Issued: 23 October 2023
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European Commission

JRC MARS Bulletin

Crop monitoring in Europe

October 2023

Warm autumn benefitted crops in the north

Worsened yield outlook for summer crops in south-eastern Europe

The downward revision of the yield forecast for grain maize and sunflowers at EU level is mainly due to a worsened outlook for summer crops in Hungary, Romania, Bulgaria and Greece. The yield forecasts for other summer crops, were revised slightly upward at EU level.

In most parts of Europe, the first half of autumn was the warmest or one of the warmest in our records (since 1991). In most regions, particularly in the northern half of Europe, the very mild temperatures, combined with adequate soil moisture conditions and high levels of sunshine, provided favourable conditions for continued growth, ripening and harvesting of summer crops, as well as for field preparations and sowing of winter crops.

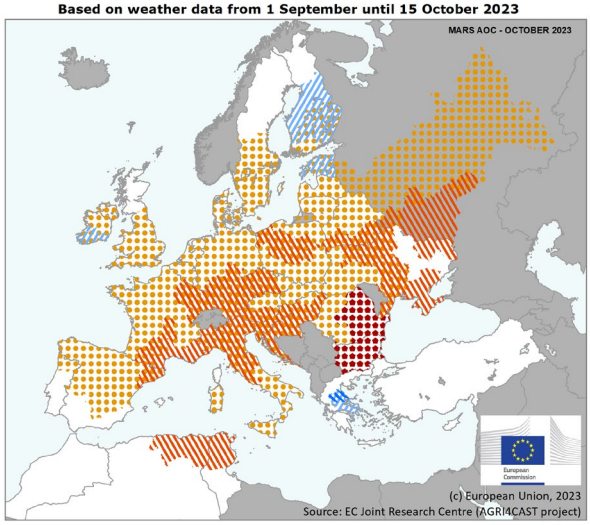
However, temperatures in the south reached much higher levels. In significant parts of Bulgaria, Hungary, Romania and Greece, rainfall also ranked among the lowest in our records; and the yield forecasts of grain maize and sunflowers were revised downwards considering the compound negative impacts of unfavourable conditions in these regions.

In the same regions, as well as in Slovenia, Croatia and parts of Ukraine, hard and dry soil conditions negatively affected the sowing and emergence of winter crops, particularly rapeseed.

In contrast, sowing and emergence of winter crops in Estonia and Finland was hampered by persistent excessively wet conditions.

AREAS OF CONCERN - EXTREME WEATHER EVENTS

Based on weather data from 1 September until 15 October 2023



Contents:

Covers the period from 1 September until 15 October

Crop	Yield t/ha				
	Avg 5yrs	September Bulletin	MARS 2023 forecasts	%23/5yrs	% Diff September
Grain maize	7.48	7.26	**7.13**	- 5	- 2
Potatoes	34.1	34.7	**35.1**	+ 3	+ 1
Sugar beet	72.0	74.5	**74.7**	+ 4	+ 0
Sunflower	2.21	2.20	**2.10**	- 5	- 5
Soybeans	2.76	2.83	**2.87**	+ 4	+ 1
Green maize	40.7	40.3	**41.3**	+ 2	+ 2

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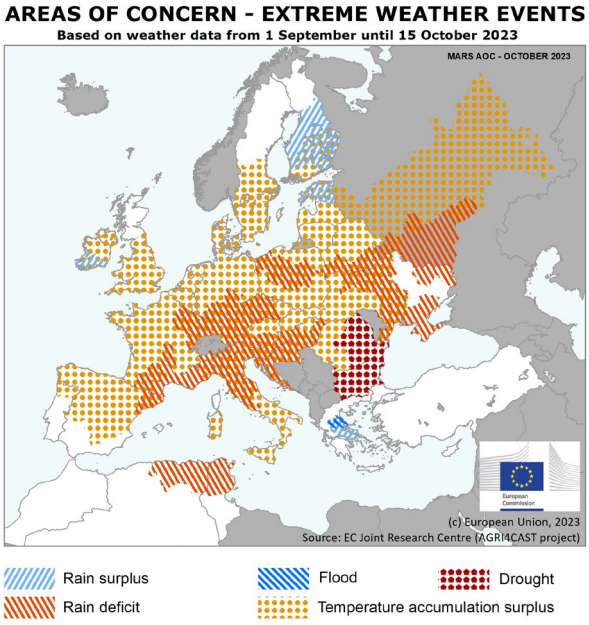
Joint Research Centre

1. Agrometeorological overview

1.1. Areas of concern



Weather conditions in most parts of Europe, were marked by a distinct temperature accumulation surplus. In most of these regions, daily average temperatures during the 1 September to 15 October review period were the highest in our records (since 1991). In most regions, particularly in the north, these conditions had no negative impact on summer crops because maximum temperatures did not reach critical levels, and indeed, crops often benefited from the sunny and in many places drier-than-usual conditions during the last growth phase; while these conditions also benefitted ripening and harvesting.

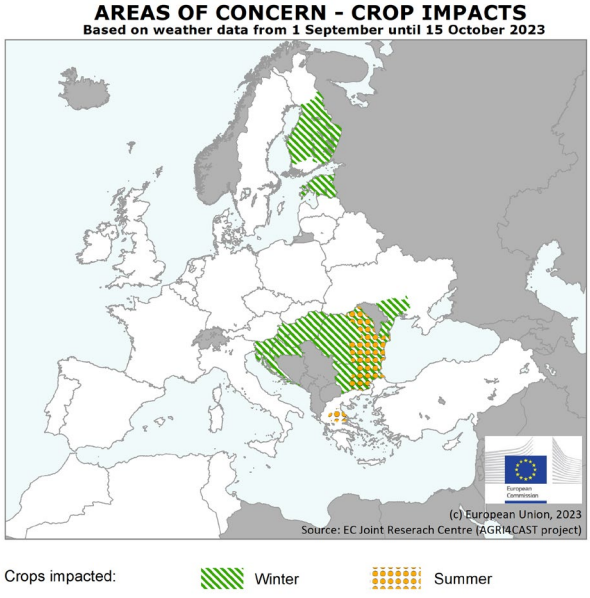
These unusual warm conditions were accompanied by a distinct rain deficit (rainfall ranking among the lowest in our records) in southern and eastern **France**, central and northern **Italy**, southern **Germany**, **Austria**, **Czechia**, northern **Poland**, and part of **European Russia**. Also in these regions negative impacts on crops were of little or no significance, due to the previously accumulated soil moisture, and/or because summer crops were ripening or had already reached maturity.

However, in **Bulgaria**, **Hungary**, **Romania**, **Slovenia**, **Croatia** and parts of **Ukraine**, the high temperatures combined with very pronounced rainfall deficit and negative climatic water balance, caused topsoils to become dry and hard, which negatively affected the rapeseed sowing campaign, as well as emergence and development of plants that had already been sown. In parts of **Hungary**, **Bulgaria**, **Romania** and **Greece**, the hot and dry conditions also had negative impacts on summer crops.

A distinct rain deficit was also observed in the central and eastern regions of the **Maghreb** area, especially in northern and central parts of **Tunisia.**

In **Estonia** and **Finland**, the unusually warm temperatures were accompanied by a distinct rain surplus, especially since early October, which caused substantial delays to the sowing of winter crops in both countries. Similar constraints were faced in southern **Ireland**, but here there is still sufficient time to complete the sowing within a suitable window.

In **Greece**, the torrential rains in early September during storm Daniel led to floods that affected the main crop growing region, Thessaly, and particularly summer crops, as reported in the September issue of the Bulletin.



1.2. Meteorological review (1 September – 15 October 2023)

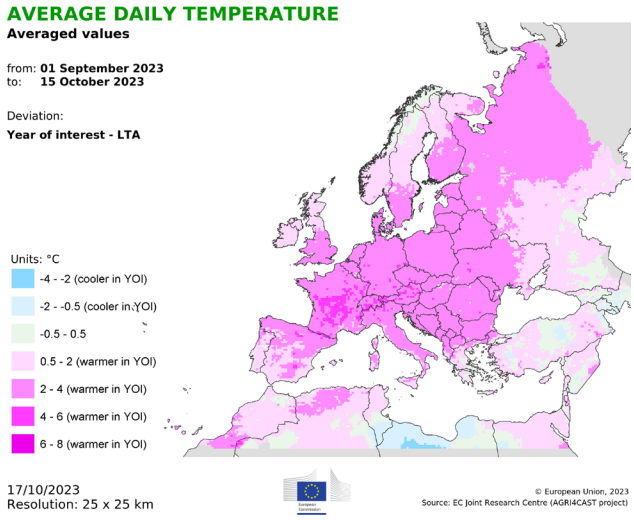
Due to formation of a heat dome, warmer-than-usual conditions prevailed almost throughout Europe, accompanied by drier-than-usual conditions in many regions.

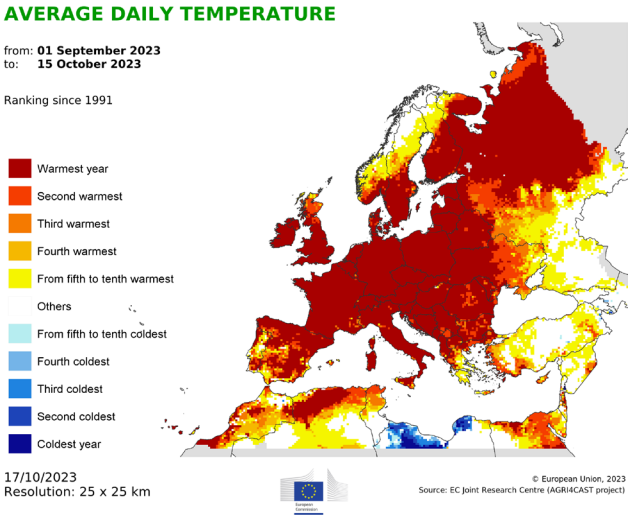
Much warmer-than-usual conditions, with daily mean temperatures between 2°C and 4°C above the 1991-2022 long-term average (LTA), were observed in most of Europe. Even more distinct positive temperature anomalies (4°C to 6°C above the LTA) were observed in central parts of France, and locally in Spain, northern Italy, Germany, Switzerland, Austria and Czechia. In most of Europe, average daily temperatures ranked among the three warmest in our records since 1991. In parts of the Iberian Peninsula, France, Italy, the Balkan Peninsula and western and southern Türkiye, more than 20 days with maximum daily temperature above 30°C were observed.

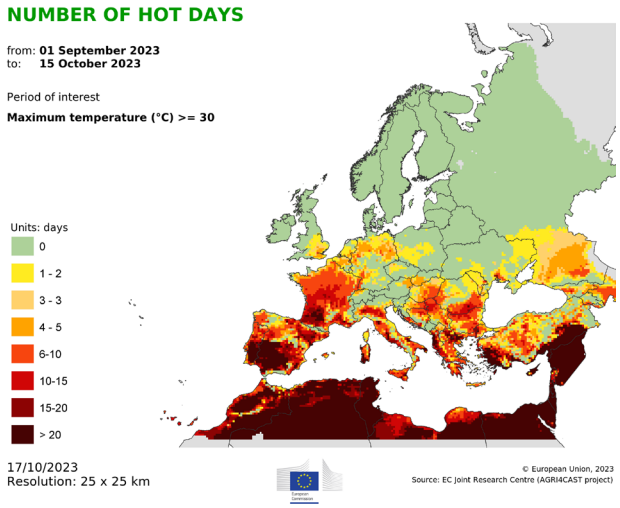
Slightly colder-than-usual conditions, with temperature anomalies between 0.5°C and 2°C below the LTA, were observed in parts of Türkiye.

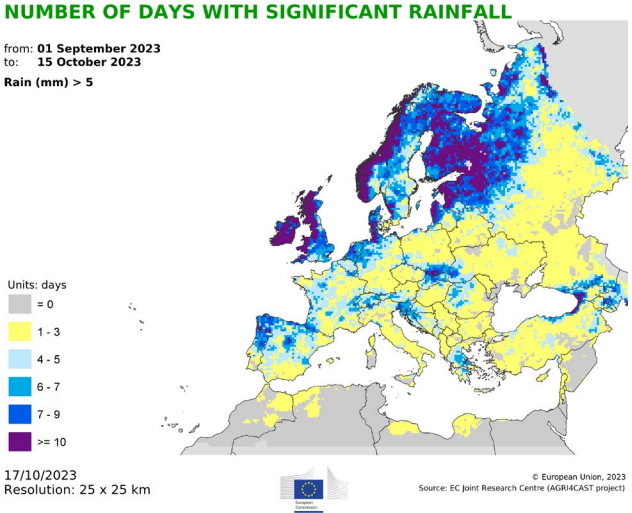
Wetter-than-usual conditions were observed in most of the Iberian Peninsula, the United Kingdom, Scandinavia, the Baltic Sea countries and northern European Russia, as well as in Greece and parts of Türkiye. In most of these regions, more than 90 mm rainfall was received, over 7 or more days where rainfall exceeded 5 mm. In many of these regions, the review period also ranked among the three wettest in our records since 1991.

Drier-than-usual conditions (rainfall 50% or more below the LTA) were observed in parts of Cataluña (in Spain), parts of southern and eastern France, most of Italy, southern Germany, most of Czechia and Hungary, northern Poland, southern Belarus, parts of Ukraine, southern and eastern Romania, most of Bulgaria, northern Greece, parts of Türkiye, and southern and central European Russia. In many of these regions, the review period ranked among the three driest in our records since 1991.







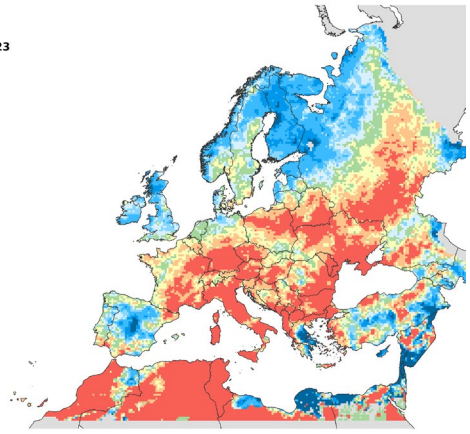


RAINFALL
Cumulative values

from: **01 September 2023**
to: **15 October 2023**

Deviation:
Year of interest - LTA

Units: %
- >= -100 - < -50
- >= -50 - < -30
- >= -30 - < -10
- >= -10 - < 10
- >= 10 - < 30
- >= 30 - < 50
- >= 50 - < 100
- >= 100 - < 150
- >= 150



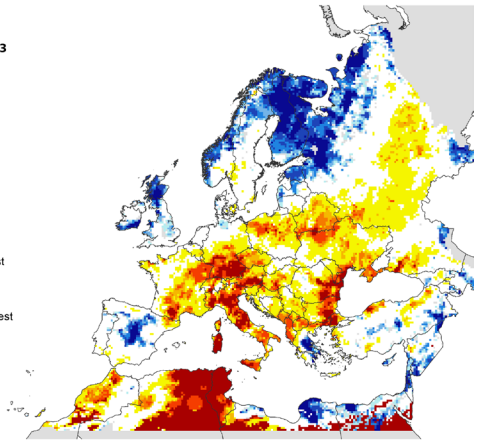
17/10/2023
Resolution: 25 x 25 km

RAINFALL
Cumulative values

from: **01 September 2023**
to: **15 October 2023**

Ranking since 1991

- Driest year
- Second driest
- Third driest
- Fourth driest
- From fifth to tenth driest
- Others
- From fifth to tenth wettest
- Fourth wettest
- Third wettest
- Second wettest
- Wettest year



17/10/2023
Resolution: 25 x 25 km

1.3. Weather forecast (19 – 28 October)

Low pressure system brings cooler autumnal conditions with heavy rain and strong winds moving over the Iberian Peninsula and into western and southern Europe, while heat builds up over the Balkan Peninsula and surrounding region.

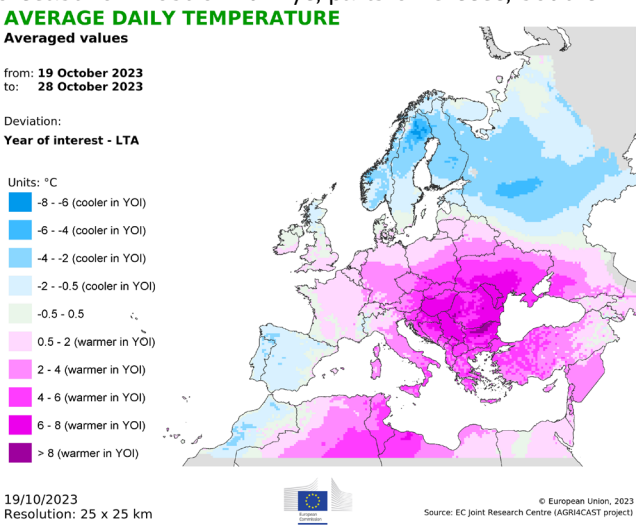
Slightly colder-than-usual conditions are forecast for the Iberian Peninsula, Scotland, the Scandinavian Peninsula, and central and northern European Russia. The most substantial negative anomalies, with daily average temperatures more than 2°C below the LTA, are forecast for most of Scandinavia and European Russia, with anomalies down to 8°C below the LTA in northern Sweden and parts of European Russia.

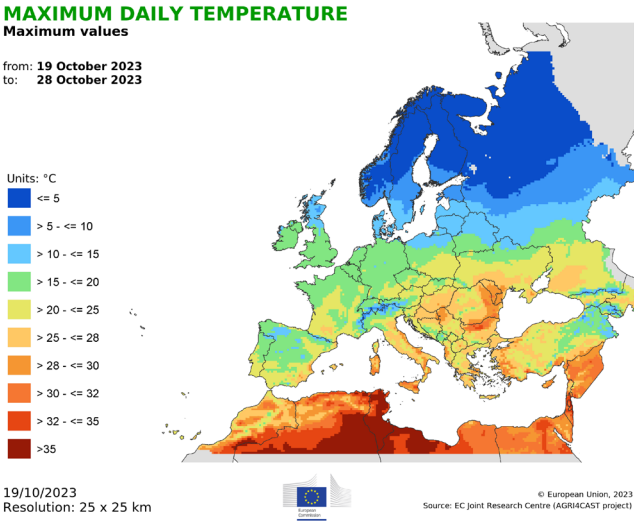
Warmer-than-usual conditions are forecast for all other parts of Europe. The most distinct positive anomalies (more than 2°C above the LTA) are forecast for most of Italy, central Europe, the Balkan Peninsula, southern Belarus, Ukraine and southern European Russia. Exceptionally high positive anomalies (6-8°C and locally up to 9°C above the LTA) are forecast for most of Hungary, Romania, Bulgaria, Moldova and south-western Ukraine.

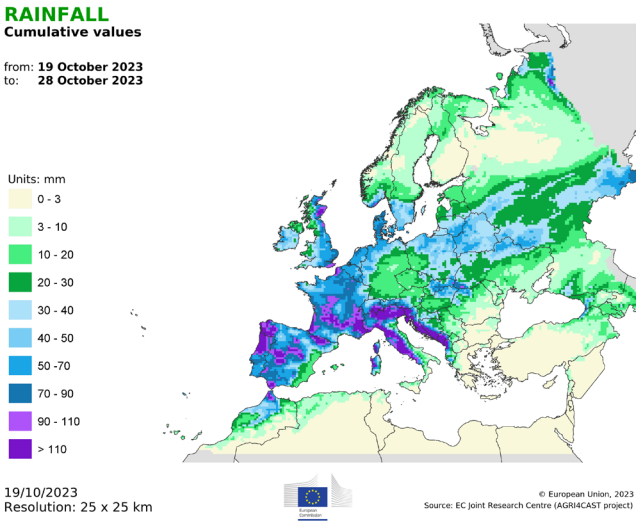
Dry conditions (total precipitation below 3 mm) are forecast for most of Türkiye, parts of Greece, southern Bulgaria, eastern Romania and Ukraine (*Odes'ka*), as well as parts of southern and northern European Russia and Scandinavia.

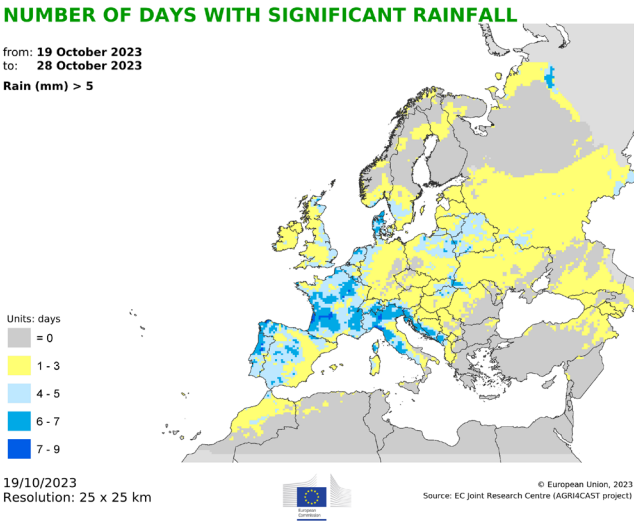
Wet conditions (total precipitation above 10 mm and up to 90 mm) are forecast for most of Europe. **Very wet conditions** (rainfall above 90 mm) are forecast for parts of the Iberian Peninsula, southern and central France, parts of the United Kingdom, northern Netherlands and north-western Germany, the Alps region, parts of Italy, and the western coastal Balkan Peninsula. In these regions, up to 9 days with rainfall above 5 mm are forecast.

The long-range weather forecast points to likely warm conditions, exceeding the 24-year climatological median by up to 1°C in November, December and January in most of Europe.







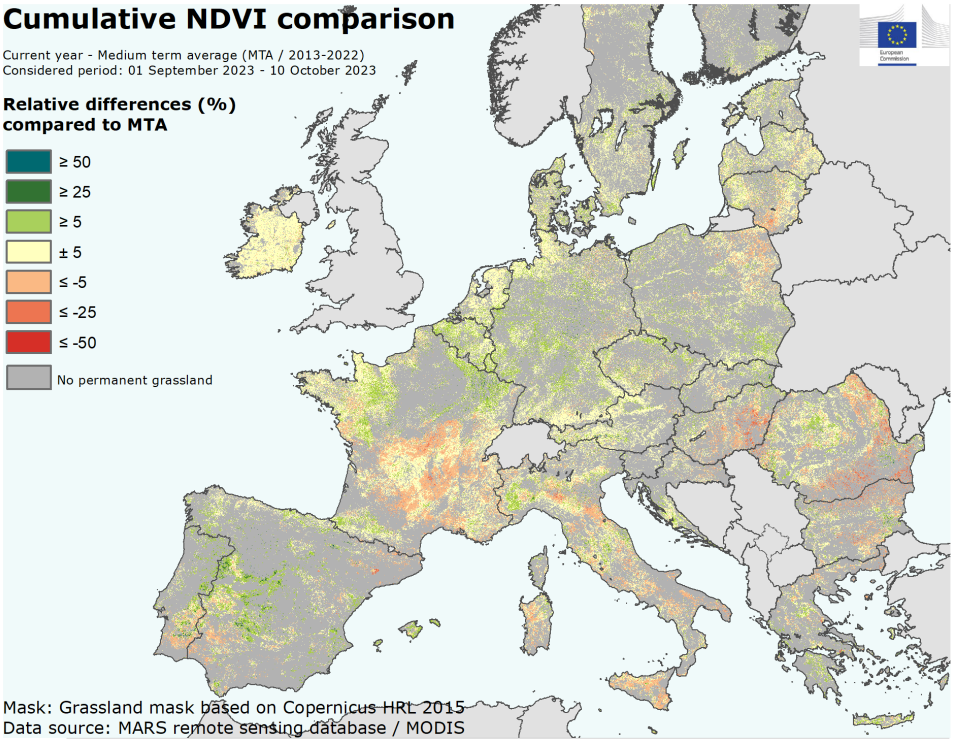


2. Grassland and fodder monitoring

Record-high temperatures prolonged biomass accumulation towards the end of the growing season

Record-high temperatures combined with record-low (or almost record-low) precipitation in several central and eastern European countries, as well as in Italy and central and southern France, led to increased pressure on grasslands and remaining fodder crops (e.g. silage maize) and their potential to accumulate biomass. Grassland areas in most other parts of Europe are in good condition.

The map below displays the differences between the Normalized Difference Vegetation Index (NDVI) cumulated from 1 September to 10 October 2023, and the medium-term average (MTA, 2013-2022) for the same period, in EU grassland areas. Positive anomalies (in green) reflect above-average surface greenness, associated with above-average grassland productivity, while negative anomalies (in red) reflect below-average surface greenness. Observations on fodder crops are added to the respective countries upon availability.



In **Ireland,** above-average rainfall compensated for any negative effects of the above-average temperatures. Harvest of silage maize has started, with first field reports confirming yields above the 5-year average. In **Denmark** and **Sweden**, temperatures during the review period ranked among the warmest in our records, while precipitation was close to average. NDVI values are in line with or slightly above the MTA in the main producing regions of both countries, indicating normal biomass accumulation for the review period. Grasslands in **Finland** and the **Baltic countries** benefited from abundant rainfall that balanced the effects of warm temperatures, except in the southernmost parts of Lithuania where rainfall was distinctly below the LTA.

In **France**, the combination of very high temperatures and very low precipitation levels led to a decrease in grassland productivity in central and southern regions (e.g. *Auvergne*), while adequate rainfall sustained growth in other regions (e.g. *Normandie*, *Pays de la Loire*). First estimates on forage maize suggest good yields, above the 5-year average. In the **Benelux** countries and northern **Germany**, well-above average temperatures and sunshine levels provided favourable conditions for growth of grassland and fodder crops. Scarce precipitation in southern **Germany** slowed down biomass accumulation,

which had previously recovered. Nevertheless, overall grasslands in Germany are progressing towards the end of the growing cycle in good condition. Similar weather patterns were observed in **Poland**, **Austria**, **Czechia** and **Slovakia**, where despite little rainfall soil moisture conditions were generally adequate due to abundant precipitation in August. Deterioration of the grassland NDVI signal is observed in north-eastern Poland, towards the border with Lithuania, due to a continuing rainfall deficit.

In **Hungary**, warm and persistent dry weather conditions reduced grassland and fodder productivity in the southern regions and eastern half of the country.

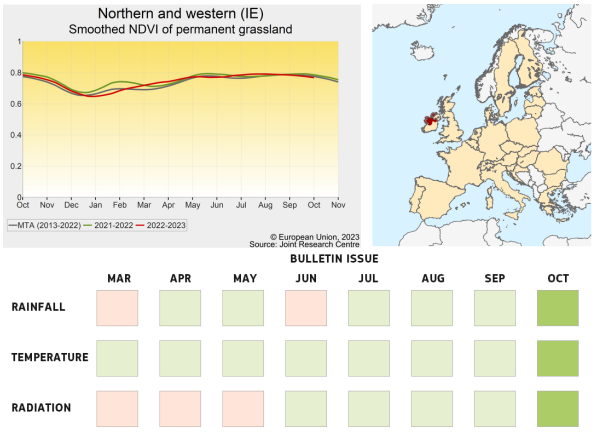
Similarly, eastern and southern **Romania**, as well as northern and eastern **Bulgaria**, have experienced long-lasting rain deficits and unusually high temperatures, leading to low levels of grassland productivity.

In **Slovenia** and **Croatia**, conditions were considerably warmer and drier than usual, with gaps between rainfall events. However, this did not mitigate the negative impacts from previous floods, resulting in grassland productivity levels close to or slightly below average. In **Greece**, the floods at the beginning of September seriously affected grassland and fodder provision in the most productive area of *Thessaly*, while the other regions benefited from average temperatures and rainfall.

In **Italy**, unusually warm and dry weather prevailed in grassland and fodder crop areas, particularly from the end of September to mid-October. Biomass accumulation continued to be below the MTA in most of the central and southern regions (e.g. *Puglia*, *Campania* and *Sicily*), while it remained around average in northern regions. More rain in the coming weeks is crucial to sustain growth. In **Spain** and **Portugal**, abundant rainfall and average temperatures in September were beneficial for grassland development. Subsequent high temperatures, particularly in the south, put pressure on grasslands, resulting in NDVI signals in line with the MTA and the previous year.

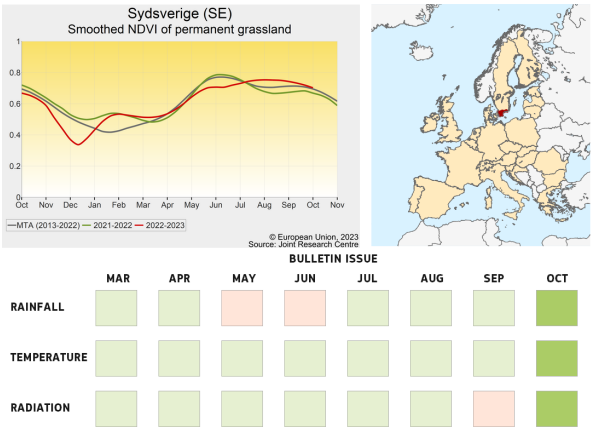
Ireland

Reference period: 01 Sep to 10 Oct 2023



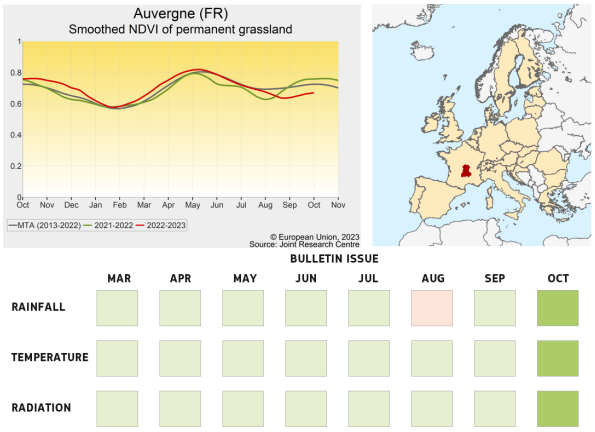
Denmark and Sweden

Reference period: 01 Sep to 10 Oct 2023



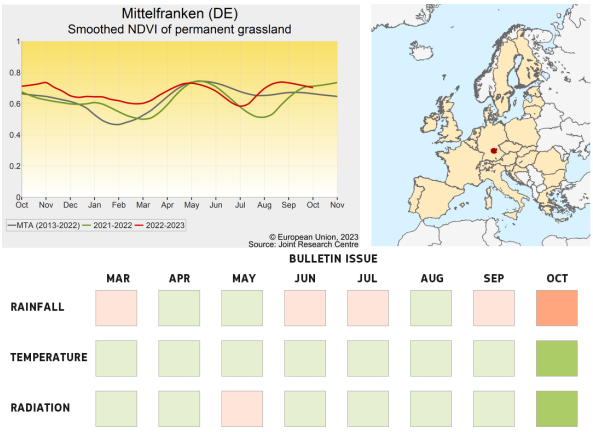
France

Reference period: 01 Sep to 10 Oct 2023



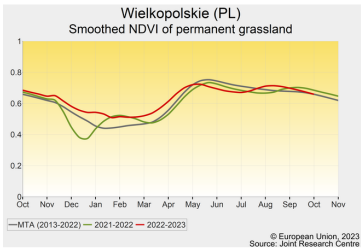
Germany - South

Reference period: 01 Sep to 10 Oct 2023



Poland

Reference period: 01 Sep to 10 Oct 2023

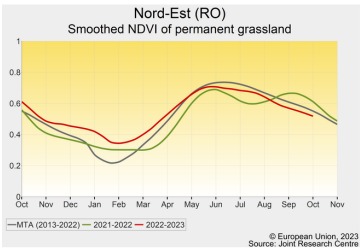


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Romania - East

Reference period: 01 Sep to 10 Oct 2023

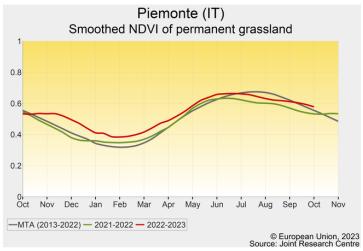


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Italy - North and central

Reference period: 01 Sep to 10 Oct 2023

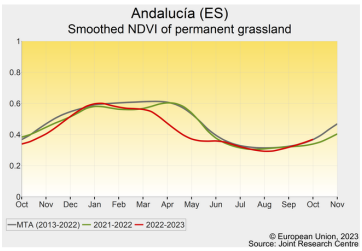


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Spain and Portugal - South

Reference period: 01 Sep to 10 Oct 2023



BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

3. Sowing conditions

Rapeseed

Fair start to the season for the main producers

In France, the rapeseed sowing campaign was timely and effective thanks to favourable agrometeorological conditions in the north of the country (where most production is located). Warmer-than-usual temperatures and adequate soil moisture conditions were favourable for the early development of plants.

In Germany, the rapeseed sowing campaign started in mid-August, following the delayed winter crop harvesting campaign and rainy conditions. The warm temperatures and relatively dry conditions that followed were optimal for the winter rapeseed sowing campaign, which progressed well until the first dekad of September (within the optimal time window). Warm temperatures and generally adequate soil moisture levels in September and at the beginning of October were favourable for early development of plants. However, rainfall is currently much needed in the south to maintain acceptable soil water levels.

Similarly, in Poland rapeseed sowing was regionally delayed due to the late winter crop harvest, further exacerbated by the rainy August weather. The warm and dry conditions in early September favoured completion of sowings. Warmer-than-usual conditions in September and early October resulted in advanced development for the rapeseed that was sown on time (in August), but regionally a rainfall deficit impaired the establishment of late sown stands, resulting in uneven plant development.

In Ireland, the sowing campaign started on time (in mid-August) but was prolonged due to rainy conditions. From early September, conditions were generally favourable for completion of sowings (within the optimal time window) and good plant establishment.

Overly wet conditions in Finland and Estonia delayed the sowing campaign and may have compromised optimal establishment of plants.

In contrast, very dry conditions in south-eastern regions of Romania and southern Ukraine may seriously impair germination, emergence and early development of plants, to the extent that re-sowing may be required.

Winter cereals

Good conditions for sowing and crop emergence

The sowing campaign for winter cereals is progressing well in most parts of Europe. In many regions, sowing started slightly later than usual, due to the knock-on effects of the late harvesting of winter crops due to excess rainfall, as well as the late harvesting of summer crops due to sowing having been delayed in spring. For most regions this has not raised concerns, as there is still time to complete the campaign within the optimal sowing window.

However, this is not the case in Finland and Estonia, where sowing of winter cereals should normally be completed by mid-October. Rainfall has persistently caused delays, first to the harvest of the preceding crops and now also to field preparation and sowing of winter cereals. Crop establishment in fields that are already sown is locally compromised by excessively wet soil conditions. Similar constraints have been faced in southern Ireland, but here there is still sufficient time to complete the sowing within a suitable window.

Rainfall also caused some delay in Denmark and Sweden, but overall conditions have been favourable. The planned sowing has already been mostly accomplished, and is expected to be completed within the usual window. Crop establishment has generally been positive, sustained by warmer-than-usual temperatures and adequate rainfall.

Sowings are proceeding as planned, or with slight delay, in France, Germany, the Benelux countries, Poland, Czechia, Austria and Slovakia, as well as in the United Kingdom. Ukraine, Russia and Belarus. Despite below-average rainfall since the end of August in many of these regions, soil moisture conditions have generally been adequate for emergence and initial growth thanks to abundant precipitation in August and scattered rainfall thereafter, substantial rainfall is also expected in the coming days.

In Hungary, sowing of winter cereals is proceeding well, although rainfall is needed for adequate sprouting and emergence, especially in central and eastern regions.

In eastern Romania and Bulgaria, hard and dry topsoils have hampered seedbed preparation. The sowing campaign for winter cereals can still be accomplished on time if adequate rain arrives in the coming weeks. Substantial rain is needed in these drought-affected regions to establish the crops before wintering.

In Slovenia and Croatia, sowing of winter crops has progressed at a good pace so far. Conditions for germination are generally adequate, except for some areas along the Hungarian and Serbian border, where low topsoil moisture levels are likely to delay germination.

In Spain, Portugal and northern Italy, sowing usually starts in mid-October. Soil conditions in the main production regions have generally been adequate for seedbed preparation. Topsoils are currently dry, but more rain is expected in the coming days. There is still sufficient time to accomplish sowing with the usual window, which if needed can be extended until early December. In Greece, southern Italy, Cyprus and Türkiye, the optimal sowing window for cereals begins in November.

4. Country analysis

4.1. European Union

France

Continued positive yield expectations for summer crops

Temperatures during the review period were higher than average, particularly in south-western parts of the country. Precipitation levels generally matched the LTA, except in the east, where they were below average. In the *Grand-Est* region, precipitation reached only 50% of the LTA.

The warm conditions during this first half of autumn have been generally beneficial for the development of grain maize and soybean during the grain-filling stage. These conditions have also favoured the harvesting of summer crops. Nationally, more than 75% of grain maize crops have already been harvested; the harvest has been earlier than previous years in southern regions, while some delays have been encountered in the northern part of the country due to unfavourable weather conditions.

The yield forecasts for summer crops remain largely unchanged from September – above the 5-year average and well above the level of 2022.

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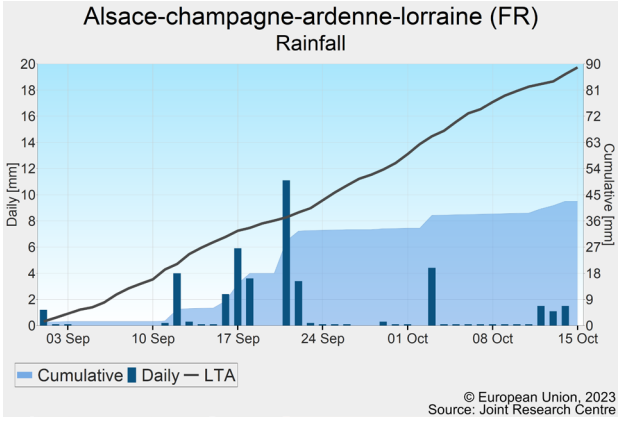
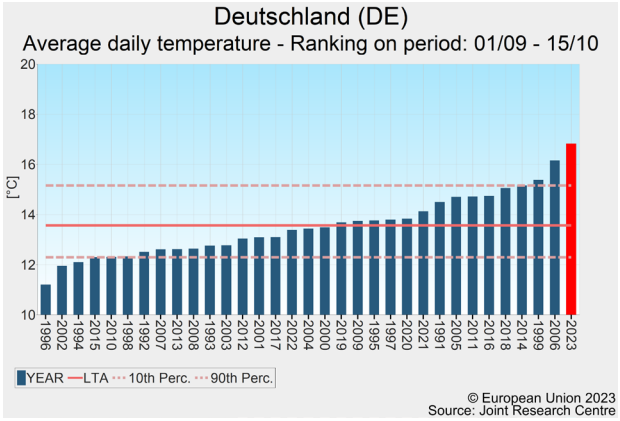


Germany

Warm autumn gives a final boost to summer crops

Temperatures were record-high nationwide during the reporting period, with averages more than 3°C above the LTA and maximum daily temperatures surpassing 30°C. At the same time, rainfall was around average in northern Germany, while very scarce in the south (e.g. *Baden-Württemberg* and *Bayern*), where it was 30-40 mm (approximately 60%) below the LTA.

Despite their advanced development stage during the review period, summer crops benefited from the mild period and exceptional growing conditions, displaying continued growth that resulted in slight positive effects on yields. Therefore, our yield forecasts were slightly raised for grain maize and potatoes (+1%), sugar beet and sunflowers (+2%), and green maize (+3%). Additionally, the stable and warm weather has been very beneficial for the start of both the harvest of summer crops (especially grain maize) and the sowing campaign for winter crops, both of which are progressing well.



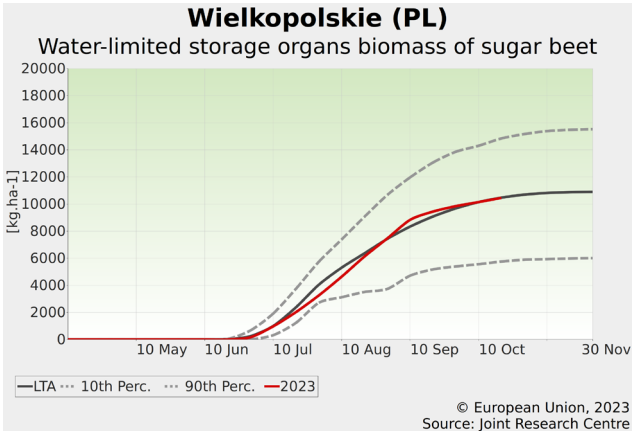
Poland

Warm and dry September advanced maturing and drying of grain maize

A very warm and dry September and first dekad of October favoured the harvest of green maize, and also maturation and grain drying of grain maize. From mid-September onwards, the grain maize harvest started early in the drought-affected centre and it is currently gaining speed across the country. Initial reports indicate highly variable grain maize yields across regions, reflecting the different soil water availability during the season – ranging from poor yields in central and north-eastern regions to above average in the north-west and south-east. Similarly, yields of potatoes and sugar beet are regionally highly variable – overall slightly below average for potatoes and around average for sugar beet.

The warm weather generally resulted in advanced development of rapeseed sown on time in August. In central Poland, however, sub-optimal soil moisture supply caused by the rainfall deficit may have locally impaired the establishment of rapeseed sown during the first dekad of September. Sowing of winter cereals is progressing on schedule, under generally good conditions.

We maintain our yield outlook for grain maize and potatoes at a little below the 5-year average, while yield expectations for sugar beet are slightly above the 5-year average.



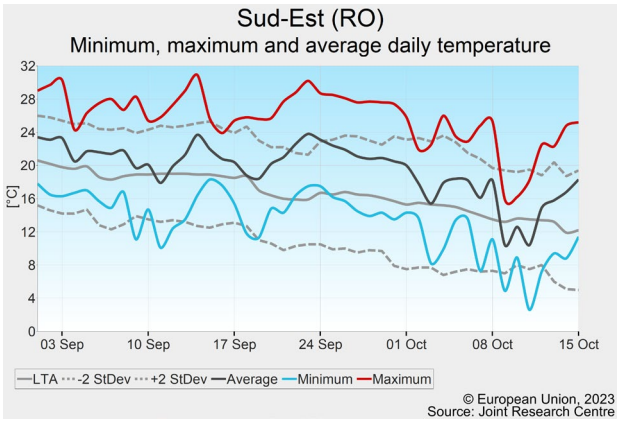
Romania

Dry topsoils hampered sowing of winter crops in eastern and south-eastern regions

Daily temperatures significantly exceeded the LTA (on average by 2-4°C) during the review period. A short colder spell around 10 October was marked with frost events (with T_{min} down to -3.5°C) in the northern regions. Rainfall was 50-95% below the LTA. Up until 25 September, precipitation was close to or above average (30-70 mm) in the western half of the country, but the eastern areas (particularly *Sud-Muntenia* and *Sud-Est*) remained dry throughout the review period.

These weather conditions favoured good progress in harvesting maize and sunflowers. Nevertheless, the yield forecasts for grain maize and sunflowers were revised further downwards, to well below average levels, given the persistent precipitation deficit and heat stress in the main producing southern regions since early August. However, summer crops are in better shape in the western regions.

Sowing of winter crops was hampered, mainly in the eastern half of Romania, due to the dry topsoils. Sowing, germination and emergence of rapeseed was particularly problematic in the south-eastern regions. Substantial rain is needed to establish crops before wintering.



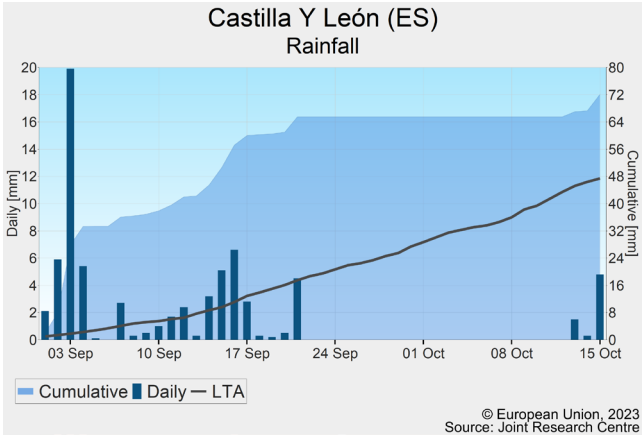
Spain and Portugal

Fair conditions for harvesting and sowing

The review period was marked by wet and relatively cool conditions during the first two dekads of September, followed by dry and unusually warm/hot conditions until mid October. Considering the period as a whole, rainfall anomalies were mostly positive, but presenting a strong concentric gradient, with negative anomalies in the coastal regions and regions bordering the Pyrenees, to up to +200% in central Spain. Temperatures after 20 September were the highest in our records, and almost constantly exceeded 30°C in the southern half of the peninsula.

Notwithstanding their extreme nature these weather conditions had little impact on summer crops which were reaching (or had already reached) the end of their growth cycle. The dry conditions in the second half of the period were favourable harvesting as well as for field preparations and sowing and emergence of rapeseed. Towards the end of the review period top soils dried out, but substantial more rain is expected in the coming days; which should provide sufficient soil moisture for the sowing campaign of winter cereals. In large areas well over 100 mm is expected, raising concerns regarding potential damage to seedbeds.

Our yield forecasts for summer crops remain essentially the same as in last month's Bulletin.



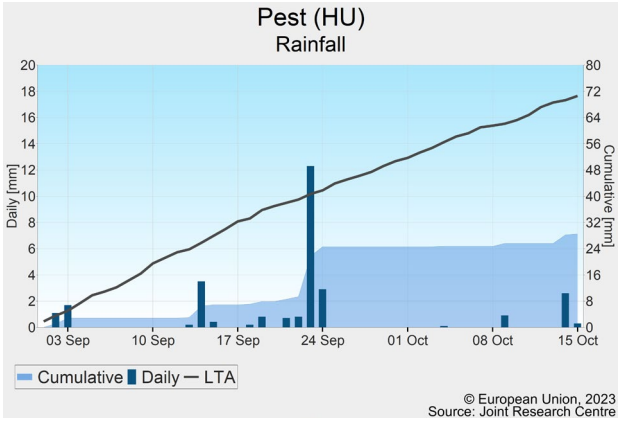
Hungary

Hot and dry autumn

The review period was the warmest in our climatological archive, at 3-4°C above the LTA. Cumulative rainfall reached only 25-55 mm and remained below the LTA across the country, with the highest precipitation deficit of 50% to 80% in the centre. Rain was unevenly distributed, with long dry periods between rainfall events.

The low soil moisture content likely delayed sowing and hampered emergence and initial development of rapeseed, primarily in the centre and east, resulting in uneven crop stands. The sowing of winter cereals is proceeding well, although rainfall is needed for adequate sprouting and emergence.

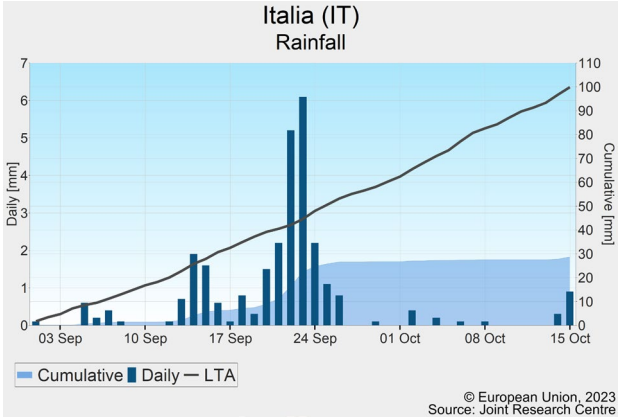
Although harvesting conditions were good, our yield forecasts for sunflowers, grain maize and sugar beet were revised slightly downwards in view of the heatwave in late August and continued water supply problems in the south-east. However, the forecasts remain at above-average levels. The yield forecast for soybean was revised moderately upwards, as water supply was sufficient in the main producing regions of western Hungary (*Dunántúl*).



Italy

New winter crop campaign kicked off under dry and warm conditions

Weather conditions in Italy were dry and warm during the reporting period. Rain was scarce and occurred mostly in the period from 21 to 24 September. The cumulative rainfall deficit from 1 September to 15 October ranged from 80-110 mm (70-90% below the LTA) in *Piemonte*, *Lombardia*, *Veneto* and *Emilia-Romagna* to 40-60 mm (30-60% below the LTA) in southern Italy. Warmer-than-usual conditions occurred throughout the peninsula during this period, with average daily temperatures 3-4°C above the LTA. The harvest of summer crops is completed, with overall yields around average. The optimal window for the upcoming campaign of winter cereal sowing is between mid-October and early November, but can extend until early December. So far, sowing conditions have been acceptable; it has been dry but more rain is expected in the coming days to support crop establishment. Our yield forecast for summer crops confirms the outlook in September: nearly 1.5% below the 5-year average for maize and 2-3% above the 5-year average for sunflowers and soybean.



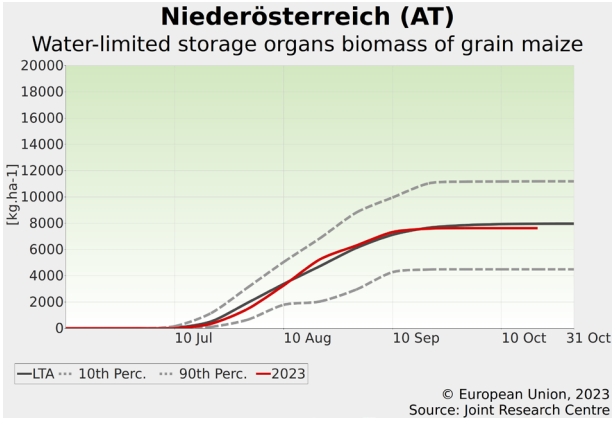
Czechia, Austria and Slovakia

Good conditions for harvesting of summer crops

The analysis period was characterised by above-average temperatures in all three countries, with record-high average temperature anomalies of 3-3.5°C above the LTA. Rainfall was significantly below the LTA (anomalies down to -50%) in Czechia and Austria, and below average in Slovakia (down to -20%), while solar radiation was above average thanks to many cloudless days.

The favourable agrometeorological conditions allowed both the sowing of winter crops and the harvest of summer crops to be conducted on time and effectively. Despite below-average rainfall, soil moisture levels were generally adequate for the establishment of winter crops, thanks to abundant precipitation in August and scattered rainfall thereafter.

Our model simulations indicate that development of maize biomass is below average in most of Czechia and north-east Austria, while above average in Slovakia and south-east Austria. The yield forecasts for grain maize and sunflowers are maintained compared to the previous Bulletin, whereas the forecast for green maize was revised upward. Yield expectations for grain maize remain below average in Czechia, close to average in Austria, and above average in Slovakia.



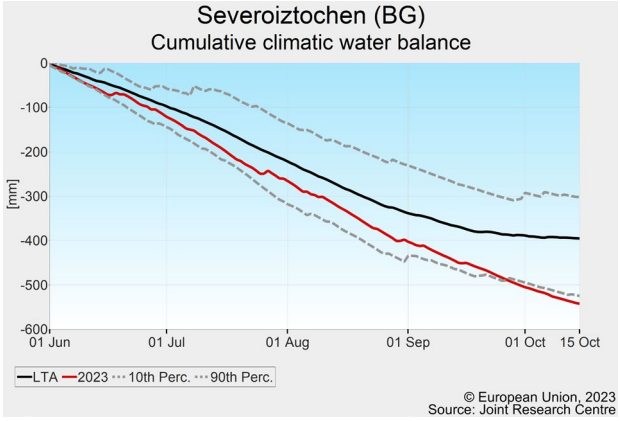
Bulgaria

Dry soil conditions negatively impacted rapeseed sowing

Rainfall was low, with a decreasing gradient from west (30-50 mm) to east (5-20 mm). The rainfall deficit reached 60-95% in central and eastern areas. Precipitation throughout the country was concentrated in the first half of September, which was followed by a long dry spell. Daily temperatures exceeded the LTA by 2-3.5°C, resulting in near-record temperatures for the review period as a whole.

The dry weather conditions allowed good progress in harvesting of summer crops. The yield forecasts for grain maize and sunflowers were revised further downwards to reflect the compound negative impacts of unfavourable conditions since the start of the season.

Dry topsoil conditions hampered seed-bed preparation and sowing of winter crops, and delayed emergence and initial crop development. Winter rapeseed is most impacted, particularly in the eastern regions where locally no sowing or no emergence occurred (these areas may later be re-sown with winter wheat). The sowing campaign for winter cereals is also affected, but this could still be accomplished on time if adequate rain arrives in the coming weeks.

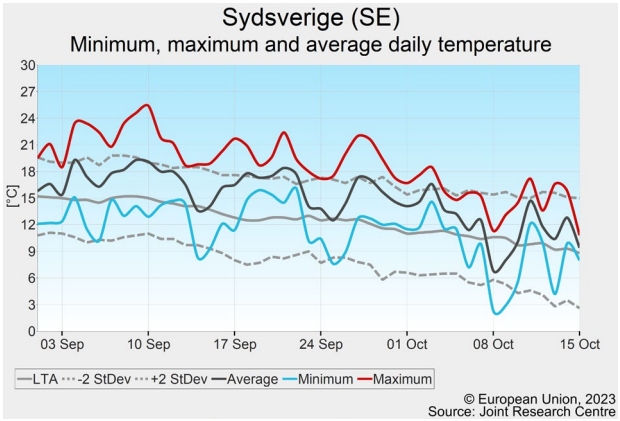


Denmark and Sweden

Autumn cereal sowing benefited from adequate soil moisture content

Warmer-than-usual temperatures (ranging from 2°C to 4°C above the LTA) prevailed during the review period, except for a few days around mid-September and the first week of October. Cumulative temperatures were approximately 20% above the LTA in both countries. Rainfall events occurred mostly during the second week of September and first week of October, with an overall rainfall surplus reported for western Denmark (+20%) and average to moderately below-average rainfall in eastern Denmark and southern Sweden.

Harvests of potatoes, green maize and sugar beet are in full swing. Sowing of winter cereals has progressed in both countries. There is expected to be a decrease in area sown with rapeseed, in favour of winter cereals, as the optimal window for rapeseed sowing was missed due to continuous rain in August. Our yield forecasts remain unchanged for Sweden but have been revised slightly upwards for potatoes and sugar beet in Denmark because of favourable autumn weather.

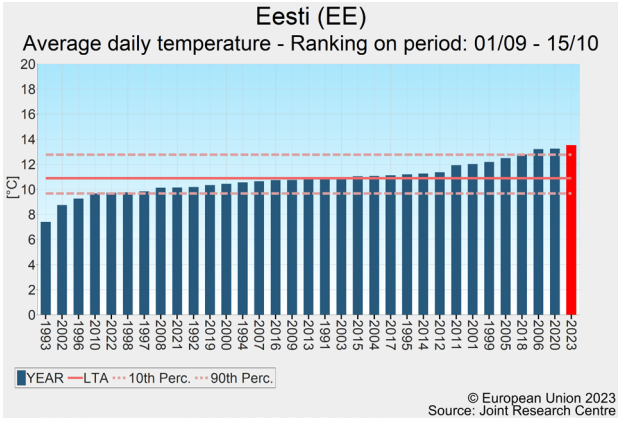


Estonia, Latvia, Lithuania, Finland

Very wet conditions in Finland and Estonia complicated autumn sowing

Warmer-than-usual temperatures prevailed throughout the region, except for a few days around 9 October. In Lithuania and Estonia, the review period was the warmest in our records. Precipitation was 40% below the LTA in southern Lithuania, but above the LTA in the rest of the region – ranging from +25% in Latvia to +80% in Estonia and throughout Finland. Radiation levels were close to average in Finland and above average in the other countries.

The cereal harvest is now completed, although it was complicated by the rain in Finland and Estonia, where some fields were not harvested because of low protein levels and disease impacts. In these countries, delays in sowing have also been reported, as a result of the late harvest and excessively wet soils. Yields of sugar beet and potatoes were revised slightly upwards for Lithuania because of the warm and dry conditions, while yields for potatoes were revised further downwards to below the 5-year average for Finland.



Greece and Cyprus

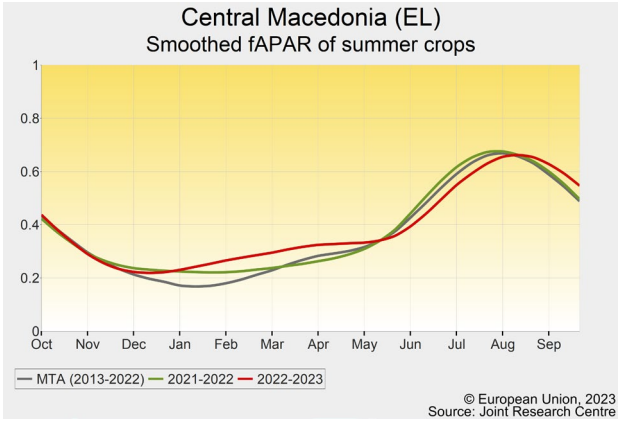
Average yields in non-flooded agricultural areas

During the review period, the harvest of sunflowers was completed in Central Macedonia and in Eastern Macedonia and Thrace. These two regions account for around 90% of Greece's sunflower production. Yield expectations slightly decreased, to around the 5-year average, due to the challenging end-of-season conditions caused by heat stress.

Harvests of potatoes and maize have begun in Greece's breadbasket regions, with reports of below-average yields in Eastern Macedonia and Thrace, but above-average yields in Central Macedonia, Western Greece and Central Greece.

Thessaly accounts for a loss of around 20% of the country's green and grain maize. The sowing of winter crops in this region is uncertain due to the floods that occurred in September. Sowing is expected to start in November, both in Greece and Cyprus.

Our yield forecasts for summer crops at national level remain unchanged, except the forecast for sunflowers, which has been revised slightly downwards.

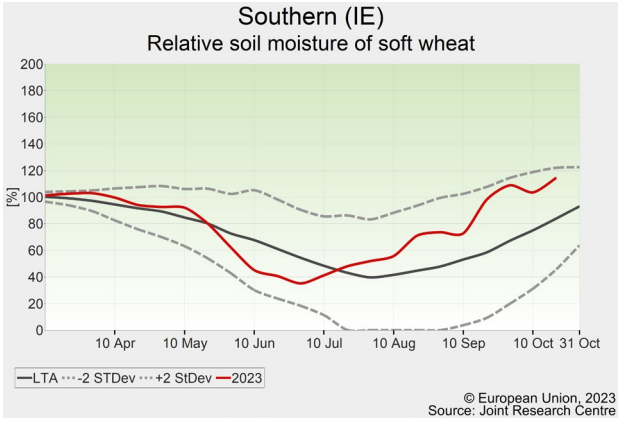


Ireland

Autumn sowing locally complicated by wet conditions

The review period has been characterised by rainfall since the second week of September, with approximately 10 days of significant (> 5 mm) precipitation. Total rainfall exceeded seasonal values by 50% in eastern and central Ireland, and by 80% in the south. Temperatures fluctuated around the LTA, except for the second week in both September and October, which were 4-6°C warmer than usual. As a result, a positive anomaly was reported for cumulative temperatures (T_{base} = 0°C) for the review period: approximately 15% above the LTA. Radiation levels were in line with seasonal values.

The harvest of spring crops is now completed but was complicated by the prolonged wet conditions. Harvest of green maize is under way, with first field reports indicating yields close to the 5-year average, confirming our model estimates. Wet soils caused delays in sowing winter cereals and rapeseed. Our yield forecasts remain unchanged.



Belgium, Luxembourg and the Netherlands

Favourable conditions for end-of-season growth, harvesting and sowing

The period from 1 September to 15 October was the warmest and one of the sunniest in our records. Rainfall was close to the LTA in the Netherlands and 20% to 40% below the LTA in Belgium and Luxembourg. Most rain was concentrated in mid-September and mid-October, with dry periods of up to 3 weeks in between. Temperatures were almost constantly above the LTA, but dropped sharply to below average on 15 October.

These favourable weather conditions allowed for the continued growth of late-sown summer crops – even in the south, where water supply remained adequate thanks to the August rain. Conditions were equally favourable for harvesting of summer crops (particularly sugar beet, potatoes and green maize) and sowing of winter crops. Emerged stands – at this point, mainly rapeseed and winter barley – are in good condition, but pest pressure is high.

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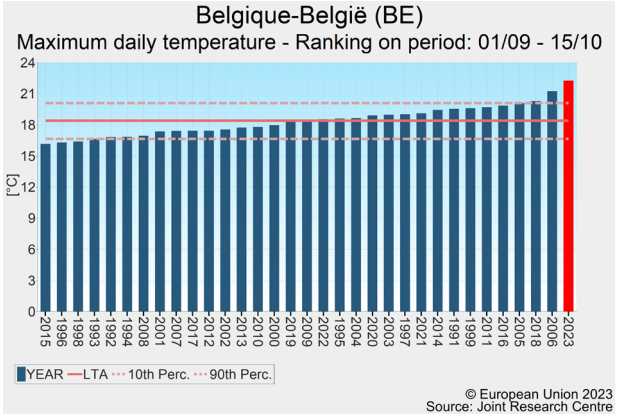
Our yield forecasts for summer crops were revised slightly upwards (by up to 3%).

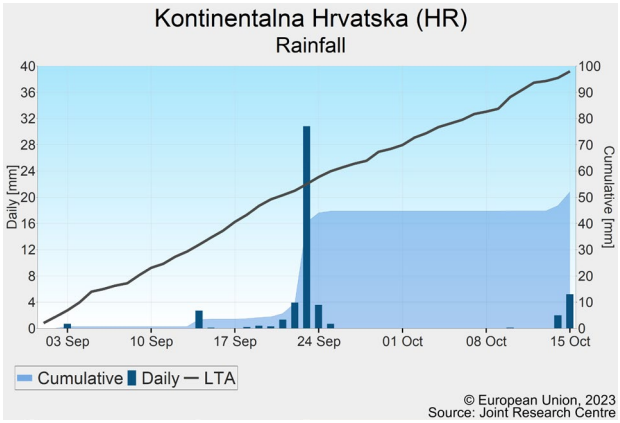


Slovenia and Croatia

Good yield outlook for summer crops

The review period was exceptionally warm, with temperatures between 3°C and 4°C above the LTA. Up until 22 September, there were a further 6-12 hot days (T_{max} > 30°C) in eastern *Kontinentalna Hrvatska* and coastal regions of Croatia. Precipitation was scarce and rainfall totals typically reached just half the usual amount in the agricultural areas. Rainfall was limited to around 22 September and mid-October.

Harvesting of sunflowers started in late August or early September and has mostly been finished thanks to favourable weather conditions. The maize harvest started late due to late sowing in spring, but is now progressing well. Yield expectations are generally good, except for areas locally affected by hail, storms or flooding during the summer. Our previous yield forecasts for summer crops were maintained at well above-average levels for both countries. Sowing of winter crops has progressed at a good pace so far. Conditions for germination are generally adequate, except for some areas along the Hungarian and Serbian border, where low topsoil moisture levels may delay germination.



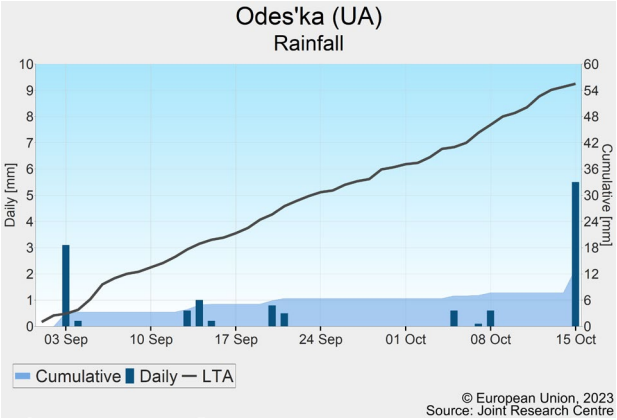
4.2. Black Sea Area

Ukraine

Sustained positive outlook under favourable dry autumn conditions

Throughout the review period, temperatures remained consistently above the LTA, particularly in western regions. Precipitation was distinctly below the LTA. In some oblasts, such as *Odes'ka*, *Mykolayivs'ka*, and *Cherkas'ka*, the review period was the driest or second-driest in our records.

Harvesting operations have commenced, and as of 13 October approximately 82% of soybean, 73% of sunflower and 22% of grain maize parcels had been harvested in government-controlled areas[1]. The harvest reports on sunflowers and soybean are in line with our forecasts in September. The sunny and dry conditions experienced in late summer and the first half of Autumn have been favourable for the final stages of grain filling and ripening, and have created optimal conditions for the upcoming harvest. Therefore, our record-high yield forecast for grain maize remains unchanged.



Türkiye

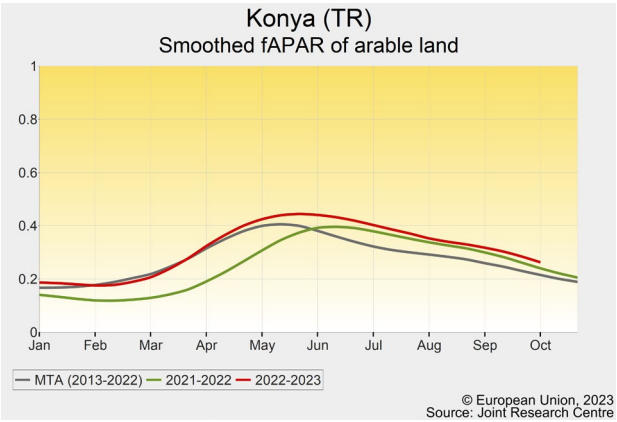
Favourable completion of harvesting campaign for summer crops

Rainfall during the review period was on average 10-20 mm above the LTA, with most of the rain events occurring in October. Average daily temperatures in September were 1-2°C above the LTA, while seasonal temperatures prevailed in the first half of October.

The relatively dry weather conditions in September allowed harvesting of grain maize in the main production regions (*Adana*, *Sanliurfa*, *Hatay* and *Mardin*) to be completed in good time, and with favourable grain-moisture levels. The season was also positive for soybean cultivation, with an above-average yield outlook in *Adana* and *Icel* (almost 80% of national production). Soybean harvesting was concluded around the second dekad of September.

An extended analysis of the season, also covering sugar beet, is provided in the October edition of the JRC MARS Bulletin on Türkiye in the Global Outlook series[2].

The sowing window for winter crops will open in November. The rainfall events in October have established favourable soil moisture conditions for sowing and crop germination.



[1] https://minagro.gov.ua/news/zhniva-2023-v-ukrayini-namolocheno-majzhe-525-mln-tonn-zernovih-ta-olijnih-kultur

[2] Manfron, G., Nisini, L., Panarello, L., Rossi, M. and Tarnavsky, E., JRC MARS Bulletin – Global outlook – Crop monitoring European neighbourhood – Türkiye, October 2023. doi:10.2760/779469. JRC133196. https://publications.jrc.ec.europa.eu/repository/handle/JRC133196

4.3. European Russia and Belarus

European Russia

Good progress in autumn harvesting and sowing campaign

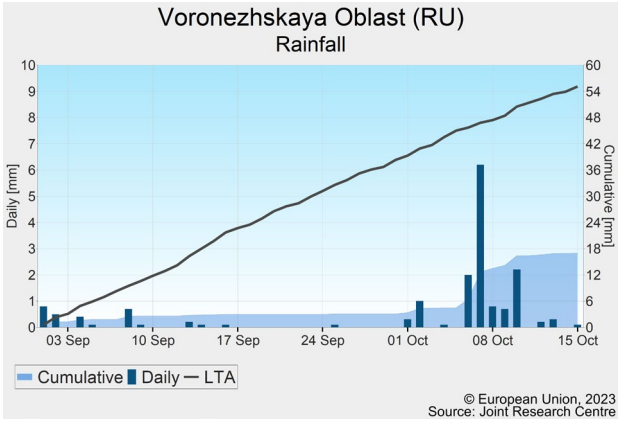
In the first half of September, near-average or slightly below-average temperatures were experienced in southern and central parts of European Russia, whereas the agriculturally less important northern part presented temperatures 1.5-5°C warmer than usual.

The second half of September was distinctly warmer than usual in most of Russia. The first half of October was marked by strong fluctuations in weather conditions, with near-average temperatures overall.

September – especially the second half – was much drier than usual in most parts of European Russia, whereas rainfall in the first half of October was above the LTA in most regions.

The predominantly dry weather conditions allowed fast progress in harvesting of spring and summer crops, thus completing an overall positive season in European Russia. An extended analysis of the season, with quantitative yield forecasts at okrug level and also covering Asian Russia, is provided in the October edition of the JRC MARS Bulletin on Russia in the Global Outlook series[3].

Dry topsoil conditions hampered soil preparation for autumn sowing. Nevertheless, sowing has so far progressed much better than usual. The rain in October is supporting sprouting and early development of winter crops.



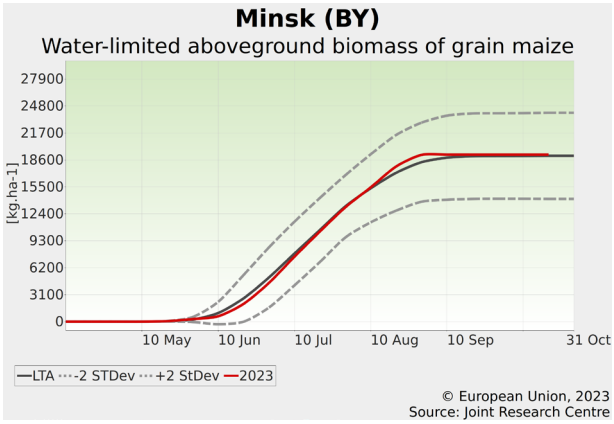
Belarus

Grain maize harvest progressing under good conditions

I Temperatures were warmer than usual in September, with daily average anomalies reaching +3-4°C. However, since October temperatures have been dropping to below the seasonal average, with minima reaching below 0°C in the east.

Precipitation for the review period was significantly below the LTA (-30% to -60%). After a very dry first half of September, scattered rainfall events improved soil moisture levels for germination and emergence of winter crops. However, regionally (especially in the south-east) soil moisture levels remained sub-optimal for emergence and early development of winter crops.

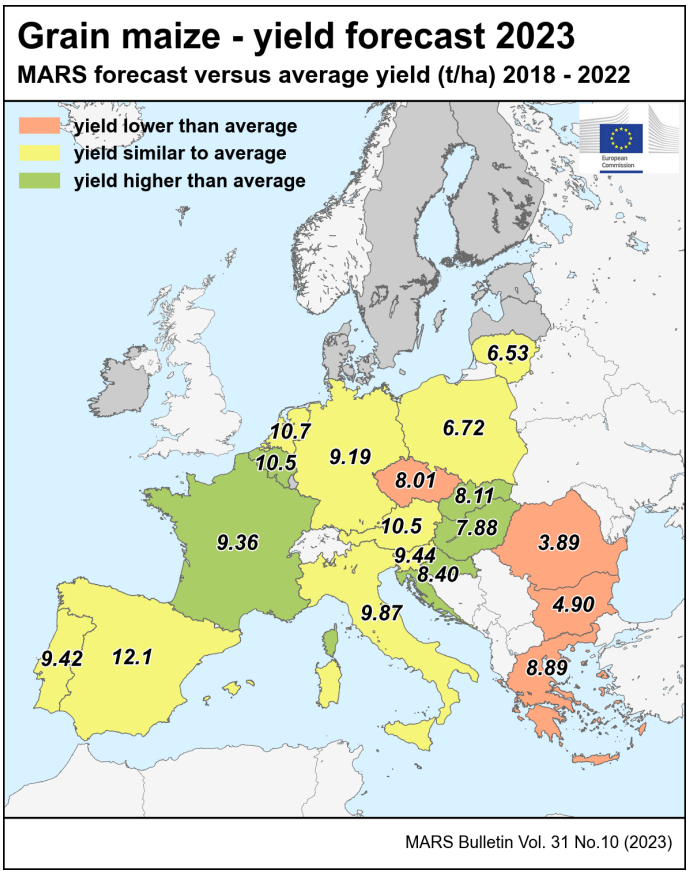
The harvest campaign for grain maize started in the second dekad of September and has been ongoing under generally favourable conditions, only briefly interrupted by rain. Our model indicates near-average or slightly above-average biomass and storage organ accumulation, and we maintain our yield outlook for grain maize at just above average.



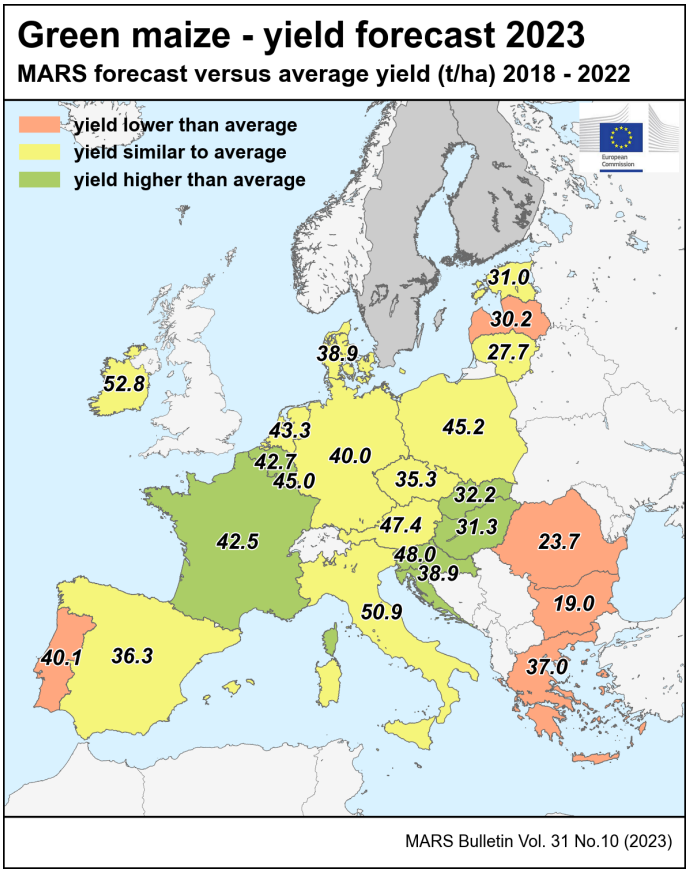
[3] Bussay, A., Tarnavsky, E., Claverie, M., Cerrani, I., Nisini Scacchiafichi, L. and Panarello, L., JRC MARS Bulletin – Global outlook – Crop monitoring European neighbourhood – Russia, October 2023. doi:10.2760/789966. JRC133237.
https://publications.jrc.ec.europa.eu/repository/handle/JRC133237

5. Crop yield forecast

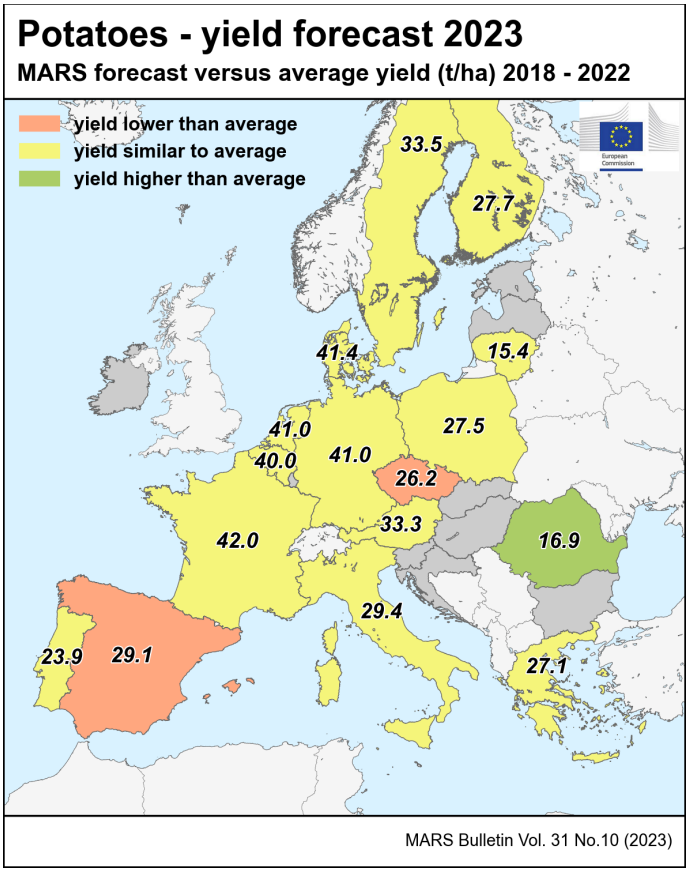
Country	Grain maize (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	7.48	5.90	**7.13**	– 5	+ 21
AT	10.6	9.82	**10.5**	– 1	+ 7
BE	10.0	9.27	**10.5**	+ 5	+ 13
BG	6.08	4.80	**4.90**	– 20	+ 2
CY	—	—	**—**	—	—
CZ	8.35	7.95	**8.01**	– 4	+ 1
DE	9.06	8.40	**9.19**	+ 2	+ 9
DK	—	—	**—**	—	—
EE	—	—	**—**	—	—
EL	10.8	9.75	**8.89**	– 18	– 9
ES	12.1	11.7	**12.1**	+ 0	+ 4
FI	—	—	**—**	—	—
FR	8.61	7.54	**9.36**	+ 9	+ 24
HR	8.06	6.11	**8.40**	+ 4	+ 37
HU	7.04	3.42	**7.88**	+ 12	+ 130
IE	—	—	**—**	—	—
IT	10.0	8.31	**9.87**	– 1	+ 19
LT	6.40	5.31	**6.53**	+ 2	+ 23
LU	—	—	**—**	—	—
LV	—	—	**—**	—	—
MT	—	—	**—**	—	—
NL	10.5	10.8	**10.7**	+ 2	– 1
PL	6.79	6.98	**6.72**	– 1	– 4
PT	9.43	9.44	**9.42**	– 0	– 0
RO	5.39	3.01	**3.89**	– 28	+ 29
SE	—	—	**—**	—	—
SI	9.09	6.68	**9.44**	+ 4	+ 41
SK	7.37	4.47	**8.11**	+ 10	+ 81



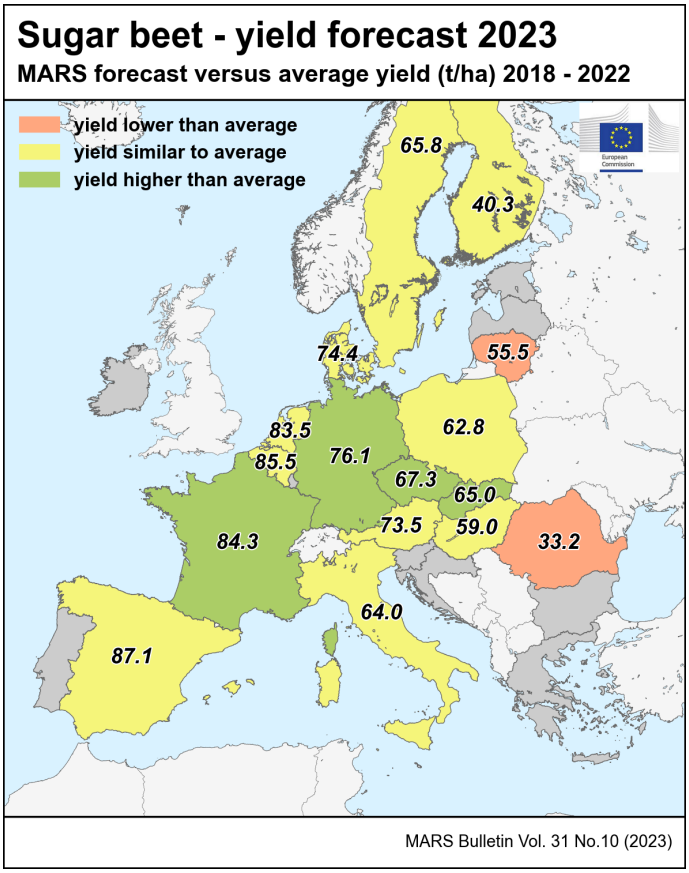
Country	Green maize (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU*	40.7	38.0	**41.3**	+ 2	+ 9
AT	47.0	47.0	**47.4**	+ 1	+ 1
BE	39.4	38.7	**42.7**	+ 8	+ 10
BG	22.2	24.1	**19.0**	– 14	– 21
CY	—	—	**—**	—	—
CZ	35.8	36.0	**35.3**	– 2	– 2
DE	40.1	36.1	**40.0**	– 0	+ 11
DK	38.5	39.7	**38.9**	+ 1	– 2
EE	31.9	30.7	**31.0**	– 3	+ 1
EL	44.7	47.0	**37.0**	– 17	– 21
ES	36.4	34.5	**36.3**	– 0	+ 5
FI	—	—	**—**	—	—
FR	39.9	35.6	**42.5**	+ 7	+ 19
HR	36.4	26.7	**38.9**	+ 7	+ 46
HU	27.7	17.6	**31.3**	+ 13	+ 78
IE	52.0	52.8	**52.8**	+ 1	+ 0
IT	51.8	47.8	**50.9**	– 2	+ 6
LT	28.4	26.6	**27.7**	– 2	+ 4
LU	44.5	41.2	**45.0**	+ 1	+ 9
LV	32.1	30.5	**30.2**	– 6	– 1
MT	—	—	**—**	—	—
NL	42.5	42.7	**43.3**	+ 2	+ 2
PL	45.2	47.7	**45.2**	– 0	– 5
PT	42.1	43.2	**40.1**	– 5	– 7
RO	25.8	20.2	**23.7**	– 8	+ 17
SE	—	—	**—**	—	—
SI	43.8	31.8	**48.0**	+ 10	+ 51
SK	29.4	22.3	**32.2**	+ 9	+ 44



Country	Potatoes (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	34.1	35.3	**35.1**	+ 3	– 1
AT	32.7	32.0	**33.3**	+ 2	+ 4
BE	39.1	38.6	**40.0**	+ 2	+ 4
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	28.3	30.2	**26.2**	– 7	– 13
DE	40.3	40.1	**41.0**	+ 2	+ 2
DK	41.7	44.2	**41.4**	– 1	– 6
EE	—	—	—	—	—
EL	27.3	26.5	**27.1**	– 1	+ 2
ES	31.7	30.5	**29.1**	– 8	– 5
FI	28.6	28.1	**27.7**	– 3	– 2
FR	40.4	38.0	**42.0**	+ 4	+ 11
HR	—	—	—	—	—
HU	—	—	—	—	—
IE	—	—	—	—	—
IT	29.2	28.3	**29.4**	+ 1	+ 4
LT	15.6	14.9	**15.4**	– 1	+ 3
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	41.2	42.6	**41.0**	– 0	– 4
PL	27.8	30.8	**27.5**	– 1	– 11
PT	23.1	24.0	**23.9**	+ 3	– 0
RO	16.2	15.9	**16.9**	+ 4	+ 6
SE	34.7	36.3	**33.5**	– 4	– 8
SI	—	—	—	—	—
SK	—	—	—	—	—



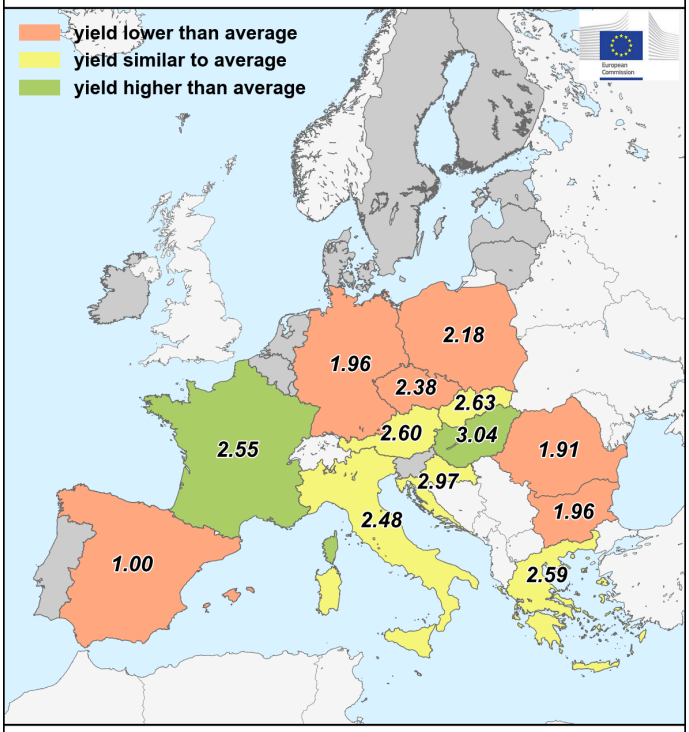
Country	Sugar beet (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	72.0	N/A	**74.7**	+ 4	N/A
AT	75.9	79.7	**73.5**	– 3	– 8
BE	85.3	89.3	**85.5**	+ 0	– 4
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	63.5	69.6	**67.3**	+ 6	– 3
DE	72.5	71.2	**76.1**	+ 5	+ 7
DK	73.6	72.3	**74.4**	+ 1	+ 3
EE	—	—	—	—	—
EL	—	—	—	—	—
ES	85.8	84.1	**87.1**	+ 2	+ 4
FI	40.1	43.1	**40.3**	+ 1	– 7
FR	78.6	78.6	**84.3**	+ 7	+ 7
HR	—	—	—	—	—
HU	57.4	47.2	**59.0**	+ 3	+ 25
IE	—	—	—	—	—
IT	63.1	N/A	**64.0**	+ 1	N/A
LT	63.2	62.5	**55.5**	– 12	– 11
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	82.4	88.8	**83.5**	+ 1	– 6
PL	60.6	63.8	**62.8**	+ 4	– 2
PT	—	—	—	—	—
RO	37.5	31.8	**33.2**	– 11	+ 5
SE	66.5	64.7	**65.8**	– 1	+ 2
SI	—	—	—	—	—
SK	59.4	56.3	**65.0**	+ 9	+ 16



Country	Sunflower (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	2.21	1.87	**2.10**	– 5	+ 12
AT	2.70	2.32	**2.60**	– 4	+ 12
BE	—	—	—	—	—
BG	2.32	2.31	**1.96**	– 16	– 15
CY	—	—	—	—	—
CZ	2.60	2.65	**2.38**	– 8	– 10
DE	2.07	1.88	**1.96**	– 5	+ 4
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	2.59	2.67	**2.59**	– 0	– 3
ES	1.17	0.90	**1.00**	– 15	+ 11
FI	—	—	—	—	—
FR	2.25	2.07	**2.55**	+ 13	+ 23
HR	3.02	2.99	**2.97**	– 2	– 1
HU	2.64	1.84	**3.04**	+ 15	+ 65
IE	—	—	—	—	—
IT	2.42	2.39	**2.48**	+ 3	+ 4
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	2.27	2.40	**2.18**	– 4	– 9
PT	—	—	—	—	—
RO	2.43	1.92	**1.91**	– 21	– 1
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	2.62	2.33	**2.63**	+ 1	+ 13

Sunflower - yield forecast 2023

MARS forecast versus average yield (t/ha) 2018 - 2022



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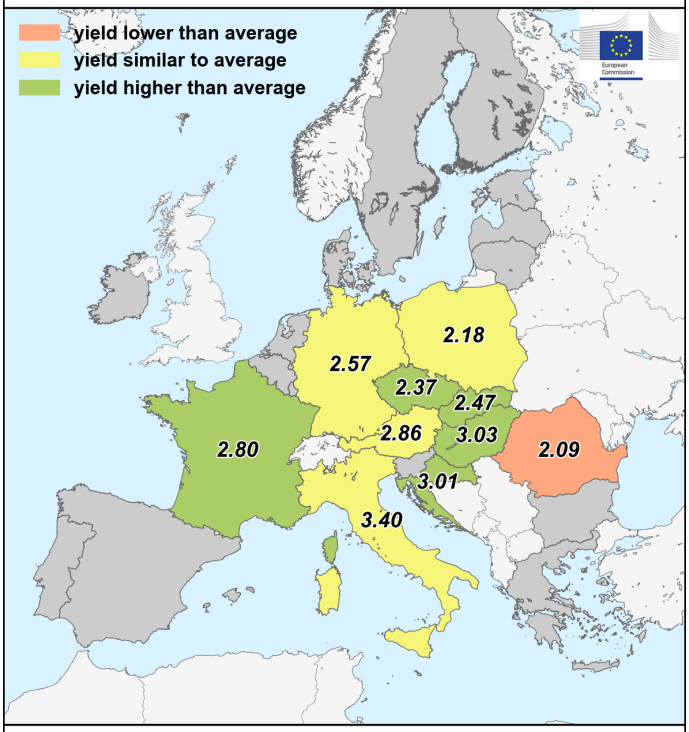
Country	Soybeans (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	2.76	2.24	**2.87**	+ 4	+ 28
AT	2.88	2.62	**2.86**	– 1	+ 9
BE	—	—	—	—	—
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	2.26	2.30	**2.37**	+ 5	+ 3
DE	2.67	2.34	**2.57**	– 4	+ 10
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	—	—	—	—	—
ES	—	—	—	—	—
FI	—	—	—	—	—
FR	2.43	2.05	**2.80**	+ 15	+ 37
HR	2.83	2.16	**3.01**	+ 6	+ 39
HU	2.58	1.85	**3.03**	+ 17	+ 64
IE	—	—	—	—	—
IT	3.30	2.64	**3.40**	+ 3	+ 29
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	2.17	2.36	**2.18**	+ 0	– 8
PT	—	—	—	—	—
RO	2.33	1.80	**2.09**	– 10	+ 16
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	2.22	1.45	**2.47**	+ 11	+ 71

Soybeans - yield forecast 2023

MARS forecast versus average yield (t/ha) 2018 - 2022



MARS Bulletin Vol. 31 No.10 (2023)

Country	Grain maize (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
BY	5.61	5.57	**5.78**	+ 3	+ 4
TR	9.32	9.33	**9.79**	+ 5	+ 5
UA	6.93	6.34	**8.08**	+ 17	+ 27
UK	—	—	—	—	—

Country	Soybeans (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
BY	—	—	—	—	—
TR	4.23	4.08	**4.59**	+ 9	+ 13
UA	2.37	2.26	**2.62**	+ 11	+ 16
UK	—	—	—	—	—

NB: Yields are forecast for crops with more than 10 000 ha per country with sufficently long and coherent yield time series.

Sources: 2018-2023 data come from DG Agriculture and Rural Development short-term-outlook data (dated September 2023, received on 10.10.2023), Eurostat Eurobase (last update: 18.09.2023), ELSTAT, Statistics Netherlands (CBS) and EES (last update: 15.11.2017). Non-EU 2018-2022 data come from USDA, Turkish Statistical Institute (TurkStat), Eurostat Eurobase (last update: 18.09.2023), Ministry for Development of Economy, Trade and Agriculture of Ukraine, Department for Environment, Food & Rural Affairs of UK (DEFRA), FAO and PSD-online.

2023 yields come from MARS Crop Yield Forecasting System (output up to 10.10.2023).

EU aggregate after 1.2.2020 is reported.

N/A = Data not available.

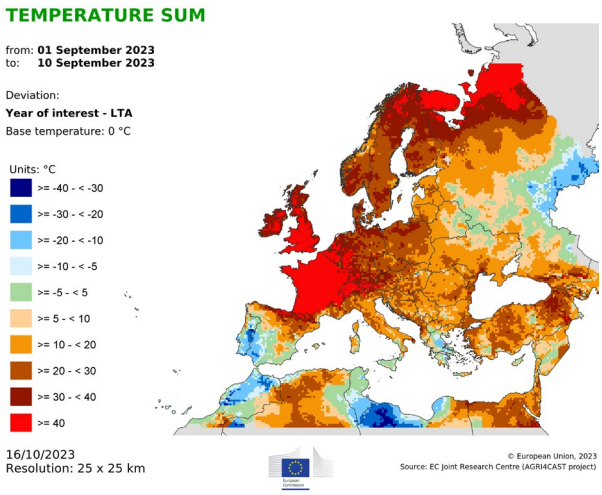
The column header '%23/5yrs' stands for the 2023 change with respect to the 5-year average(%). Similarly, '%23/22' stands for the 2023 change with respect to 2022(%).

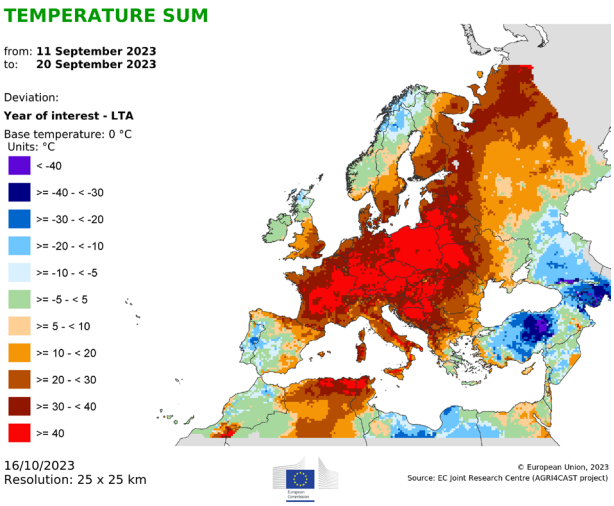
* The EU figures do not include green maize forecasts for Sweden since recent data on yields were not consistent.

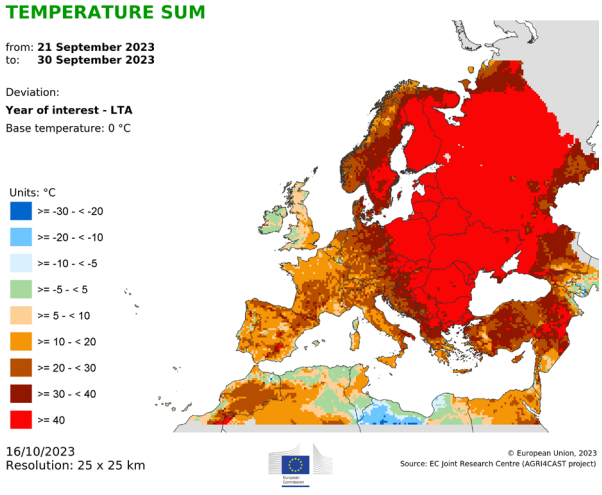
Cop name	Eurostat Crop name	Eurostat Crop Code	Official Eurostat Crop definition*
Total wheat	Wheat and spelt	C1100	Common wheat (*Triticum aestivum* L. emend. Fiori et Paol.), spelt (*Triticum spelta* L.), einkorn wheat (*Triticum monococcum* L.) and durum wheat (*Triticum durum* Desf.).
Total barley	Barley	C1300	Barley (*Hordeum vulgare* L.).
Soft wheat	Common wheat and spelt	C1110	Common wheat (*Triticum aestivum* L. emend. Fiori et Paol.), spelt (*Triticum spelta* L.) and einkorn wheat (*Triticum monococcum* L.).
Durum what	Durum wheat	C1120	*Triticum durum* Desf.
Spring barley	Spring barley	C1320	Barley (*Hordeum vulgare* L.) sown in the spring.
Winter barley	Winter barley	C1310	Barley (*Hordeum vulgare* L.) sown before or during winter.
Grain maize	Grain maize and corn-cob-mix	C1500	Maize (*Zea mays* L.) harvested for grain, as seed or as corn-cob-mix.
Green maize	Green maize	G3000	All forms of maize (*Zea mays* L.) grown mainly for silage (whole cob, parts of or whole plant) and not harvested for grain.
Rye	Rye and winter cereal mixtures (maslin)	C1200	Rye (*Secale cereale* L.) sown any time, mixtures of rye and other cereals and other cereal mixtures sown before or during the winter (maslin).
Triticale	Triticale	C1600	Triticale (x *Triticosecale* Wittmack).
Rape and turnip rape	Rape and turnip rape seeds	I1110	Rape (*Brassica napus* L.) and turnip rape (*Brassica rapa* L. var. oleifera (Lam.)) grown for the production of oil, harvested as dry grains.
Sugar beet	Sugar beet (excluding seed)	R2000	Sugar beet (*Beta vulgaris* L.) intended for the sugar industry, alcohol production or renewable energy production.
Potatoes	Potatoes (including seed potatoes)	R1000	Potatoes (*Solanum tuberosum* L.).
Sunflower	Sunflower seed	I1120	Sunflower (*Helianthus annuus* L.) harvested as dry grains.
Soybeans	Soya	I1130	Soya (*Glycine max* L. Merril) harvested as dry grains.
Rice	Rice	C2000	Rice (*Oryza sativa*, L.).
* *Source:*	Eurostat - Annual crop statistics (Handbook 2020 Edition)		

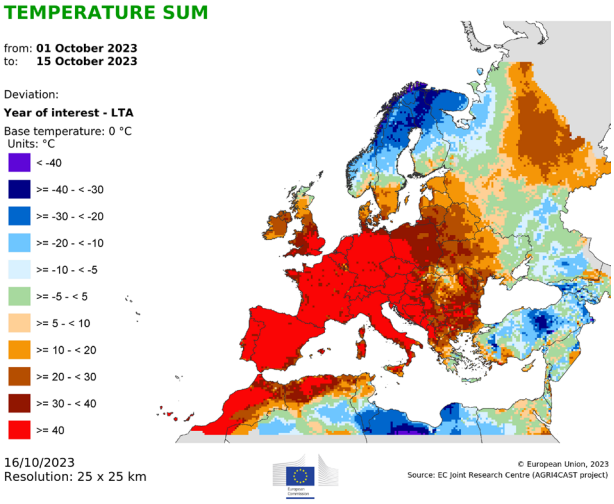
6. Atlas

Temperature regime

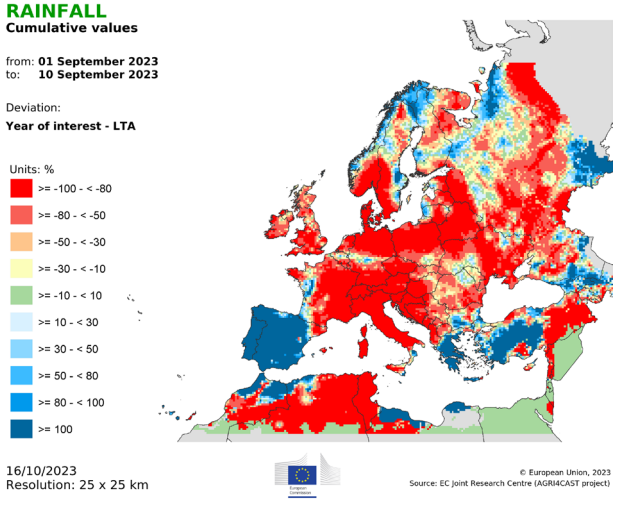


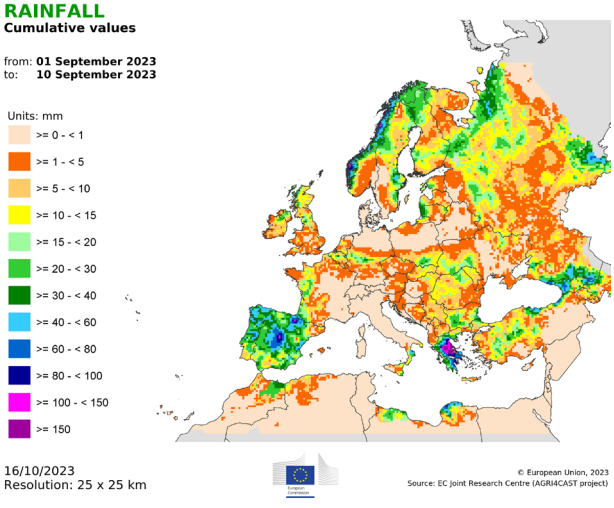






Precipitation



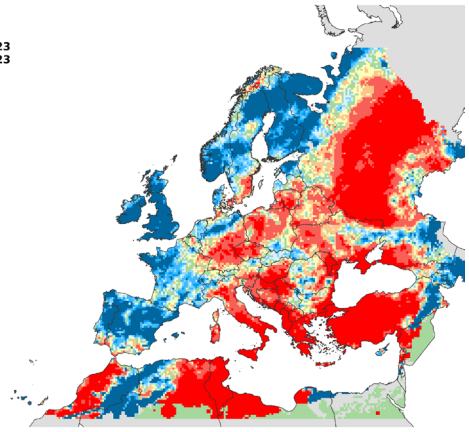


RAINFALL
Cumulative values

from: **11 September 2023**
to: **20 September 2023**

Deviation:
Year of interest - LTA

Units: %
- >= -100 - < -80
- >= -80 - < -50
- >= -50 - < -30
- >= -30 - < -10
- >= -10 - < 10
- >= 10 - < 30
- >= 30 - < 50
- >= 50 - < 80
- >= 80 - < 100
- >= 100

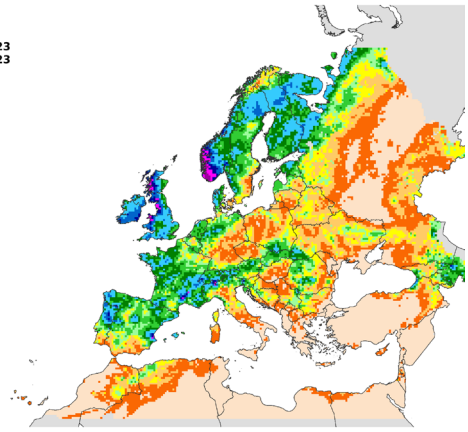


16/10/2023
Resolution: 25 x 25 km

RAINFALL
Cumulative values

from: **11 September 2023**
to: **20 September 2023**

Units: mm
- >= 0 - < 1
- >= 1 - < 5
- >= 5 - < 10
- >= 10 - < 15
- >= 15 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40 - < 60
- >= 60 - < 80
- >= 80 - < 100
- >= 100 - < 150
- >= 150



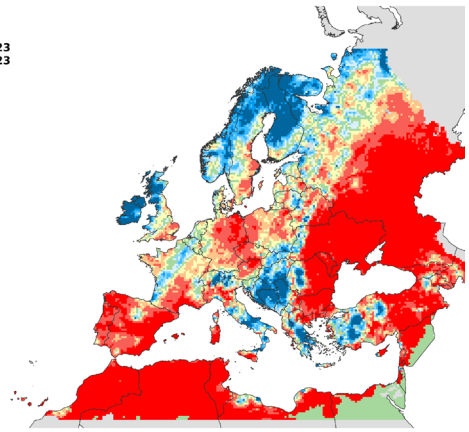
16/10/2023
Resolution: 25 x 25 km

RAINFALL
Cumulative values

from: **21 September 2023**
to: **30 September 2023**

Deviation:
Year of interest - LTA

Units: %
- >= -100 - < -80
- >= -80 - < -50
- >= -50 - < -30
- >= -30 - < -10
- >= -10 - < 10
- >= 10 - < 30
- >= 30 - < 50
- >= 50 - < 80
- >= 80 - < 100
- >= 100

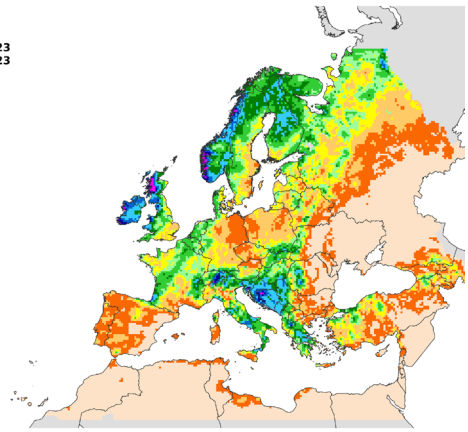


16/10/2023
Resolution: 25 x 25 km

RAINFALL
Cumulative values

from: **21 September 2023**
to: **30 September 2023**

Units: mm
- >= 0 - < 1
- >= 1 - < 5
- >= 5 - < 10
- >= 10 - < 15
- >= 15 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40 - < 60
- >= 60 - < 80
- >= 80 - < 100
- >= 100 - < 150
- >= 150



16/10/2023
Resolution: 25 x 25 km

RAINFALL
Cumulative values

from: **01 October 2023**
to: **15 October 2023**

Deviation:
Year of interest - LTA

Units: %
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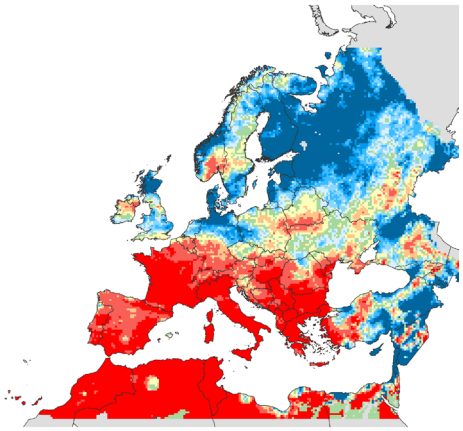
- >= -80 - < -50
- >= -50 - < -30
- >= -30 - < -10
- >= -10 - < 10
- >= 10 - < 30
- >= 30 - < 50
- >= 50 - < 80
- >= 80 - < 100
- >= 100



16/10/2023
Resolution: 25 x 25 km

RAINFALL
Cumulative values

from: **01 October 2023**
to: **15 October 2023**

Units: mm
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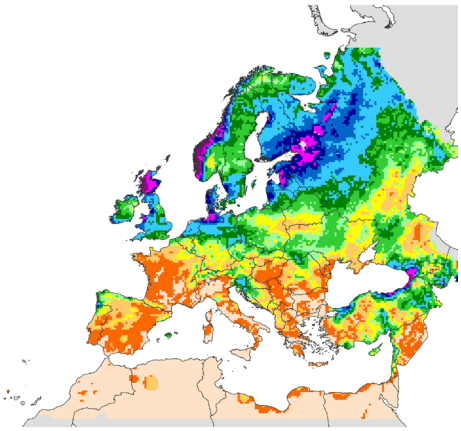
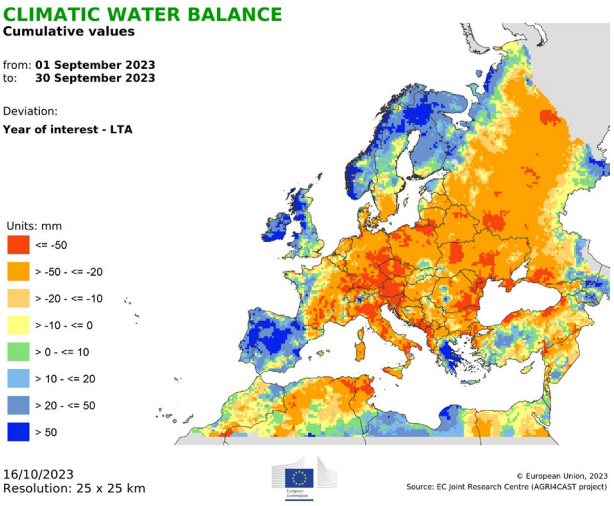
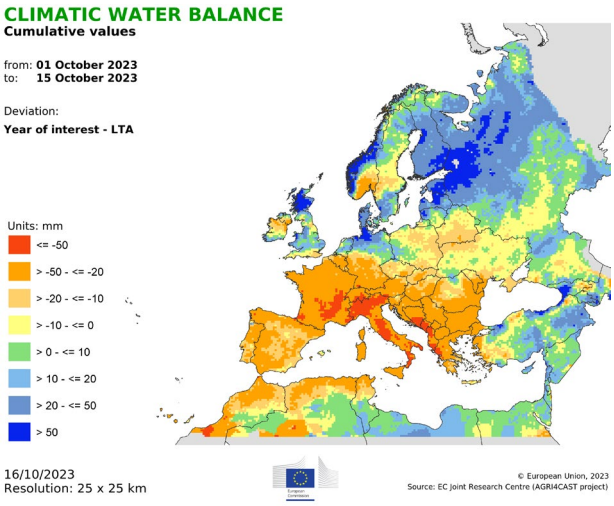
- >= 1 - < 5
- >= 5 - < 10
- >= 10 - < 15
- >= 15 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40 - < 60
- >= 60 - < 80
- >= 80 - < 100
- >= 100 - < 150
- >= 150



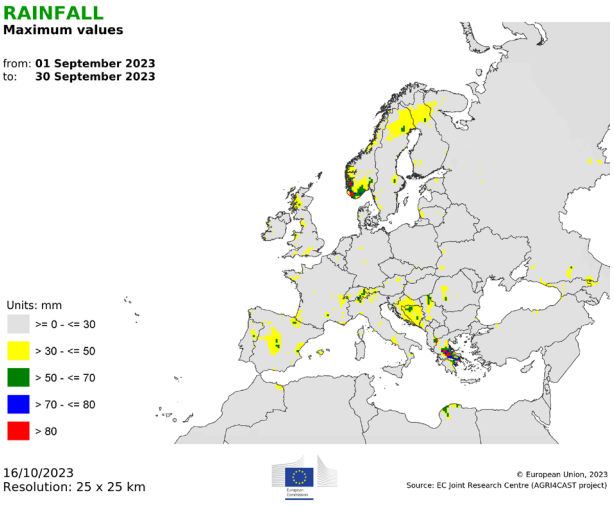
16/10/2023
Resolution: 25 x 25 km

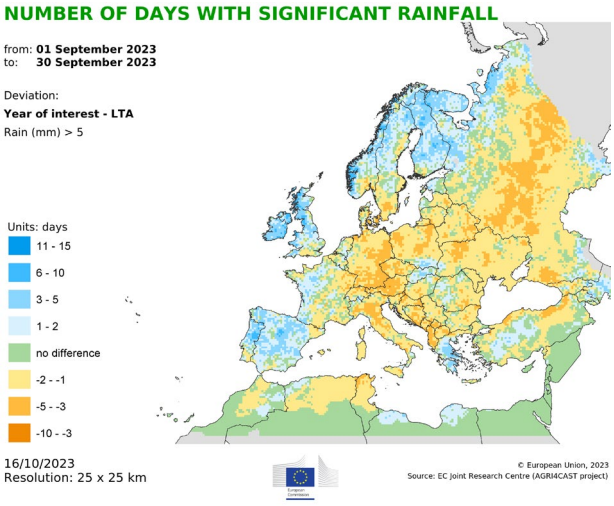
Climatic water balance

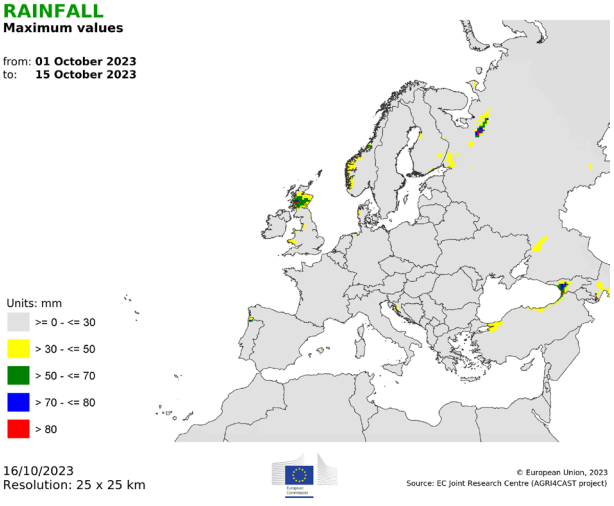


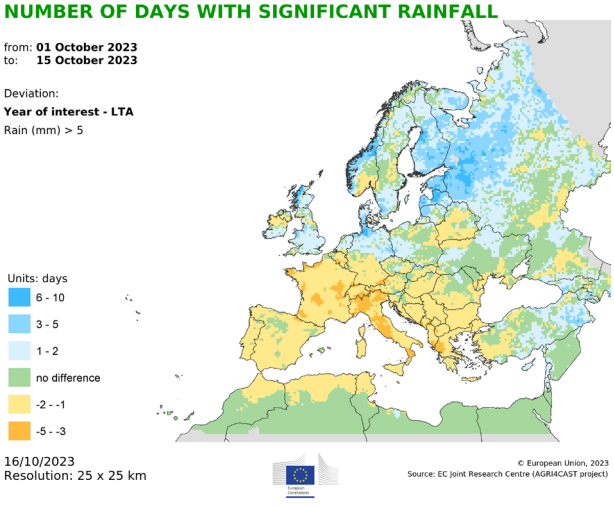


Weather events





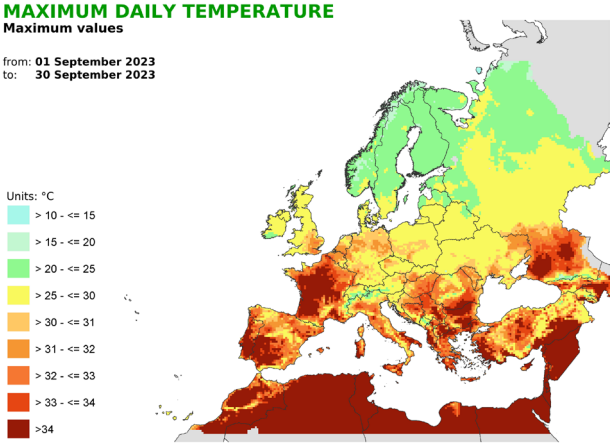




MAXIMUM DAILY TEMPERATURE

Maximum values

from: **01 September 2023**
to: **30 September 2023**



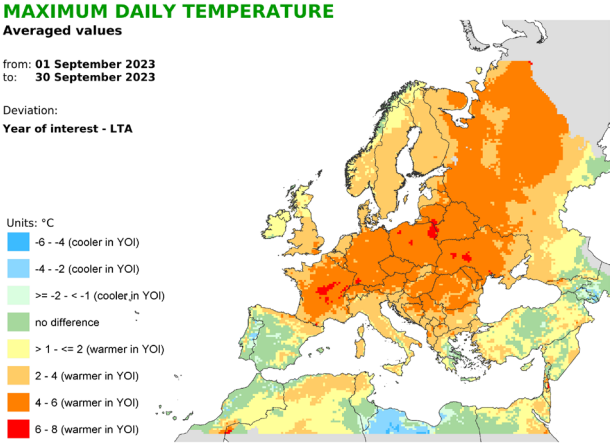
16/10/2023
Resolution: 25 x 25 km

MAXIMUM DAILY TEMPERATURE

Averaged values

from: **01 September 2023**
to: **30 September 2023**

Deviation:
Year of interest - LTA

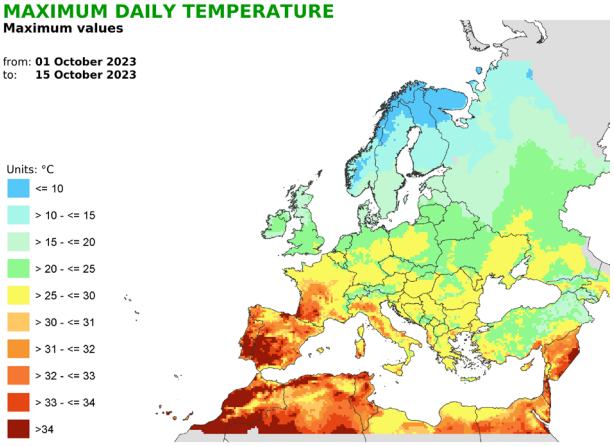


16/10/2023
Resolution: 25 x 25 km

MAXIMUM DAILY TEMPERATURE

Maximum values

from: **01 October 2023**
to: **15 October 2023**



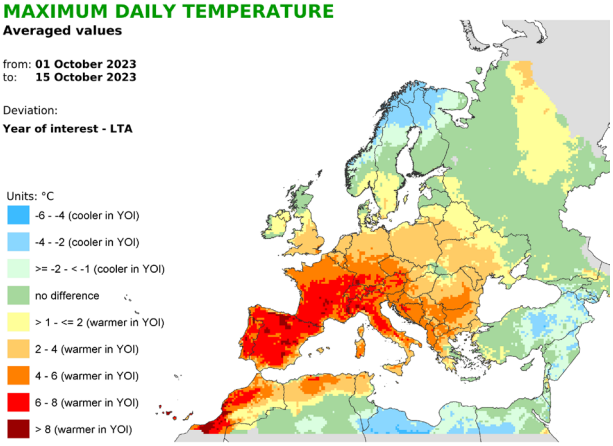
16/10/2023
Resolution: 25 x 25 km

MAXIMUM DAILY TEMPERATURE

Averaged values

from: **01 October 2023**
to: **15 October 2023**

Deviation:
Year of interest - LTA

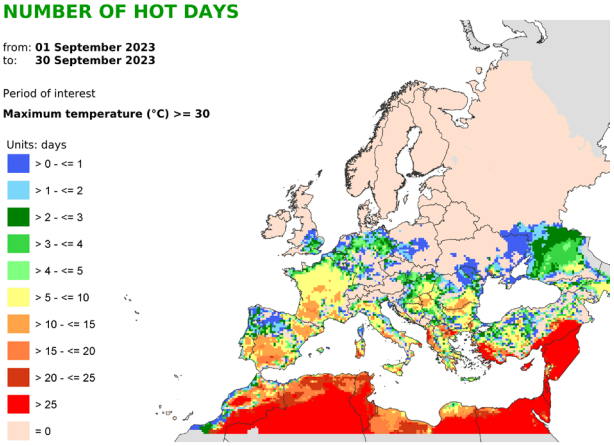


16/10/2023
Resolution: 25 x 25 km

NUMBER OF HOT DAYS

from: **01 September 2023**
to: **30 September 2023**

Period of interest
Maximum temperature (°C) >= 30

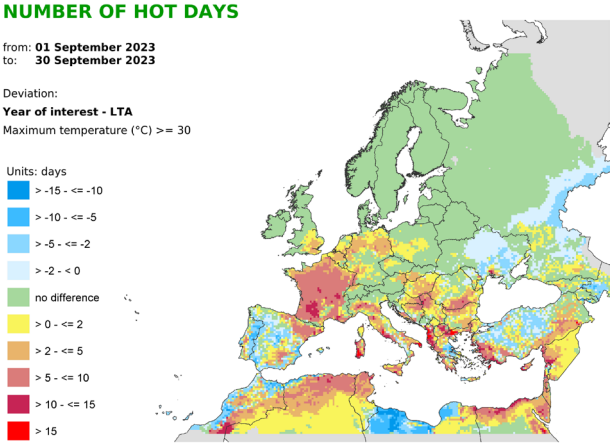


16/10/2023
Resolution: 25 x 25 km

NUMBER OF HOT DAYS

from: **01 September 2023**
to: **30 September 2023**

Deviation:
Year of interest - LTA
Maximum temperature (°C) >= 30



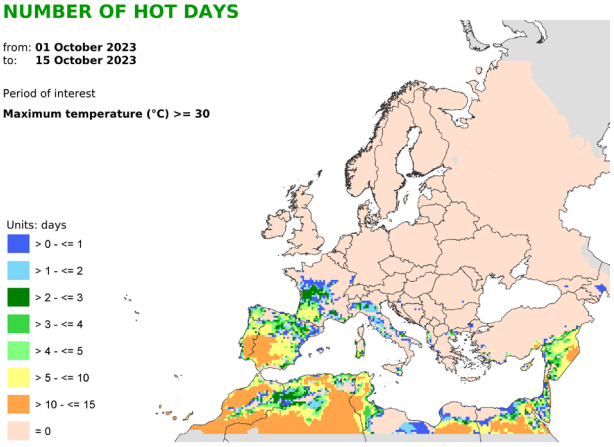
16/10/2023
Resolution: 25 x 25 km

NUMBER OF HOT DAYS

from: **01 October 2023**
to: **15 October 2023**

Period of interest

Maximum temperature (°C) >= 30

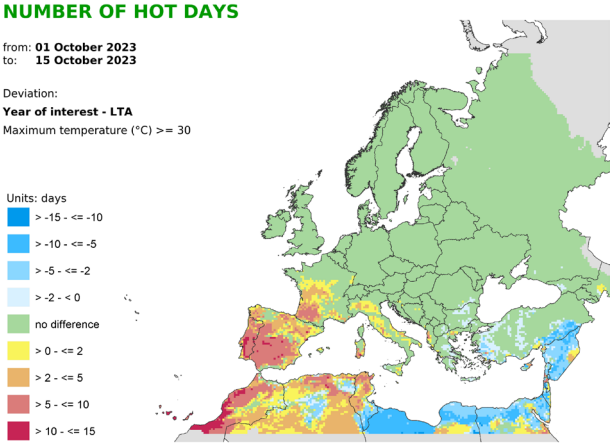


16/10/2023
Resolution: 25 x 25 km

NUMBER OF HOT DAYS

from: **01 October 2023**
to: **15 October 2023**

Deviation:
Year of interest - LTA
Maximum temperature (°C) >= 30

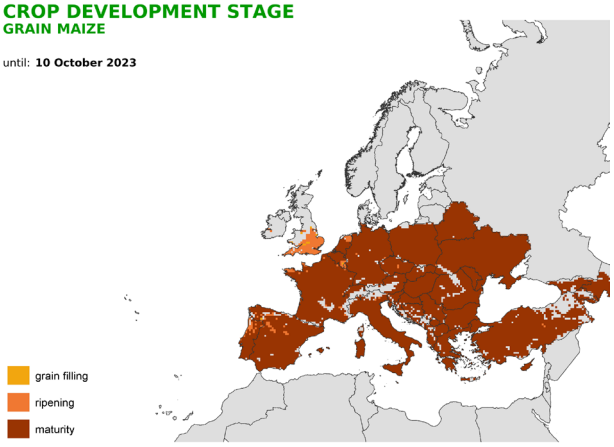


16/10/2023
Resolution: 25 x 25 km

Maize

CROP DEVELOPMENT STAGE
GRAIN MAIZE

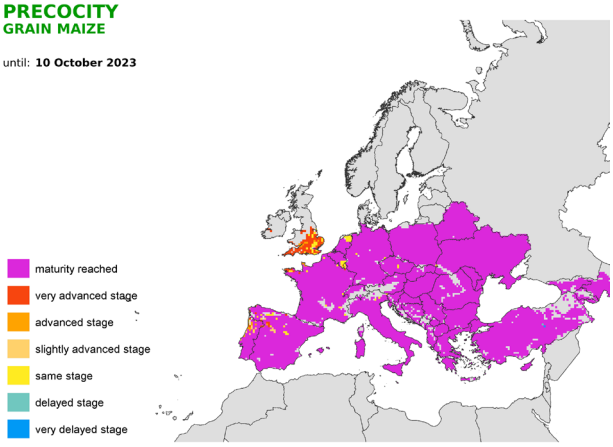
until: **10 October 2023**



16/10/2023
Resolution: 25 x 25 km

PRECOCITY
GRAIN MAIZE

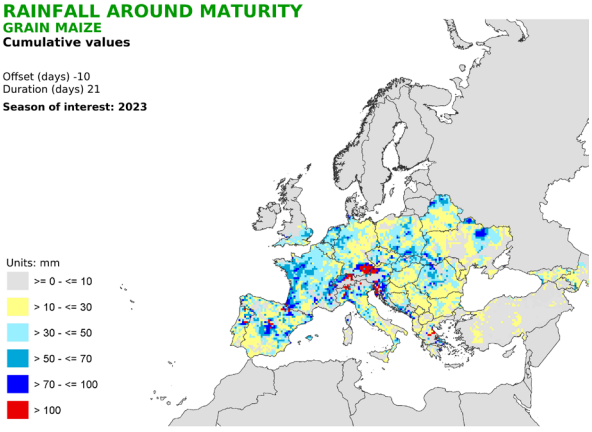
until: **10 October 2023**



16/10/2023
Resolution: 25 x 25 km

RAINFALL AROUND MATURITY
GRAIN MAIZE
Cumulative values

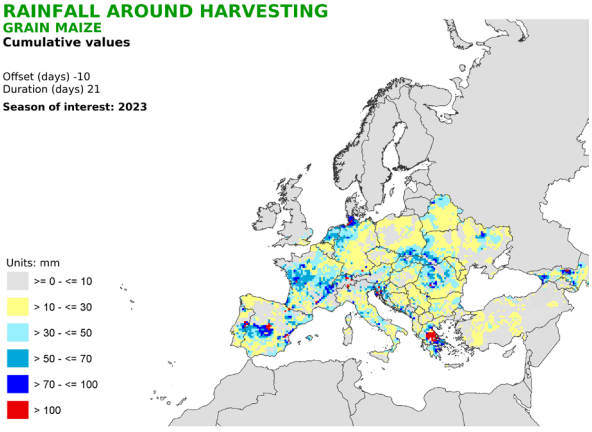
Offset (days) -10
Duration (days) 21
Season of interest: 2023



16/10/2023
Resolution: 25 x 25 km

RAINFALL AROUND HARVESTING
GRAIN MAIZE
Cumulative values

Offset (days) -10
Duration (days) 21
Season of interest: 2023



16/10/2023
Resolution: 25 x 25 km

JRC MARS Bulletins 2023

Date	Publication	Reference
23 Jan	Agromet analysis	Vol. 31 No 1
20 Feb	Agromet analysis	Vol. 31 No 2
20 Mar	Agromet analysis, pasture analysis, yield forecast	Vol. 31 No 3
24 Apr	Agromet analysis, remote sensing, pasture analysis, sowing conditions, yield forecast	Vol. 31 No 4
22 May	Agromet analysis, remote sensing, pasture analysis, sowing update, yield forecast	Vol. 31 No 5
19 Jun	Agromet analysis, remote sensing, pasture analysis, rice analysis, yield forecast	Vol. 31 No 6
24 Jul	Agromet analysis, remote sensing, pasture analysis, harvesting conditions, yield forecast	Vol. 31 No 7
21 Aug	Agromet analysis, remote sensing, pasture update, harvesting update, yield forecast	Vol. 31 No 8
18 Sep	Agromet analysis, remote sensing, pasture analysis, rice analysis, harvesting update, yield forecast	Vol. 31 No 9
23 Oct	Agromet analysis, pasture update, sowing conditions, harvesting update, yield forecast	Vol. 31 No 10
27 Nov	Agromet analysis, sowing update, harvesting update	Vol. 31 No 11
18 Dec	Agromet analysis	Vol. 31 No 12

Mission statement

The Joint Research Centre provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society.

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Analysis and reports

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Technical note

The long-term average (LTA) used within this Bulletin as a reference is calculated on the basis of weather data from 1991-2022.

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