -0,2 |
| CY | - | - | - | - | - |
| CZ | 35,0 | 29,8 | 32,5 | -7,1 | +8,9 |
| DE | 42,8 | 35,3 | 39,4 | -7,9 | +12 |
| DK | 36,8 | 35,2 | 37,8 | +2,8 | +7,6 |
| EE | 28,4 | 30,7 | 29,7 | +4,4 | -3,5 |
| ES | 39,7 | 40,5 | 38,9 | -1,9 | -4,0 |
| FI | - | - | - | - | - |
| FR | 41,6 | 40,3 | 40,1 | -3,7 | -0,6 |
| GR | 18,8 | 22,0 | 21,2 | +13 | -3,6 |
| HR | 36,9 | 40,1 | 37,0 | +0,2 | -7,8 |
| HU | 28,5 | 31,0 | 30,1 | +5,7 | -2,8 |
| IE | 50,5 | 49,7 | 52,1 | +3,2 | +4,9 |
| IT | 52,4 | 52,0 | 49,2 | -6,0 | -5,3 |
| LT | 29,8 | 28,3 | 28,7 | -3,6 | +1,4 |
| LU | 46,9 | 42,4 | 43,0 | -8,3 | +1,5 |
| LV | 31,0 | 31,3 | 31,1 | +0,2 | -0,6 |
| MT | - | - | - | - | - |
| NL | 41,8 | 38,6 | 42,6 | +1,7 | +10 |
| PL | 44,0 | 42,6 | 36,8 | -16 | -14 |
| PT | 38,3 | 36,2 | 39,0 | +1,9 | +7,7 |
| RO | 27,3 | 30,9 | 29,9 | +10 | -3,2 |
| SE | - | - | - | - | - |
| SI | 46,5 | 47,9 | 46,1 | -0,7 | -3,7 |
| SK | 29,4 | 32,5 | 28,4 | -3,5 | -13 |
| UK | - | - | - | - | - |



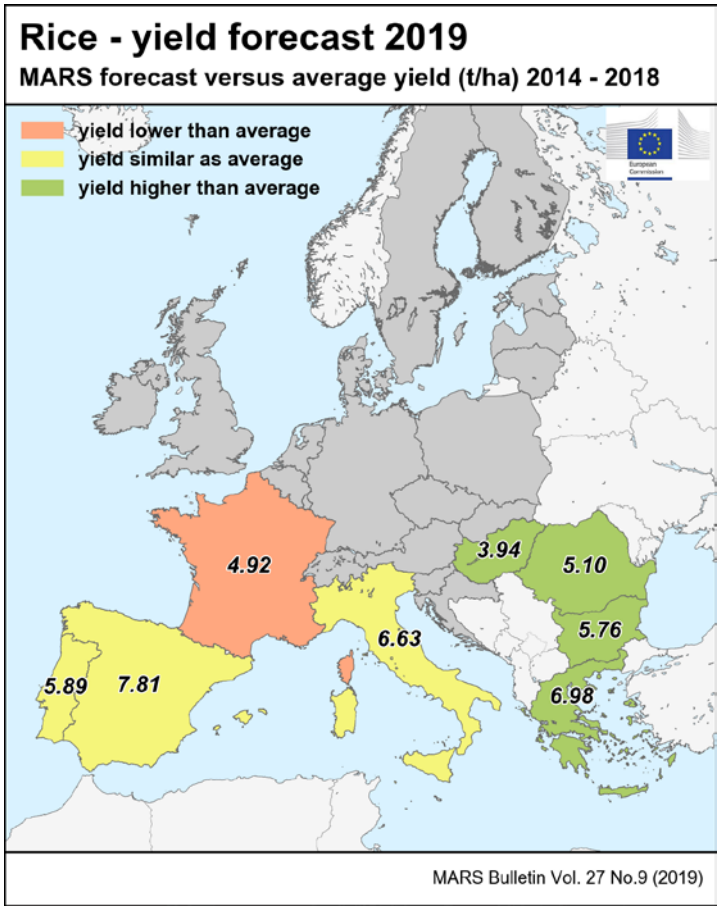
| Country | SUGAR BEETS (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 75,2 | 69,2 | 72,2 | -4,0 | +4,3 |
| AT | 73,9 | 68,8 | 70,7 | -4,3 | +2,8 |
| BE | 83,7 | 82,8 | 82,0 | -2,0 | -1,0 |
| BG | - | - | - | - | - |
| CY | - | - | - | - | - |
| CZ | 64,4 | 57,5 | 61,4 | -4,6 | +6,7 |
| DE | 75,0 | 63,3 | 74,2 | -1,1 | +17 |
| DK | 65,9 | 61,5 | 69,2 | +4,9 | +13 |
| EE | - | - | - | - | - |
| ES | 91,3 | 86,7 | 88,5 | -3,1 | +2,1 |
| FI | 38,0 | 36,3 | 40,5 | +6,7 | +12 |
| FR | 88,6 | 81,6 | 81,2 | -8,4 | -0,5 |
| GR | - | - | - | - | - |
| HR | 62,6 | 54,8 | 67,4 | +7,6 | +23 |
| HU | 64,0 | 59,3 | 63,8 | -0,2 | +7,6 |
| IE | - | - | - | - | - |
| IT | 62,2 | 64,0 | 58,2 | -6,5 | -9,1 |
| LT | 55,8 | 57,2 | 51,6 | -7,5 | -9,7 |
| LU | - | - | - | - | - |
| LV | - | - | - | - | - |
| MT | - | - | - | - | - |
| NL | 83,8 | 76,4 | 85,0 | +1,5 | +11 |
| PL | 60,5 | 59,9 | 55,2 | -8,8 | -7,9 |
| PT | - | - | - | - | - |
| RO | 41,1 | 38,5 | 44,1 | +7,4 | +15 |
| SE | 64,0 | 55,3 | 64,3 | +0,4 | +16 |
| SI | - | - | - | - | - |
| SK | 60,4 | 59,9 | 59,1 | -2,1 | -1,3 |
| UK | 73,5 | 69,3 | 74,8 | +1,7 | +7,9 |




| Country | POTATO (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 33,8 | 31,1 | 32,8 | -2,8 | +5,5 |
| AT | 31,0 | 29,4 | 28,1 | -9,6 | -4,5 |
| BE | 43,4 | 32,6 | 42,0 | -3,3 | +29 |
| BG | - | - | - | - | - |
| CY | - | - | - | - | - |
| CZ | 27,3 | 25,5 | 23,5 | -14 | -7,9 |
| DE | 43,5 | 35,4 | 39,1 | -10 | +11 |
| DK | 40,8 | 34,8 | 43,0 | +5,4 | +24 |
| EE | - | - | - | - | - |
| ES | 31,3 | 29,8 | 30,8 | -1,4 | +3,5 |
| FI | 27,1 | 28,1 | 27,1 | +0,1 | -3,3 |
| FR | 42,4 | 39,4 | 40,2 | -5,2 | +2,1 |
| GR | 27,2 | 28,8 | 28,3 | +3,9 | -1,9 |
| HR | - | - | - | - | - |
| HU | 24,6 | 22,8 | 25,3 | +2,9 | +11 |
| IE | - | - | - | - | - |
| IT | 27,9 | 28,9 | 28,3 | +1,7 | -2,0 |
| LT | 16,0 | 15,5 | 15,4 | -3,8 | -1,0 |
| LU | - | - | - | - | - |
| LV | 19,2 | 19,9 | 19,5 | +1,8 | -2,0 |
| MT | - | - | - | - | - |
| NL | 42,6 | 36,6 | 41,9 | -1,5 | +15 |
| PL | 25,3 | 25,1 | 24,1 | -5,0 | -4,3 |
| PT | 20,3 | 21,1 | 20,7 | +1,7 | -1,9 |
| RO | 16,2 | 17,7 | 15,4 | -5,2 | -13 |
| SE | 34,0 | 30,3 | 34,8 | +2,5 | +15 |
| SI | - | - | - | - | - |
| SK | - | - | - | - | - |
| UK | 42,8 | 41,6 | 43,3 | +1,1 | +4,0 |



| Country | RICE (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| EU | 6,70 | 6,80 | 6,76 | +1,0 | -0,6 |
| AT | - | - | - | - | - |
| BE | - | - | - | - | - |
| BG | 5,42 | 5,76 | 5,76 | +6,2 | -0,0 |
| CY | - | - | - | - | - |
| CZ | - | - | - | - | - |
| DE | - | - | - | - | - |
| DK | - | - | - | - | - |
| EE | - | - | - | - | - |
| ES | 7,74 | 7,89 | 7,81 | +1,0 | -1,0 |
| FI | - | - | - | - | - |
| FR | 5,54 | 5,48 | 4,92 | -11 | -10 |
| GR | 6,35 | 5,80 | 6,98 | +9,8 | +20 |
| HR | - | - | - | - | - |
| HU | 3,77 | 3,96 | 3,94 | +4,7 | -0,4 |
| IE | - | - | - | - | - |
| IT | 6,62 | 6,83 | 6,63 | +0,1 | -3,0 |
| LT | - | - | - | - | - |
| LU | - | - | - | - | - |
| LV | - | - | - | - | - |
| MT | - | - | - | - | - |
| NL | - | - | - | - | - |
| PL | - | - | - | - | - |
| PT | 5,93 | 5,47 | 5,89 | -0,8 | +7,6 |
| RO | 4,46 | 5,31 | 5,10 | +14 | -4,0 |
| SE | - | - | - | - | - |
| SI | - | - | - | - | - |
| SK | - | - | - | - | - |
| UK | - | - | - | - | - |




## Belarus, Turkey, Ukraine

| Country | GRAIN MAIZE (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| BY | 5,22 | 5,00 | 5,76 | +10 | +15 |
| TR | 9,34 | 9,64 | 9,69 | +3,8 | +0,5 |
| UA | 6,37 | 7,84 | 7,26 | +14 | -7,4 |

| Country | SOYBEAN (t/ha) | | | | |
|---|---|---|---|---|---|
| | Avg 5yrs | 2018 | MARS 2019 forecasts | %19/5yrs | %19/18 |
| BY | - | - | - | - | - |
| TR | 4,35 | 4,26 | 4,57 | +4,9 | +7,2 |
| UA | 2,17 | 2,58 | 2,52 | +16 | -2,2 |

Notes: Yields are forecast for crops with more than 10000 ha per country with sufficently long and coherent yield time series (for rice more than 1000 ha per country)

The yield forecasts for winter crops (soft wheat, durum wheat, winter barley, rye, triticale, and rapeseed) have not been updated and are based on the forecasts reported in the August issue of the Bulletin. The area data and subsequent production calculations for these crops have been updated. Any change – compared to August - in the yield forecast for these crops at EU level is due to changes in area of the respective crop at country level.

Sources: EU 2014-2019 data come from DG AGRICULTURE short term Outlook data (dated August 2019, received on 30/08/2019), EUROSTAT Eurobase (last update: 22/08/2019) and EES (last update: 15/11/2017)

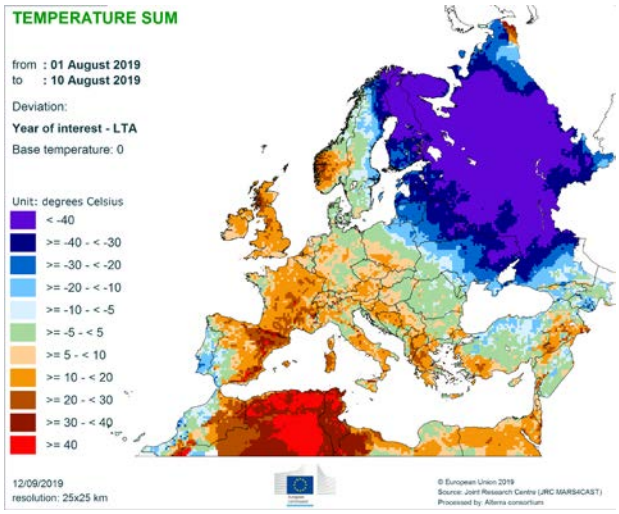
Non-EU 2014-2018 data come from USDA, Turkish Statistical Institute (TurkStat), EUROSTAT Eurobase (last update: 22/08/2019), State Statistics Service of Ukraine, FAO and PSD-online

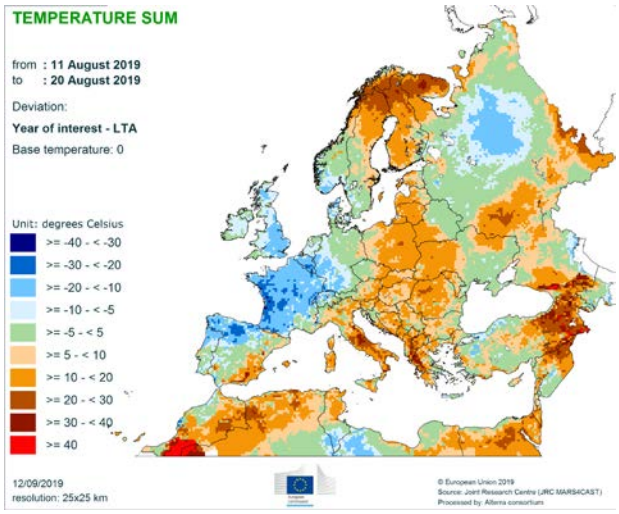
2019 yield forecasts come from MARS CROP YIELD FORECASTING SYSTEM (output up to 10/09/2019)

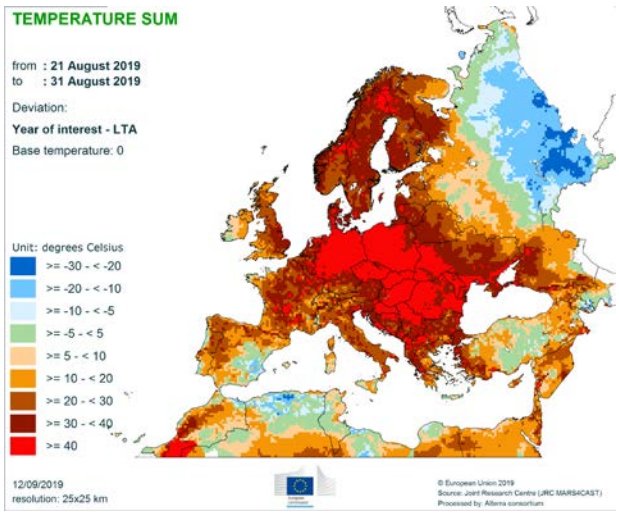
The EU figures do not include green maize forecasts for Sweden and the United Kingdom since recent data on yields were not consistent.

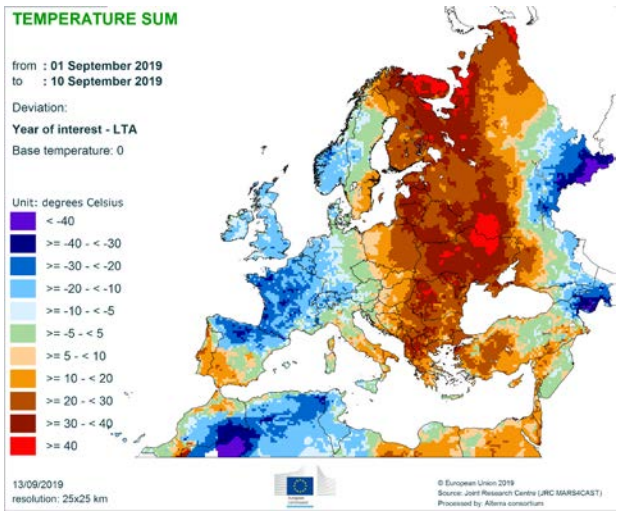
# 6. Atlas

## Temperature regime

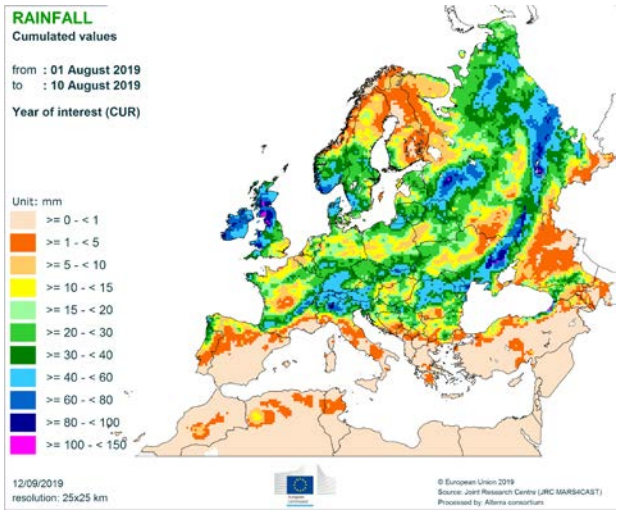


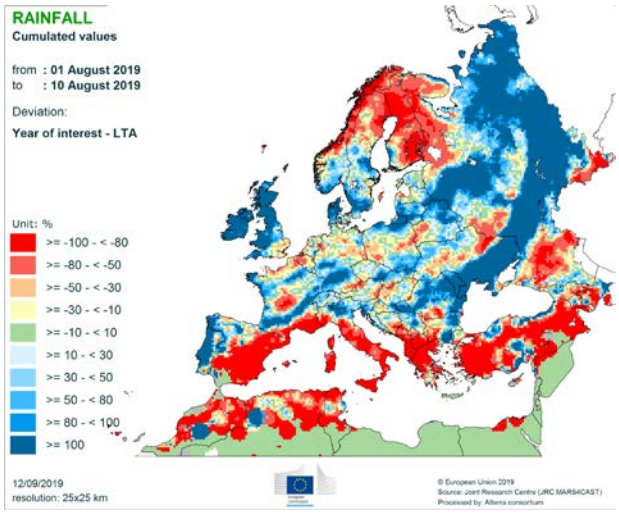



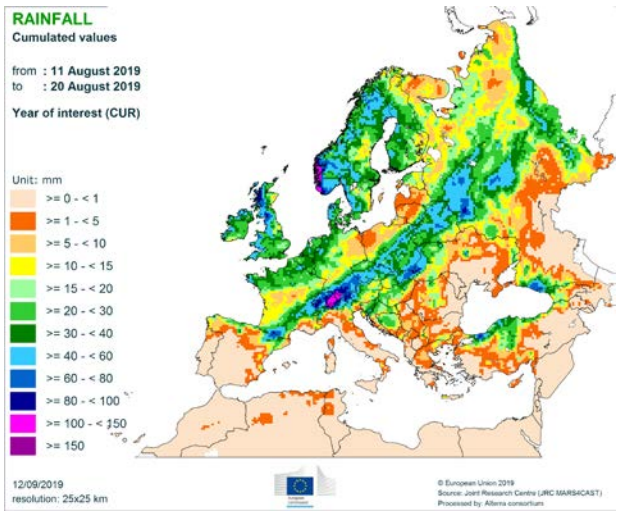



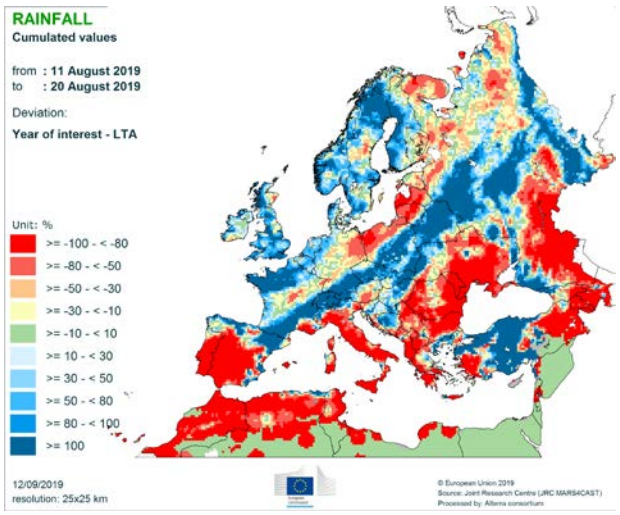



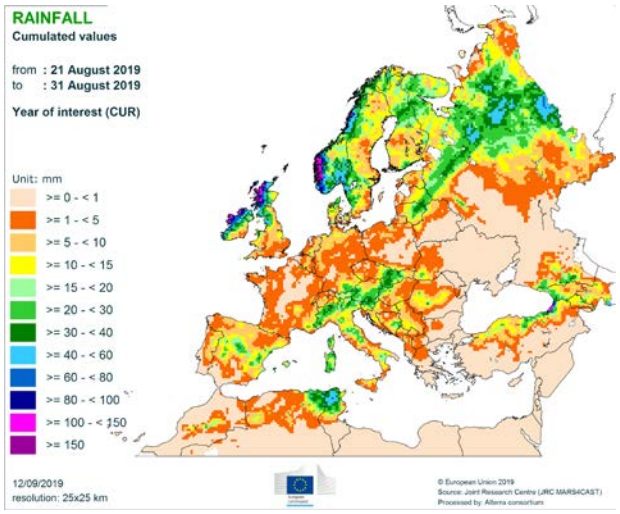

## Precipitation

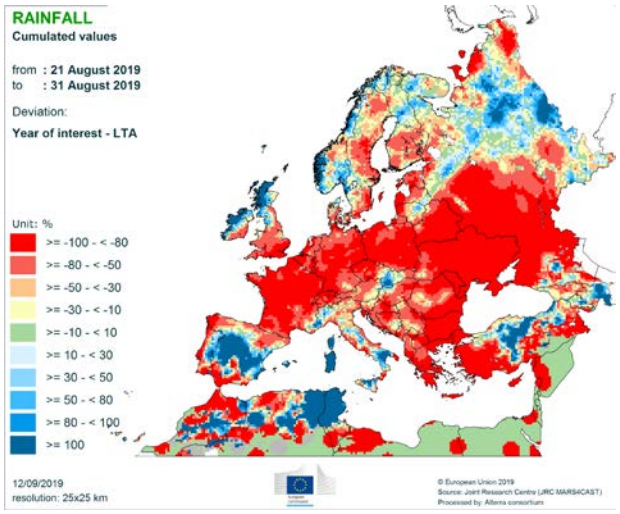


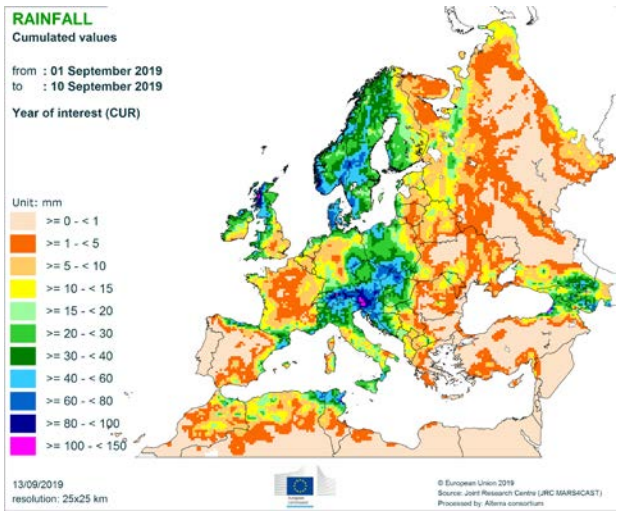



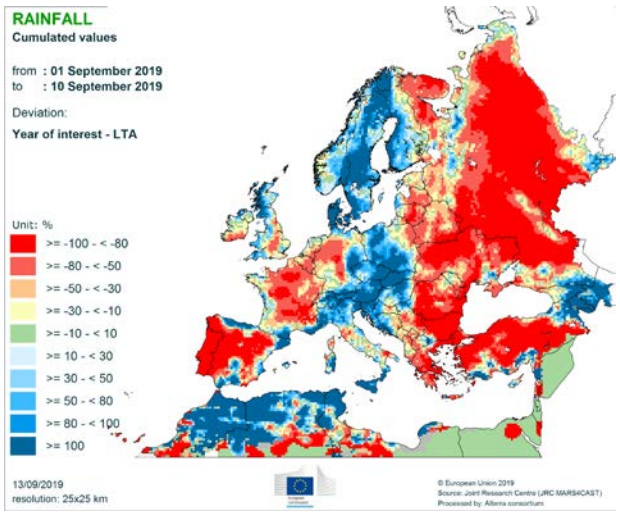

RAINFALL
Cumulated values
from : 11 August 2019
to : 20 August 2019
Year of interest (CUR)
Unit: mm
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150
12/09/2019
resolution: 25x25 km


RAINFALL
Cumulated values
from : 11 August 2019
to : 20 August 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
12/09/2019
resolution: 25x25 km

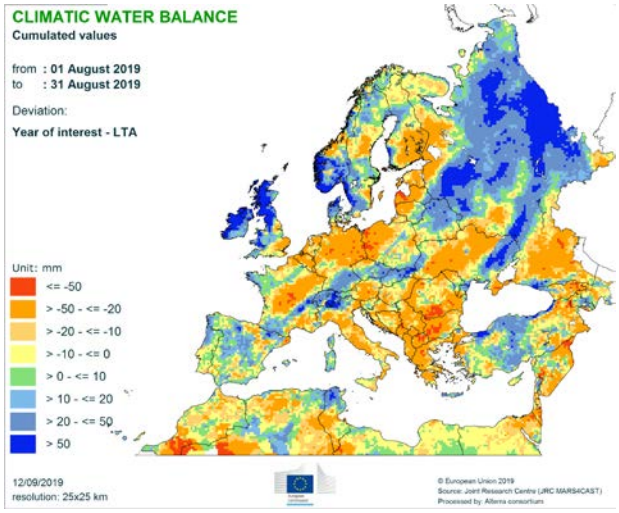

RAINFALL
Cumulated values
from : 21 August 2019
to : 31 August 2019
Year of interest (CUR)
Unit: mm
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150
12/09/2019
resolution: 25x25 km

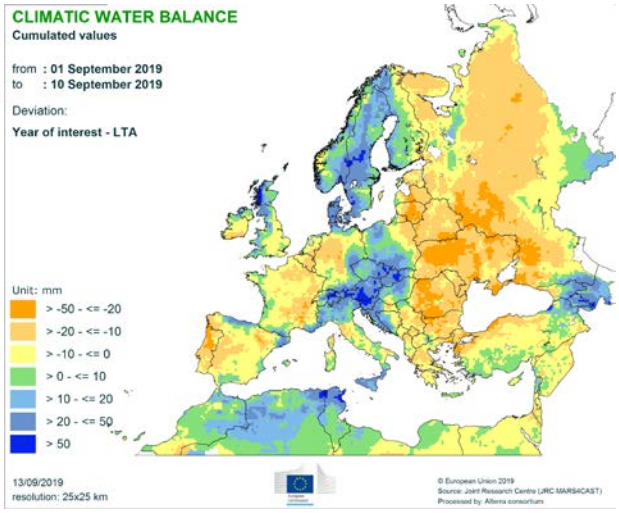

RAINFALL
Cumulated values
from : 21 August 2019
to : 31 August 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
12/09/2019
resolution: 25x25 km


RAINFALL
Cumulated values
from : 01 September 2019
to : 10 September 2019
Year of interest (CUR)
Unit: mm
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
13/09/2019
resolution: 25x25 km

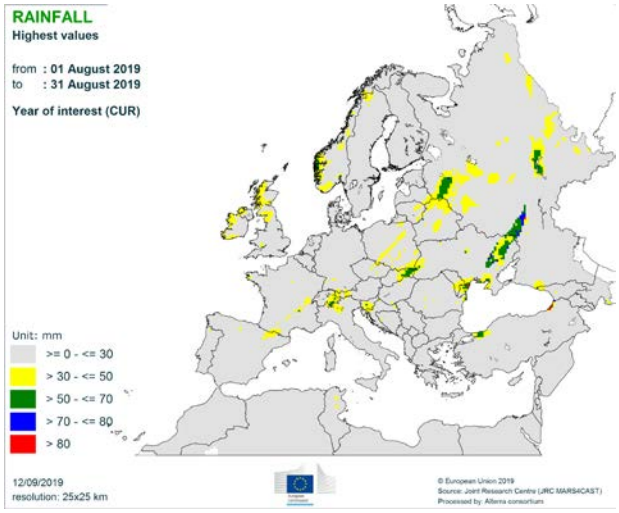

RAINFALL
Cumulated values
from : 01 September 2019
to : 10 September 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
13/09/2019
resolution: 25x25 km

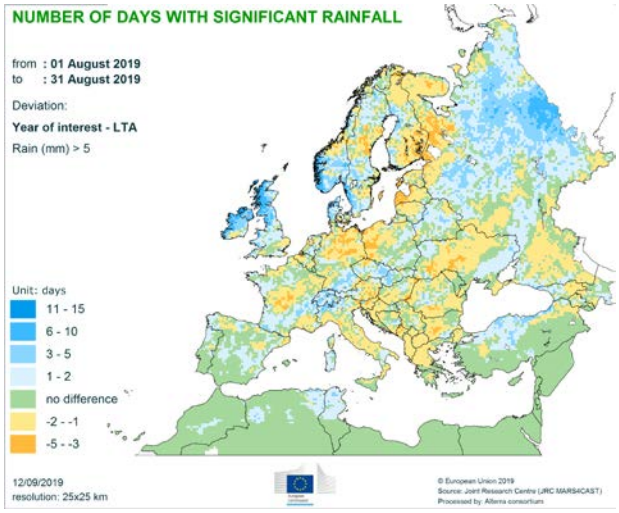
# Climatic water balance

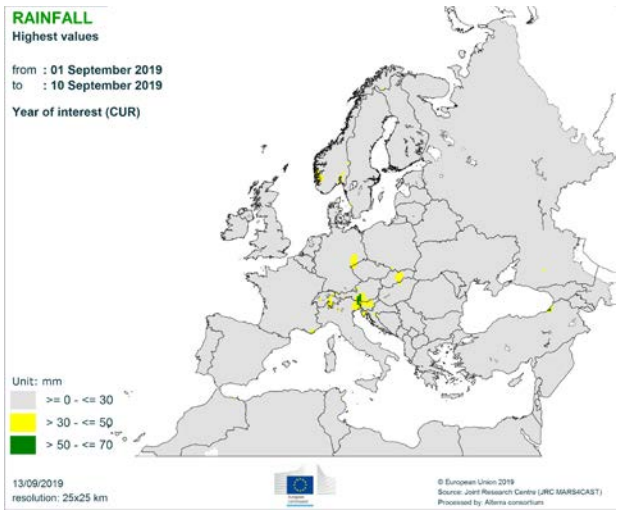


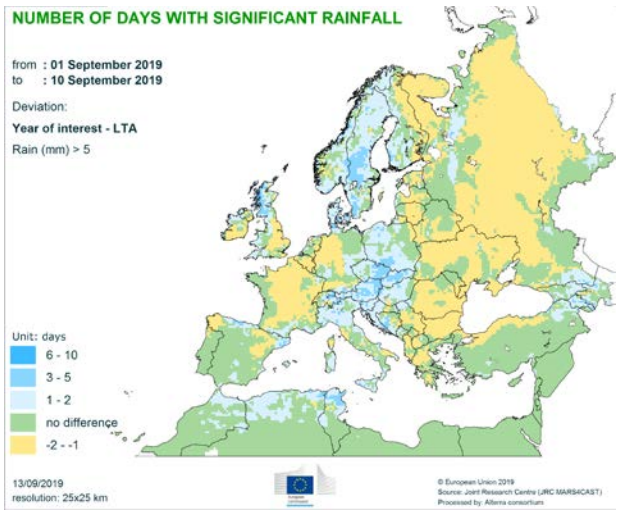



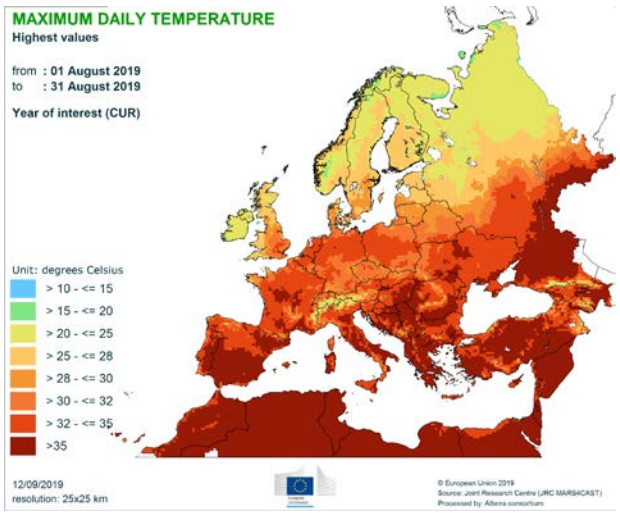

# Weather events

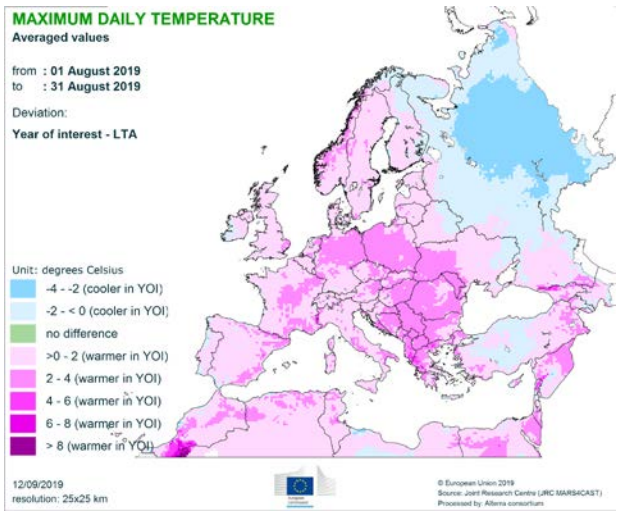


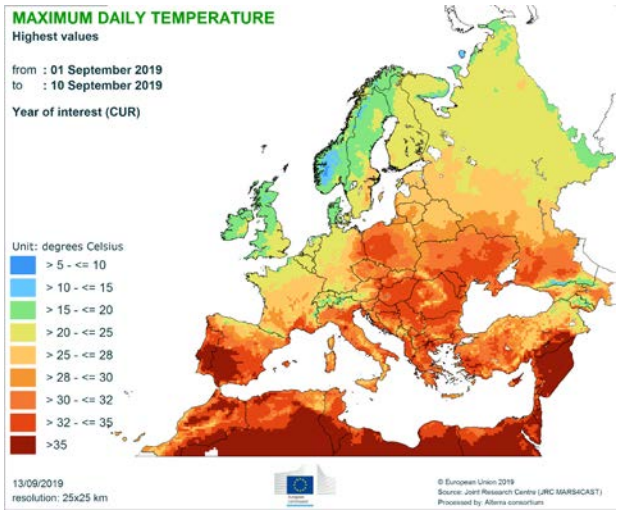



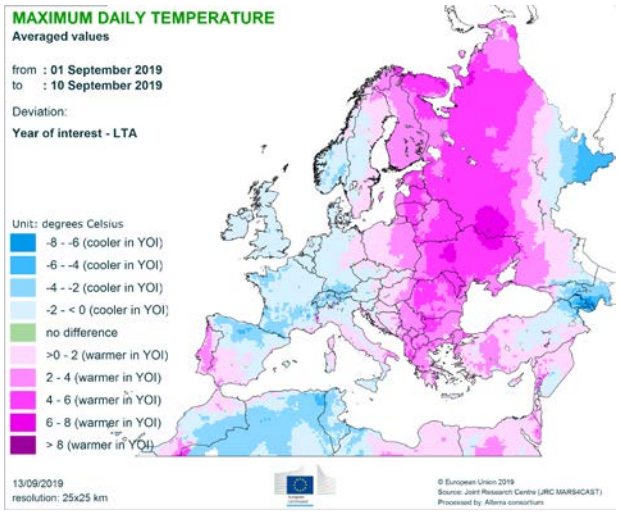



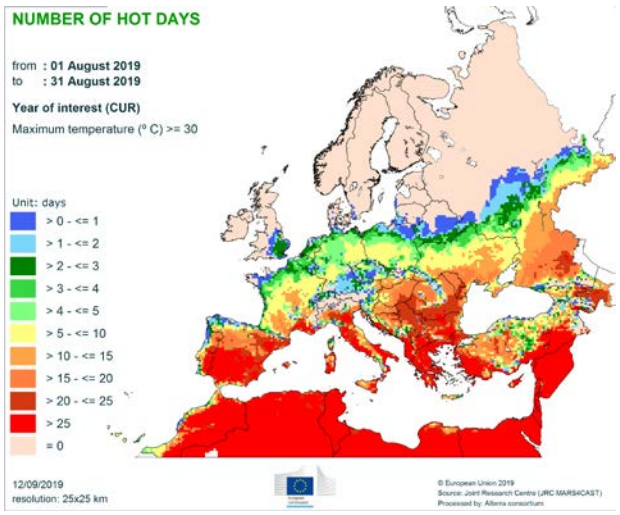



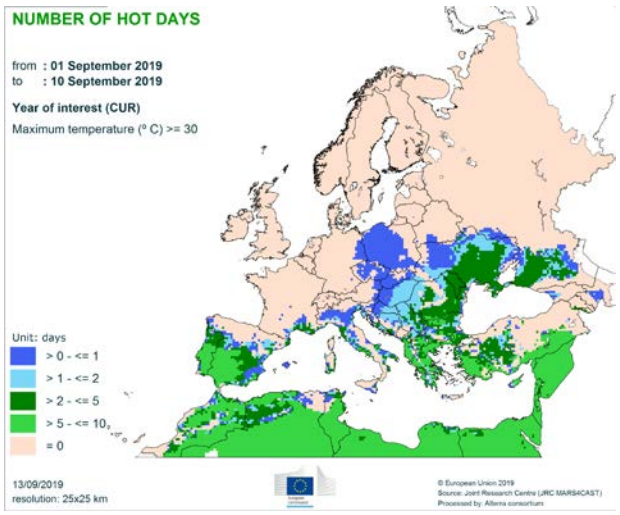

MAXIMUM DAILY TEMPERATURE
Highest values
from : 01 August 2019
to : 31 August 2019
Year of interest (CUR)
Unit: degrees Celsius
> 10 - <= 15
> 15 - <= 20
> 20 - <= 25
> 25 - <= 28
> 28 - <= 30
> 30 - <= 32
> 32 - <= 35
>35
12/09/2019
resolution: 25x25 km


MAXIMUM DAILY TEMPERATURE
Averaged values
from : 01 August 2019
to : 31 August 2019
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-4 - -2 (cooler in YOI)
-2 - < 0 (cooler in YOI)
no difference
>0 - 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
> 8 (warmer in YOI)
12/09/2019
resolution: 25x25 km

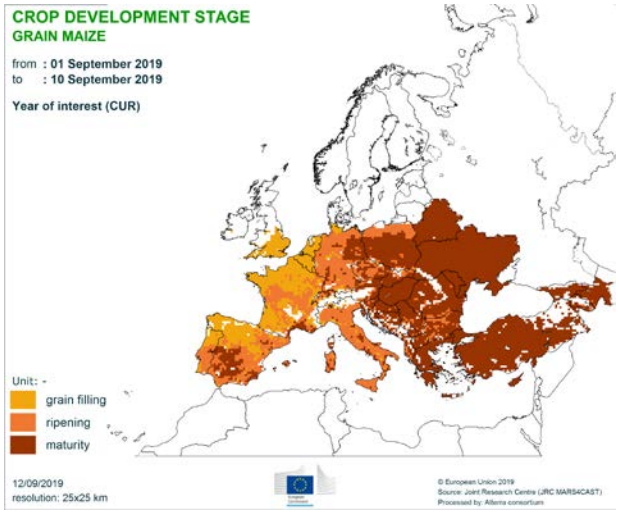

MAXIMUM DAILY TEMPERATURE
Highest values
from : 01 September 2019
to : 10 September 2019
Year of interest (CUR)
Unit: degrees Celsius
> 5 - <= 10
> 10 - <= 15
> 15 - <= 20
> 20 - <= 25
> 25 - <= 28
> 28 - <= 30
> 30 - <= 32
> 32 - <= 35
>35
13/09/2019
resolution: 25x25 km

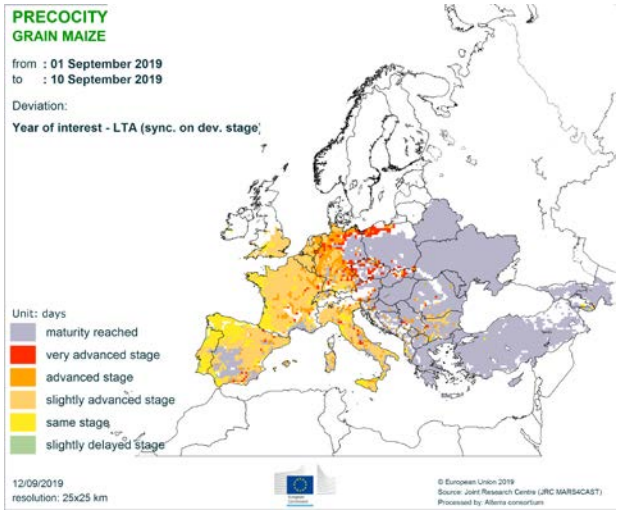

MAXIMUM DAILY TEMPERATURE
Averaged values
from : 01 September 2019
to : 10 September 2019
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-8 - -6 (cooler in YOI)
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
-2 - < 0 (cooler in YOI)
no difference
>0 - 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
> 8 (warmer in YOI)
13/09/2019
resolution: 25x25 km

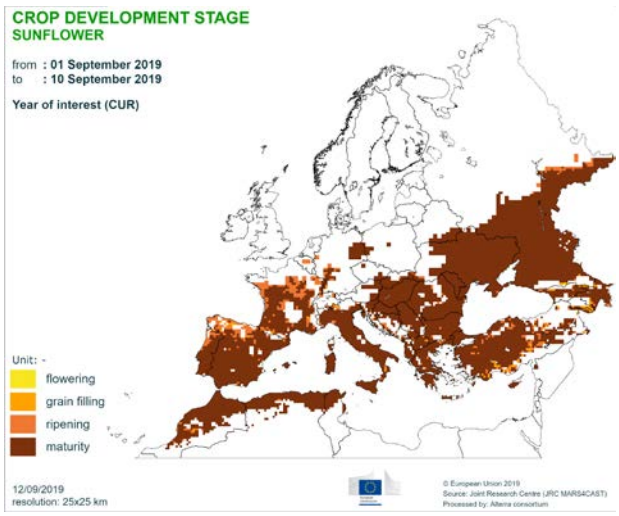

NUMBER OF HOT DAYS
from : 01 August 2019
to : 31 August 2019
Year of interest (CUR)
Maximum temperature (° C) >= 30
Unit: days
> 0 - <= 1
> 1 - <= 2
> 2 - <= 3
> 3 - <= 4
> 4 - <= 5
> 5 - <= 10
> 10 - <= 15
> 15 - <= 20
> 20 - <= 25
> 25
= 0
12/09/2019
resolution: 25x25 km

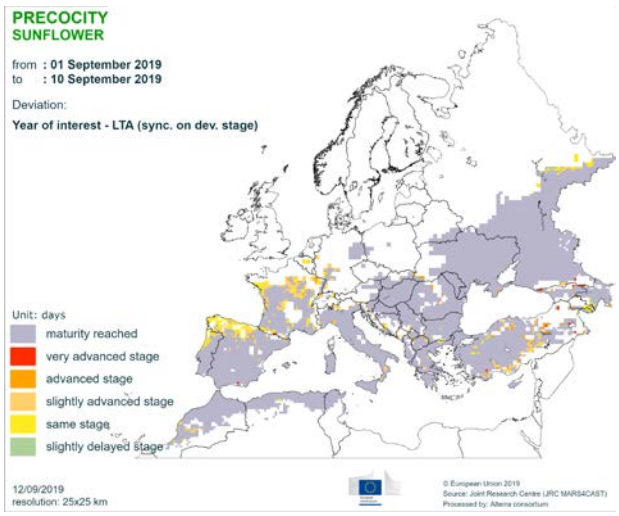

NUMBER OF HOT DAYS
from : 01 September 2019
to : 10 September 2019
Year of interest (CUR)
Maximum temperature (° C) >= 30
Unit: days
> 0 - <= 1
> 1 - <= 2
> 2 - <= 5
> 5 - <= 10
= 0
13/09/2019
resolution: 25x25 km

# Crop development stages and precocity

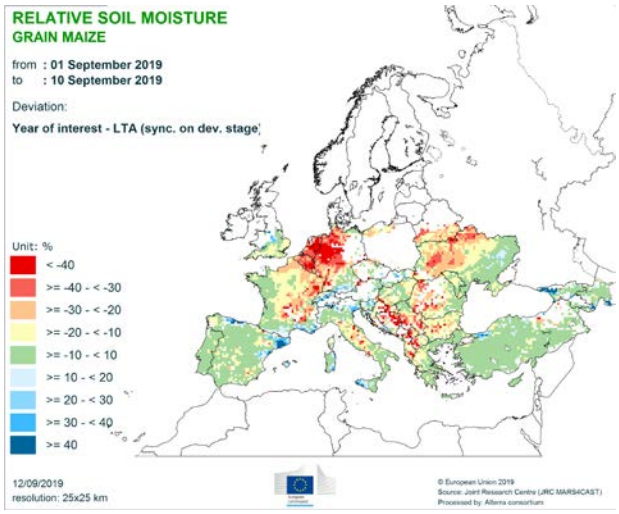


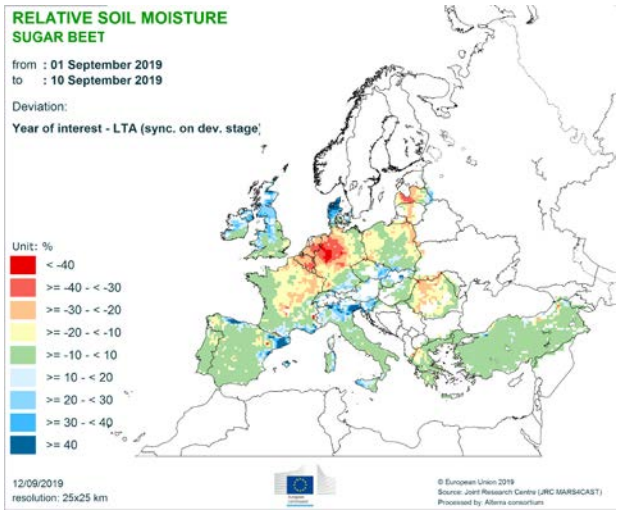



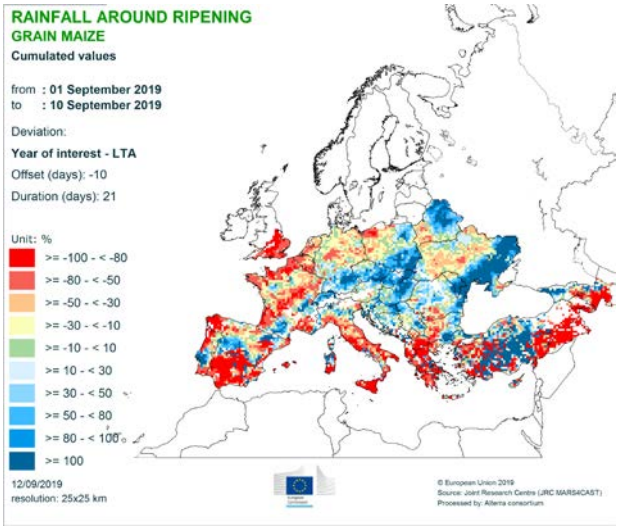



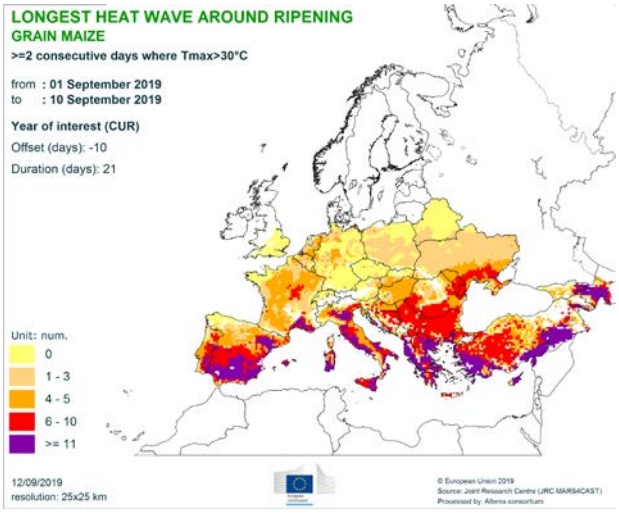

# Relative soil moisture



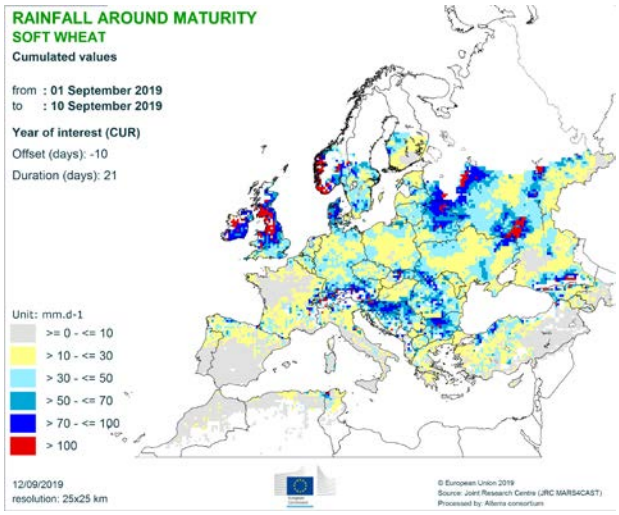



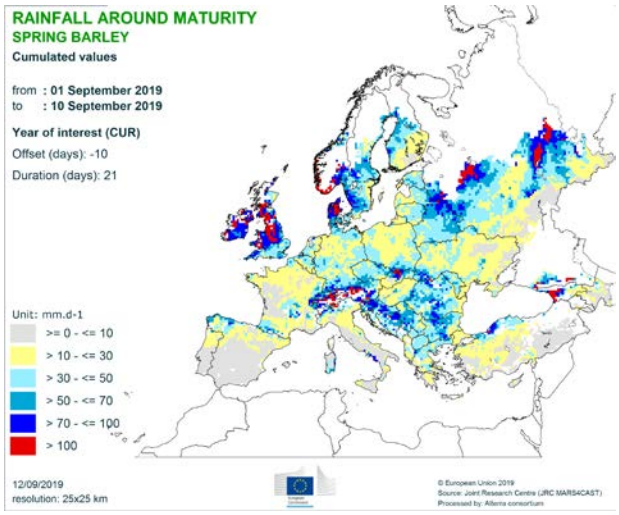
# Rainfall and longest heatwave around ripening




# Precipitation around harvesting



## JRC MARS Bulletins 2019

| Date | Publication | Reference |
|---|---|---|
| 21 Jan | Agromet analysis | Vol. 27 No 1 |
| 25 Feb | Agromet analysis | Vol. 27 No 2 |
| 18 Mar | Agromet analysis, yield forecast | Vol. 27 No 3 |
| 15 Apr | Agromet analysis, remote sensing, yield forecast, sowing conditions, pasture analysis | Vol. 27 No 4 |
| 20 May | Agromet analysis, remote sensing, yield forecast, sowing update, pasture analysis | Vol. 27 No 5 |
| 17 Jun | Agromet analysis, remote sensing, yield forecast, pasture update, rice analysis | Vol. 27 No 6 |
| 22 Jul | Agromet analysis, remote sensing, yield forecast, harvesting conditions, pasture update | Vol. 27 No 7 |
| 26 Aug | Agromet analysis, remote sensing, yield forecast, pasture update, harvesting update | Vol. 27 No 8 |
| 16 Sep | Agromet analysis, remote sensing, yield forecast, pasture update, rice analysis, harvesting update, | Vol. 27 No 9 |
| 28 Oct | Agromet analysis, remote sensing, yield forecast, harvesting update, sowing conditions | Vol. 27 No 10 |
| 25 Nov | Agromet analysis, harvesting update, sowing update | Vol. 27 No 11 |
| 16 Dec | Agromet analysis | Vol. 27 No 12 |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Technical note:

The long-term average (LTA) used within this Bulletin as a reference is based on an archive of data covering 1979-2018.