Issued: 19 June 2023
JRC MARS Bulletin Vol. 31 No 6

European Commission

JRC MARS Bulletin
Crop monitoring in Europe
June 2023

Difficult start to summer affects yield outlook
Yield forecasts at EU level remain mostly close to 5-year average

The weather observed during this review period was again marked by strong contrasts, with negative impacts on crop yield expectations in several regions. The strongest downward revision (by 4% at EU level) was for spring barley.

The map on the right reflects the most distinct weather-related impacts on crops that occurred after the reporting period of the May Bulletin (14 May). Since then, drought conditions ended in most parts of the Iberian Peninsula. However, the recent rains arrived too late for spring and winter crops.

Sunny and dry conditions in large parts of north-western, northern and northern-central Europe resulted in rapid depletion of soil moisture reserves, negatively affecting the yield potential of winter, spring, and summer crops.

A distinct rainfall surplus in southern and northern parts of Italy, Hungary, Croatia and Slovenia, resulted in waterlogged conditions, flooded areas and increased pest pressure, with negative impact (total losses in flooded areas) on winter crops.

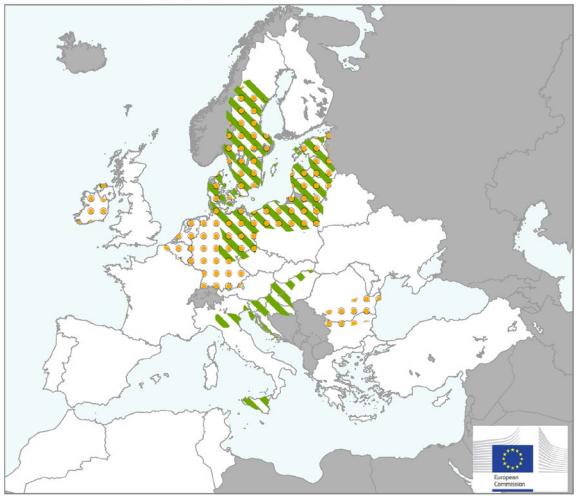
In the Danube River valley in northern Bulgaria and southern Romania, cold temperatures caused delays to sowing and the early emergence of summer crops.

This issue of the Bulletin features a special section on rice in Europe.

Contents:

Covers the period from 1 May until 12 June

AREAS OF CONCERN - CROP IMPACTS
Based on weather data until 12 June 2023



Winter crops impacted Spring and/or summer crops impacted

Crop	Yield t/ha				
	Avg 5yrs	May Bulletin	MARS 2023 forecasts	%23/5yrs	% Diff May
Total cereals	5.38	5.60	**5.52**	+ 3	- 1
Total wheat	5.59	5.79	**5.70**	+ 2	- 2
Soft wheat	5.81	6.01	**5.92**	+ 2	- 1
Durum wheat	3.50	3.48	**3.40**	- 3	- 2
Total barley	4.90	4.89	**4.76**	- 3	- 3
Spring barley	4.19	3.90	**3.73**	- 11	- 4
Winter barley	5.77	6.00	**5.91**	+ 2	- 2
Grain maize	7.48	7.64	**7.61**	+ 2	- 0
Rye	3.98	4.26	**4.24**	+ 7	- 0
Triticale	4.22	4.32	**4.33**	+ 3	+ 0
Rape and turnip rape	3.10	3.34	**3.29**	+ 6	- 1
Potato	34.1	36.4	**35.5**	+ 4	- 2
Sugar beet	72.8	76.7	**75.9**	+ 4	- 1
Sunflower	2.21	2.22	**2.21**	+ 0	- 0
Soybean	2.76	2.85	**2.89**	+ 5	+ 1
Rice	6.49	—	**6.45**	- 1	—

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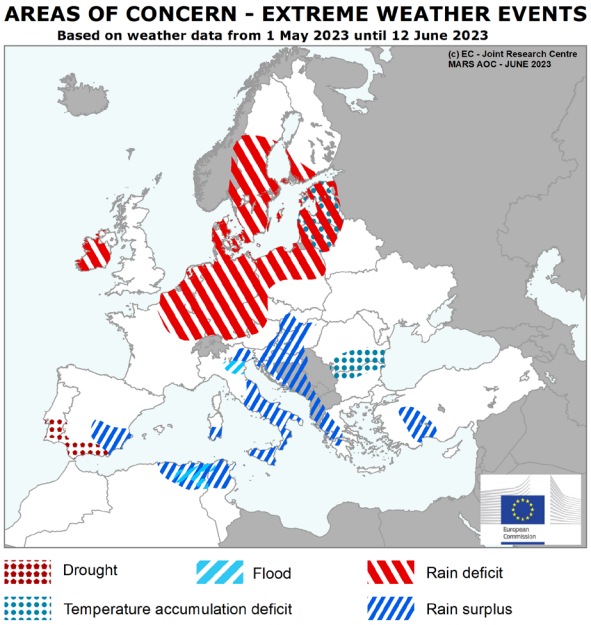
Joint Research Centre

1. Agrometeorological overview

1.1. Areas of concern



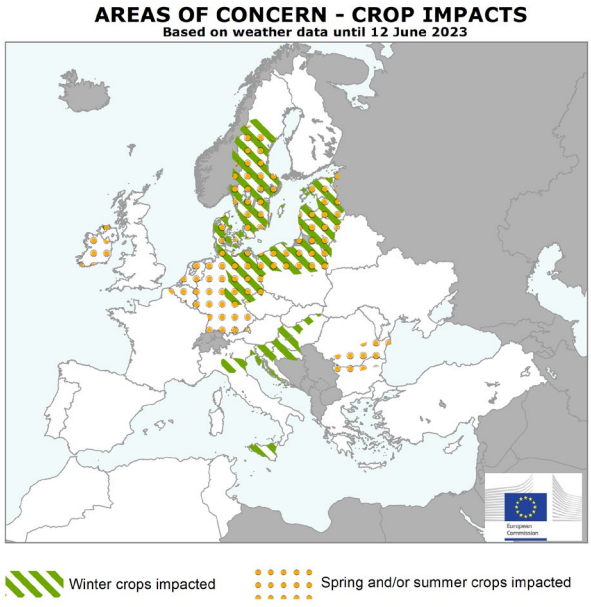
The maps reflect the most distinct weather events (above) and associated impacts (bottom right) that occurred after the reporting period of the May Bulletin (14 May).

Drought conditions ended in most parts of the Iberian Peninsula, but persisted, in southern parts of Spain (*Andalucia*) and Portugal (*Alentejo*). The associated crop damage was reported in the May 2023 bulletin and is not repeated here. However, the recent rains, including rainfall excess in the southeast of Spain, were of little or no benefit for spring crops in the region impacted by drought reported in the May bulletin, as rainfall was mainly received in the last dekad of May and first dekad of June, while summer crops continue under low irrigation quotas.

The sunny and dry conditions across most of the North European Plain, southern Scandinavia, and most of the British Isles, resulted in substantial **rainfall deficit**. In Sweden and Denmark, the second lowest rainfall (after 2018) was observed according to our records and rainfall is urgently needed, particularly for winter cereals reaching flowering and spring crops reaching heading. Continued water stress in this region might impact yields. In Ireland, the Baltic Sea countries, and Poland, as well as in many regions of eastern Germany, the rainfall deficit, following the delayed sowing reported in the May 2023 bulletin, caused concern for both winter and summer crops. In the Benelux countries and most of western and southern Germany, summer crops are most affected; particularly potatoes. In northern France, despite the rainfall deficit, there are no immediate concerns for crop development at this stage.

Rainfall surplus of about twice the long-term average was observed in north-eastern Italy (*Veneto* region), as well as in many regions in central and southern Italy, including the islands of Sicily and southern Sardinia. In Sicily, strong-wind episodes coupled with heavy rains in early June led to waterlogging of durum wheat fields in the provinces of *Ragusa*, *Agrigento*, and *Catania*. In the flood-affected region of *Emilia-Romagna*, Italy, as reported in the May 2023 bulletin, further excess rainfall events during the early part of June, including in Sicily, compounded the negative impact on winter crops. In parts of Slovakia, Hungary, and most of Croatia and Slovenia, rainfall surplus caused increased pest pressure. In North Africa (Tunisia and Algeria), rainfall exceeding the LTA by 100% and more led to severe **floods** (see https://floodlist.com/africa/algeria-floods-may-2023).

In the Danube River valley in northern Bulgaria and southern Romania, cold temperatures (areas of **temperature accumulation deficit**) caused delays to sowing, emergence and early development of summer crops.



1.2. Meteorological review (1 May – 12 June 2023)

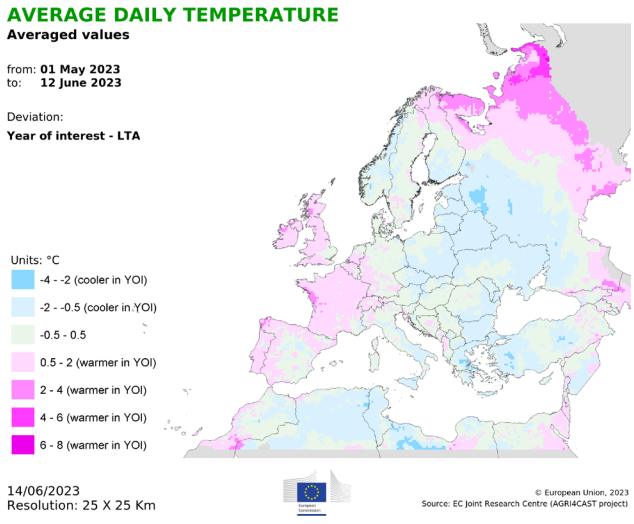
Contrasting patterns, transitioning from drier- to wetter-than-usual conditions, were observed in southern Europe, while drier-than-usual conditions were observed in many parts of northern and eastern Europe, with no distinct departure of daily average temperatures from the LTA in most of Europe.

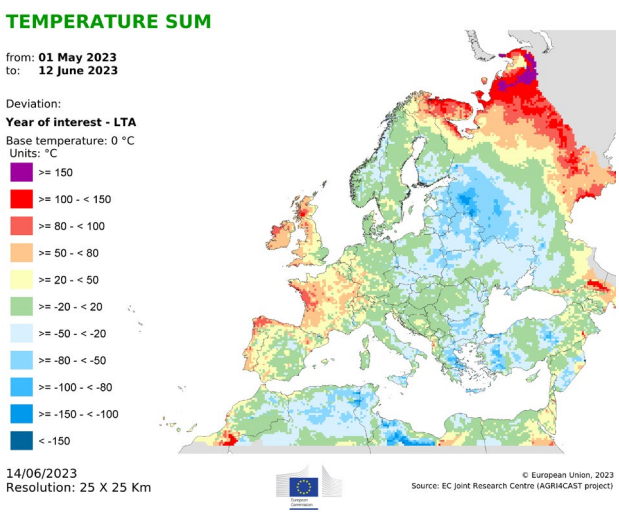
Warmer-than-usual conditions, with daily mean temperatures between 2°C and 4°C above the 1991-2022 long-term average (LTA), were observed in northern European Russia and in small areas in western France, north-western Iberian Peninsula, Ireland and Scotland. This is reflected in temperature sums (T_{base} = 0°C) exceeding the LTA by 100°Cd or more. Less distinct positive anomalies were observed in parts of the Iberian Peninsula, most of France, bordering regions in northern Italy, Austria and Germany, and in most of the Benelux countries, Ireland and the United Kingdom.

Slightly colder-than-usual conditions, with temperature anomalies between 0.5°C and 2°C below the LTA, were observed in most other parts of Europe, as well as in western and central Türkiye. More distinct negative anomalies were observed in parts of Greece, Türkiye, and European Russia bordering Belarus and the Baltic Sea countries. In these regions, temperature sums were less than -80°Cd relative to the LTA.

Wetter-than-usual conditions (+50% or more rainfall with respect to the LTA) were observed in most of Spain and north-eastern Portugal, parts of southern France, most of Italy, the western Balkan Peninsula, western Hungary and south-western Slovakia, as well as in western Türkiye, parts of European Russia, and along the Atlantic coast of Norway. **Much wetter-than-usual conditions** (+150% or more with respect to the LTA) were observed in parts of southern and central Spain, many regions of Italy (*Puglia*, *Calabria*, *Basilicata*, *Sicilia,* and southern *Sardegna* in the south; *Emilia-Romagna* in the north-east), western Türkiye, and part of the Caspian Depression in southern European Russia. In many of these regions, rainfall exceeding the LTA accumulated over 10 or more days above the 5 mm threshold.

Drier-than-usual conditions (-50% or more with respect to the LTA) were observed in most of the North European Plain and East European Plain, as well in southern and central Sweden, southern Norway and most of the British Isles.



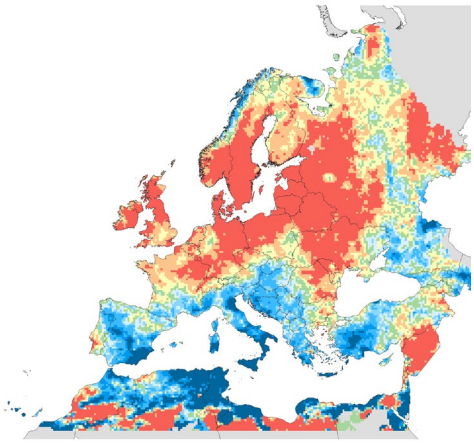


RAINFALL
Cumulative values

from: **01 May 2023**
to: **12 June 2023**

Deviation:
Year of interest - LTA

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



14/06/2023
Resolution: 25 X 25 Km

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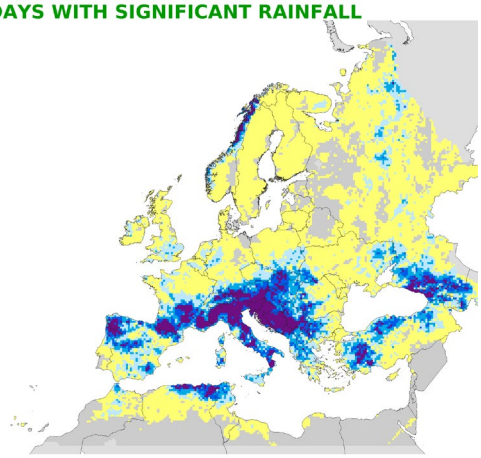
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF DAYS WITH SIGNIFICANT RAINFALL

from: **01 May 2023**
to: **12 June 2023**
Rain (mm) > 5

Units: days
- = 0
- 1 - 3
- 4 - 5
- 6 - 7
- 7 - 9
- >= 10



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Resolution: 25 X 25 Km

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Source: EC Joint Research Centre (AGRI4CAST project)

1.3. Spring review (March, April, May)

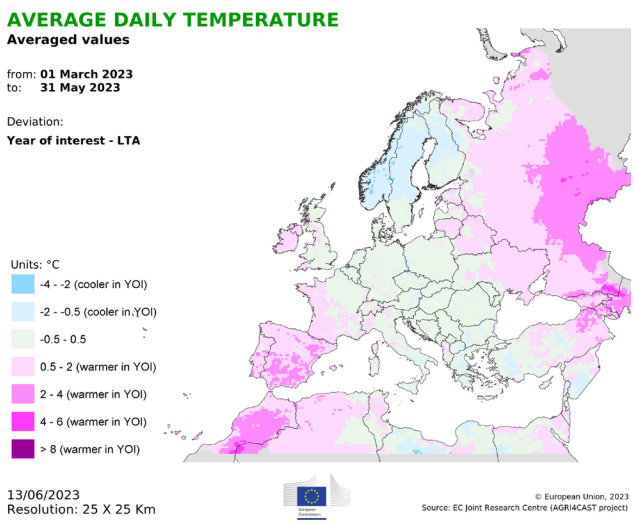
Spring was characterised by drier-than-usual conditions in southern Europe, which intensified drought in the Iberian Peninsula, and contrasting wetter-than-usual conditions in many other parts of Europe, including some of the regions affected by drought earlier in the season.

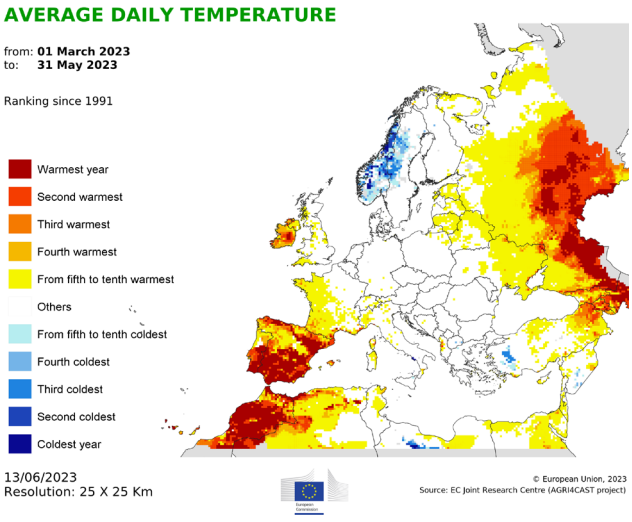
Warmer-than-usual conditions, with respect to the 1991-2022 long-term average (LTA), were observed in the Iberian Peninsula, southern and western France, and Ireland in the west; and in parts of the Baltic Sea region, Belarus, most of Ukraine, central and eastern Türkiye, and most of European Russia in the east. In most of these regions, average daily temperatures were between 0.5°C and 2°C above the LTA. More distinct positive temperature anomalies (up to 4°C above the LTA) were observed in parts of the Iberian Peninsula and eastern European Russia. In the southern Iberian Peninsula, the **number of hot days** (with daily maximum temperature above 25°C) was 15 or more days above the LTA. In these regions, as well as in Ireland, average daily temperatures ranked among the highest in our records (since 1991).

Colder-than-usual conditions, with temperature anomalies between -2°C and -0.5°C with respect to the LTA, were observed in Norway and most of Sweden and Finland, as well as in parts of the Balkan region and eastern and central Türkiye. In most of southern Scandinavia, the **number of cold days** (with daily minimum temperature below 0°C) exceeded the LTA by more than 5 days. In most other regions in the eastern half of Europe, the number of cold days was below the LTA.

Drier-than-usual conditions (precipitation anomalies of 50% or more below the LTA) were observed in large parts of the Iberian Peninsula and locally in eastern European Russia. Less intense precipitation anomalies (between 30% and 50% below the LTA) were observed in other parts of the Iberian Peninsula (mainly thanks to substantial rainfall after 20 May), in the Baltic Sea region and parts of Scandinavia, as well as in parts of Romania, the northernmost part of Ukraine and the bordering region into Russia, and parts of eastern and northern European Russia. In many of these areas, the spring ranked among the three driest since the start of our records in 1991.

Wetter-than-usual conditions (+50% or more rainfall with respect to the LTA) were observed in the southern United Kingdom, the Benelux countries, the Alps, parts of Italy and the western Balkans, as well as in most of Türkiye, Moldova, parts of eastern Ukraine and European Russia, and parts of Scandinavia. In many of these areas, the spring ranked among the three wettest since 1991. There was poor temporal distribution of rainfall in several of these regions. This was particularly the case in large parts of Italy (e.g. *Emilia-Romagna*; southern Italy, including Sicily and southern Sardinia), where most of the rainfall was concentrated in May.



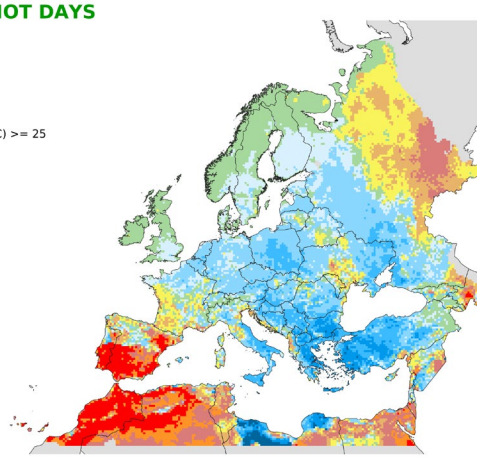


NUMBER OF HOT DAYS

from: **01 March 2023**
to: **31 May 2023**

Deviation:
Year of interest - LTA
Maximum temperature (°C) >= 25
Units: days

- =< -15
- > -15 - <= -10
- > -10 - <= -5
- > -5 - <= -2
- > -2 - < 0
- no difference
- > 0 - <= 2
- > 2 - <= 5
- > 5 - <= 10
- > 10 - <= 15
- > 15



13/06/2023
Resolution: 25 X 25 Km

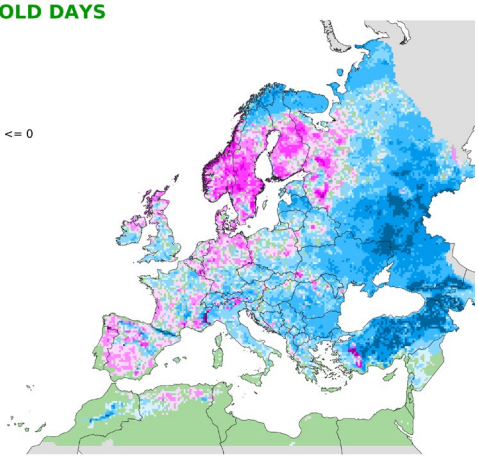
© European Union, 2023
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF COLD DAYS

from: **01 March 2023**
to: **31 May 2023**

Deviation:
Year of interest - LTA
Minimum temperature (°C) <= 0
Units: days

- <= -15
- > -15 - <= -10
- > -10 - <= -5
- > -5 - <= -2
- > -2 - < 0
- no difference
- > 0 - <= 2
- > 2 - <= 5
- > 5 - <= 10
- > 10 - <= 15
- > 15



13/06/2023
Resolution: 25 X 25 Km

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Source: EC Joint Research Centre (AGRI4CAST project)

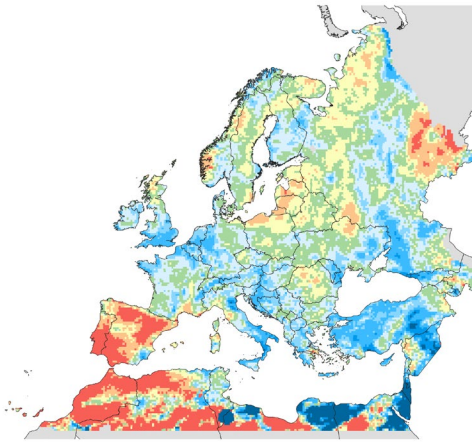
RAINFALL
Cumulative values

from: **01 March 2023**
to: **31 May 2023**

Deviation:
Year of interest - LTA

Units: %

- >= -100 - < -50
- >= -50 - < -30
- >= -30 - < -10
- >= -10 - < 10
- >= 10 - < 30
- >= 30 - < 50
- >= 50 - < 100
- >= 100 - < 150
- >= 150



13/06/2023
Resolution: 25 X 25 Km

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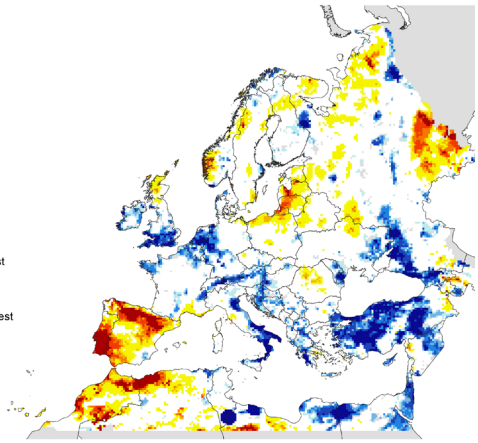
Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: **01 March 2023**
to: **31 May 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



13/06/2023
Resolution: 25 X 25 Km

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Source: EC Joint Research Centre (AGRI4CAST project)

1.4. Weather forecast (15 - 24 June)

Influenced by a high-pressure system over Scandinavia, many parts of Europe (particularly in the north) will be characterised by warmer-than-usual conditions, accompanied by wet spells, which will be most pronounced in a north-sound band from the Baltic Sea to the Mediterranean Sea.

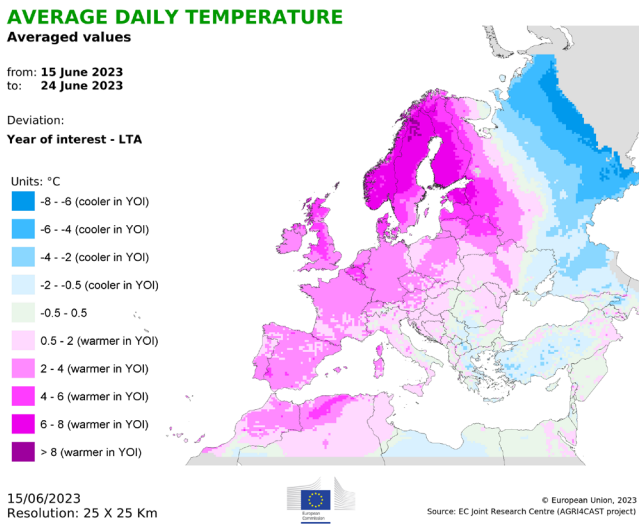
Slightly colder-than-usual conditions, with daily average temperature anomalies between -2°C and -0.5°C (locally down to -4°C) relative to the LTA, are forecast for parts of the Balkan Peninsula and most of Türkiye. More distinct negative temperature anomalies (daily average temperatures down to 8°C below the LTA) are forecast in most of north-eastern European Russia.

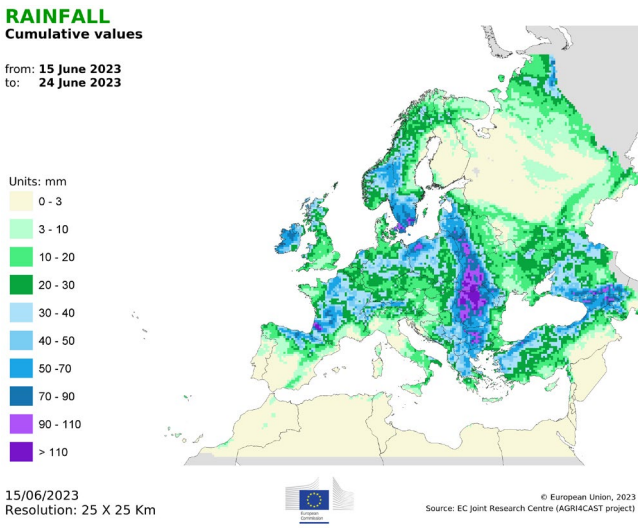
Warmer-than-usual conditions, with daily average temperatures exceeding the LTA by 2°C to 4°C, are forecast for most of the Iberian Peninsula, France, Ireland, parts of the United Kingdom, the Netherlands and Germany, as well as most of Poland, Czechia, Austria, parts of central Ukraine, parts of Belarus, Lithuania and western European Russia. **Much warmer-than-usual conditions**, with daily average temperatures exceeding the LTA by more than 4°C, and up to 8°C, are forecast for parts of the United Kingdom, most of Belgium and southernmost parts of the Netherlands, Denmark, the Scandinavian Peninsula, Latvia, Estonia, northern Belarus and westernmost European Russia. Maximum daily temperatures above 35°C are forecast in most of the Iberian Peninsula, parts of southern Italy (including the island of *Sardegna*) and parts of the western Balkan Peninsula, as well as in south-eastern Türkiye.

Dry conditions (total precipitation less than 3 mm) are forecast for most of the southern and central Iberian Peninsula, along the Mediterranean coast of France, north-western and central Italy, south-eastern Türkiye, most of Finland, and northern European Russia.

Wet conditions (total precipitation above 10 mm) are expected in most of Europe. Regions in the northern Iberian Peninsula, parts of France, most of Ireland, the Alps region, parts of Germany and northern Poland, southern Scandinavia, as well as a large north-south band extending from Latvia into Greece, are forecast to receive 40 mm and more rainfall. In the latter region, six or more days with rainfall above 5 mm are forecast. Parts of these regions will receive more than 90 mm of rainfall.

The long-range weather forecast, particularly for July and August but also for September, points to highly likely warmer-than-usual conditions in most of Europe, especially across the North European Plain. In the latter region, rainfall is likely to be lower than usual, particularly in July and August. Southern Europe, and particularly the Iberian Peninsula and Italy, are forecast to receive above-average rainfall, particularly in July and August.

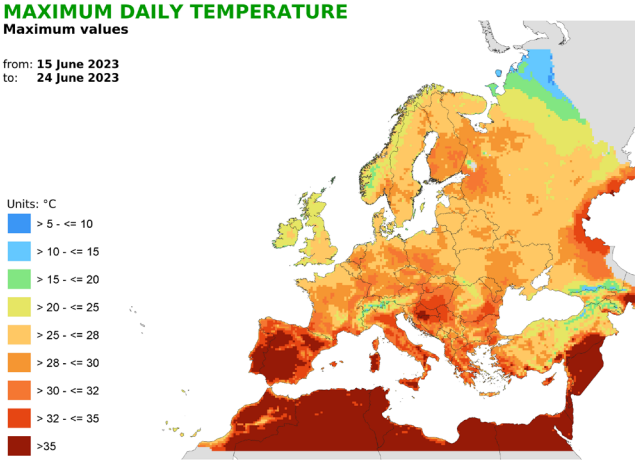




MAXIMUM DAILY TEMPERATURE

Maximum values

from: **15 June 2023**
to: **24 June 2023**



15/06/2023
Resolution: 25 X 25 Km

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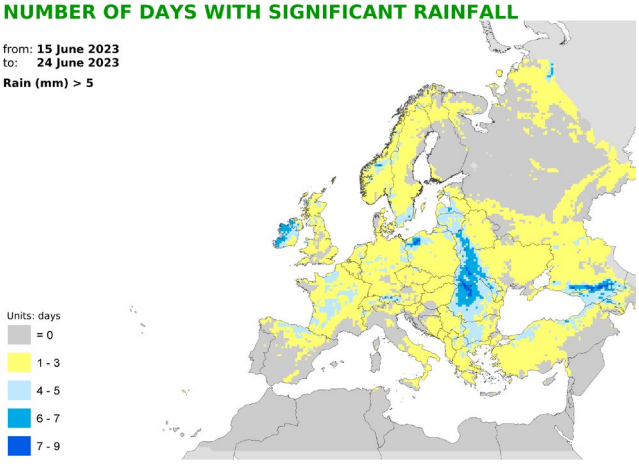
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF DAYS WITH SIGNIFICANT RAINFALL

from: **15 June 2023**
to: **24 June 2023**

Rain (mm) > 5



15/06/2023
Resolution: 25 X 25 Km

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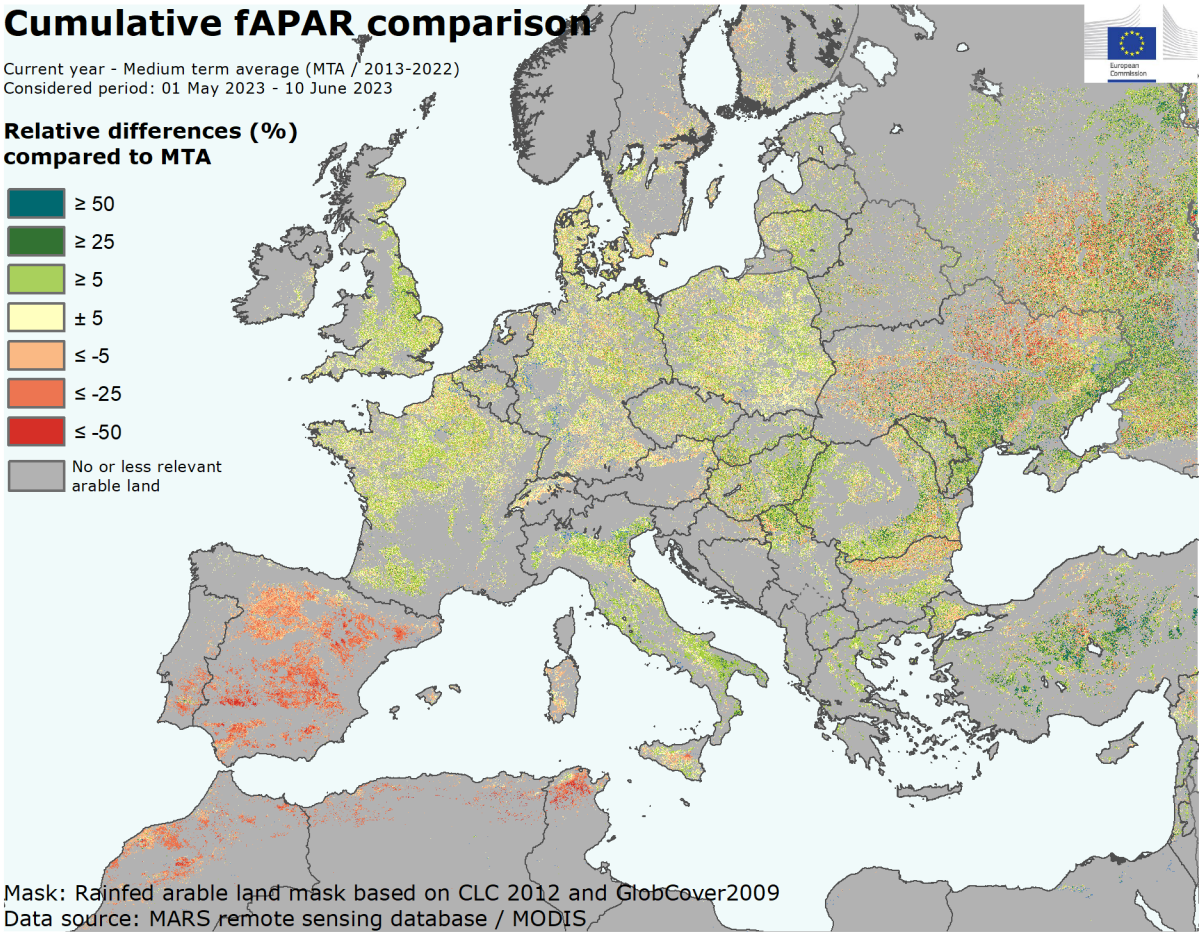
Source: EC Joint Research Centre (AGRI4CAST project)

2. Remote sensing – observed canopy conditions

Good crop vigour in much of Europe with the exception of the Iberian Peninsula

Across most of Europe, there is a positive anomaly indicating favourable conditions in spring, primarily due to adequate precipitation up to mid-May, except in the Iberian Peninsula. The dry spell since mid-May has started to affect growth in northern regions.



The map displays the relative differences (in percentages) between the cumulated Fraction of Absorbed Photosynthetically Active Radiation (fAPAR) from 1 May to 10 June 2023 and the medium-term average (MTA, 2013-2022) for the same period. Positive anomalies (in green) reflect above-average biomass or early crop development, while negative anomalies (in red) reflect below-average biomass or late crop development.

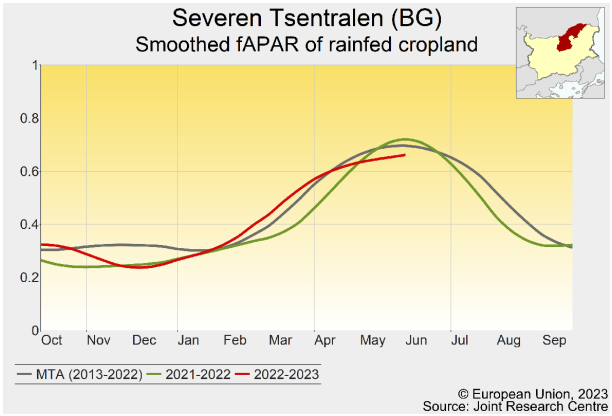
The map above predominantly displays the condition of winter crops, as biomass accumulation for summer crops in northern and central Europe has just started and is contributing little to fAPAR values. The **Iberian Peninsula**, however, shows a strong negative anomaly, resulting from an early spring drought that was followed by intense precipitation starting in mid-May. In **Italy** and **Greece**, the review period was characterised by wet weather, leading to favourable conditions for **summer** crops.

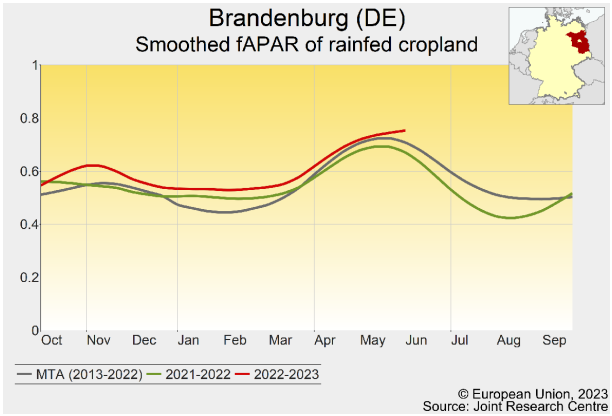
In **France**, the continuous wet conditions until mid-May were beneficial for the growth of both winter crops (in the flowering stage) and summer crops (in the vegetative stages). In the **Benelux** countries, **Germany**, **Denmark**, **Sweden**, **Poland** and the **Baltic Sea** region, fAPAR values remain average to slightly positive. The advanced season led to a positive anomaly, but the dry period since mid-May has started to slow down crop development, particularly in **Denmark** and **Sweden.**

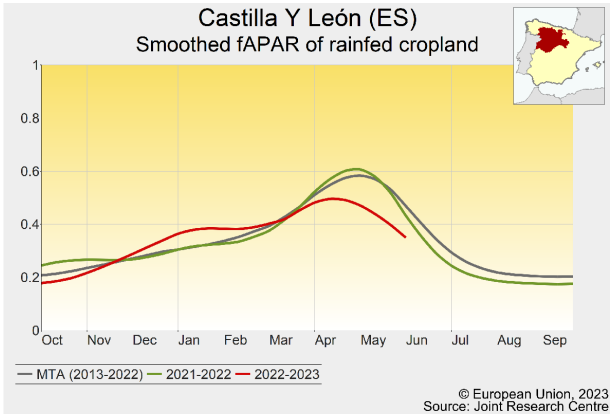
In **Hungary** and western **Romania**, conditions are still good to excellent. In eastern **Romania**, conditions are above average overall, while in northern **Bulgaria** they

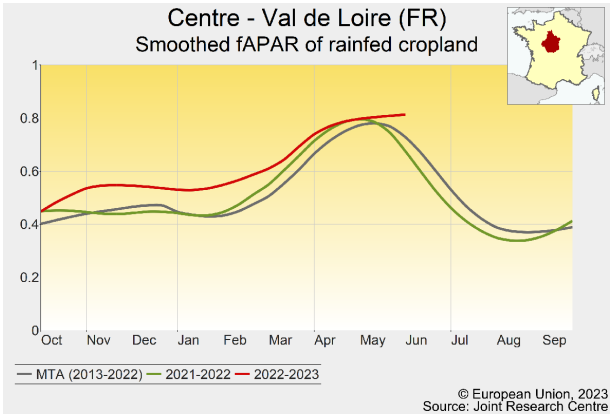
are mostly negative, due to underdeveloped or delayed summer crops.

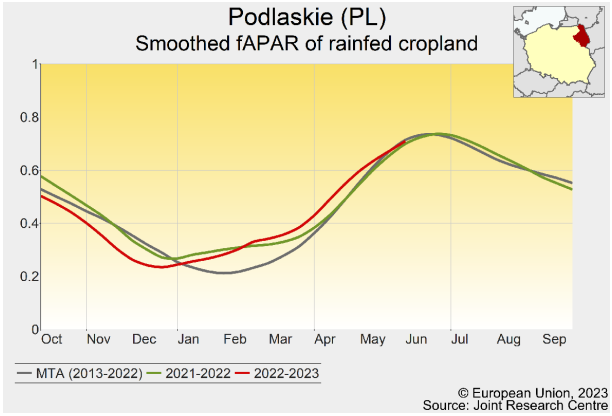
In **Türkiye,** the map indicates highly positive conditions, reflecting above-average biomass accumulation, thanks to significant spring rainfall. In the **Maghreb** region, the condition of crops did not recover from the long-lasting drought; the above-average rainfall in the review period arrived too late to be beneficial for crop growth. In western **Ukraine**, the map indicates a slowing down of the phenological cycle of winter crops, due to decreased radiation in April and delayed sowings of summer crops. In the central parts of the country, the overall situation is positive, due to favourable soil moisture and thermal conditions. The conflict line is evident on the map, with negative anomalies due to a sharp increase in fallow land, and the contrast may increase as it is unlikely that the land will be cultivated for summer crops.

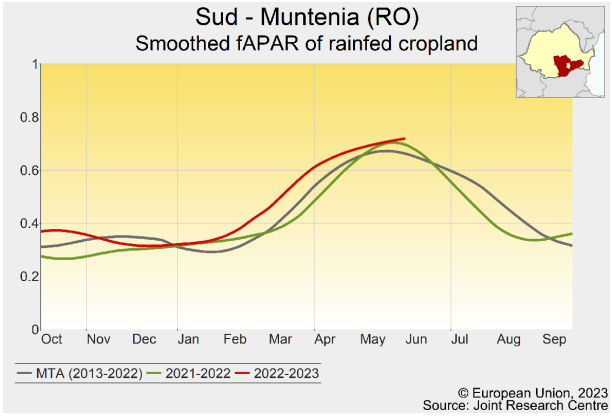










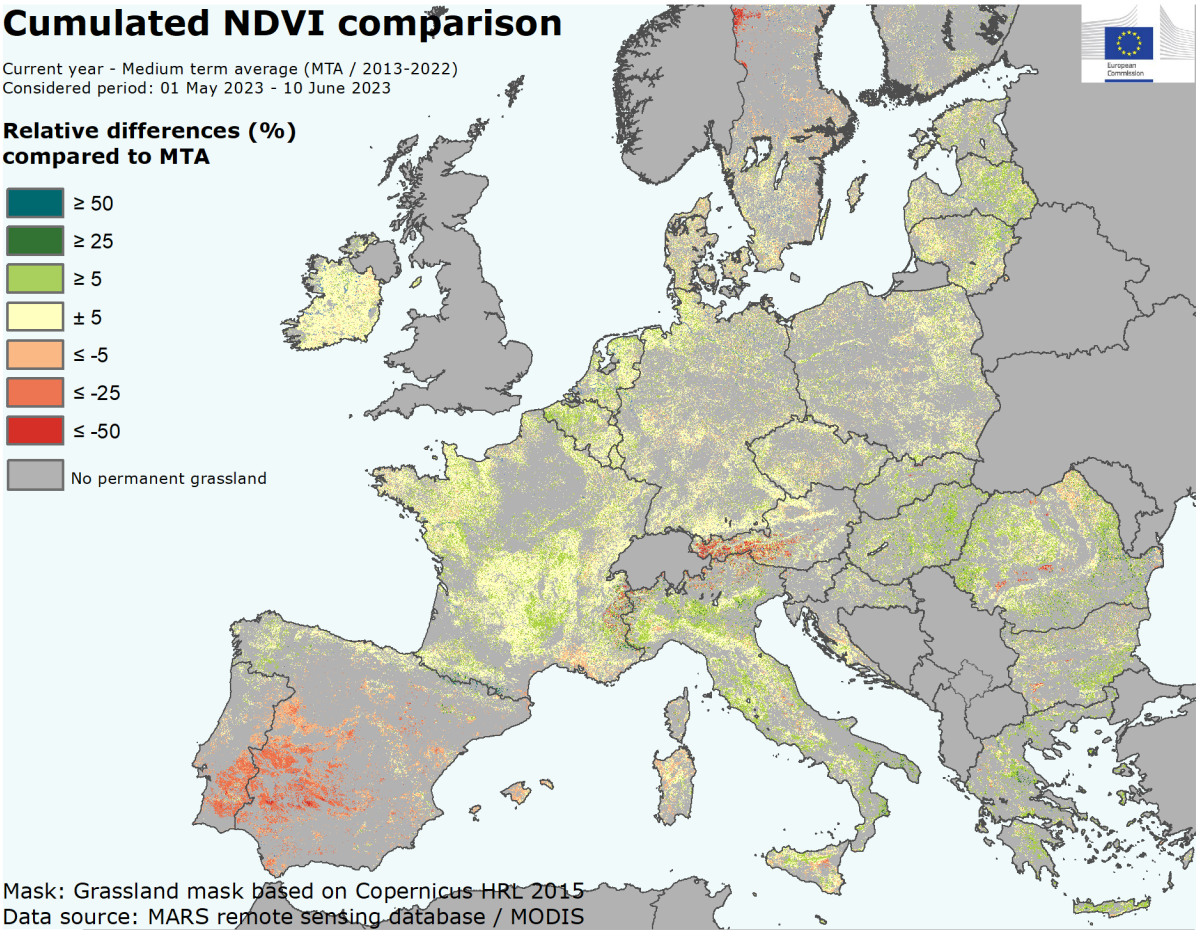


3. Grassland and fodder monitoring

Contrasted water patterns affect growth in northern and southern regions, fair conditions over the rest of Europe

European grasslands have witnessed a period of opposing growth conditions over the past months. While central and northern European regions have faced exceptionally low levels of precipitation since mid-May, heavy rainfall and flooding negatively affected grasslands in several regions in southern Europe.

The map below displays the differences between the normalized difference vegetation index (NDVI) cumulated from 1 May to 10 June 2023, and the medium-term average (MTA, 2013-2022) for the same period. Positive anomalies (in green) reflect above-average surface greenness, while negative anomalies (in red) reflect below-average surface greenness. The sharply contrasting red colours in the French and Austrian Alps, as well as in central Romanian mountain areas, are caused by late snow events and/or high cloud coverage. At this stage of the year, the status of fodder crops cannot yet be assessed.



In **France**, favourable conditions are reported for most of the country, except for some regions in the south (Rhône Valley, PACA and Mediterranean regions), where grassland productivity has been below average because of the drier-than-usual conditions that prevailed in April [1]. In the **Netherlands, Belgium and Luxembourg,** after 2 months of abundant rain, dry and sunny weather since the second week of May has favoured grassland growth. However, soil moisture reserves have depleted, particularly following the steep temperature increase in June. Rain is urgently needed and many farmers have already started irrigating grasslands. In **Germany**,

[1] https://www.web-agri.fr/herbe/article/226989/la-production-d-herbe-superieure-de-12-pourcents-a-la-moyenne-excepte-dans-le-sud-est

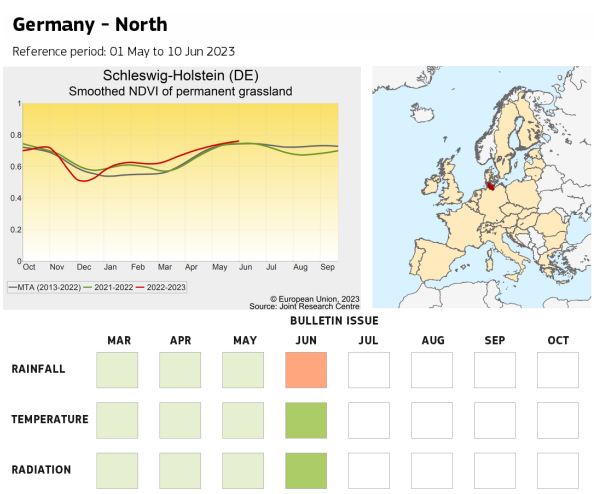
positive growth conditions prevailed and there was improved accessibility to fields compared to the previous month. However, scarce precipitation (especially in the north-east) considerably decreased soil moisture levels, which might slow down further (re)growth. In **Poland** and **Czechia,** conditions are similar, with favourable biomass accumulation but growth slightly slowed by recent rainfall deficits, bringing it close to average. Projected rainfall in the coming days should be beneficial. **Austria** and **Slovakia** benefited from adequate rainfall and temperature conditions.

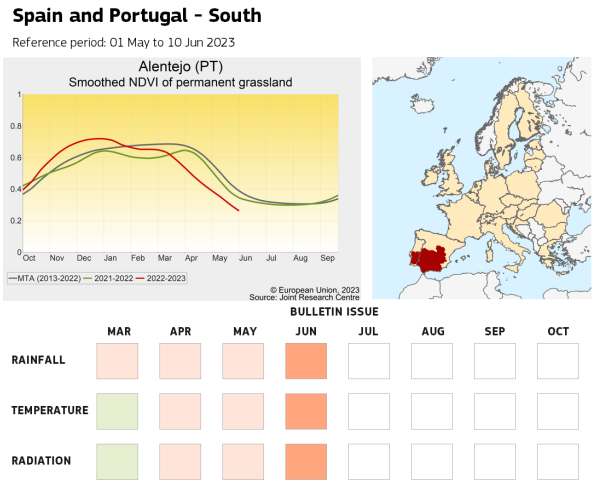
In **Hungary**, grassland productivity is well above the MTA. Southern and central **Romania** saw below-average precipitation in most areas during the review period, but grassland productivity is above the MTA thanks to adequate soil moisture levels and moderate temperatures. In eastern **Romania**, below-average rainfall caused water stress but biomass accumulation is still near average. In **Bulgaria**, the meteorological conditions were slightly better and growth is close to the MTA.

A large rainfall deficit is observed in the **Baltic countries** and **Ireland.** Nevertheless, grassland productivity is around average at the national level, although with large spatial variability. More rainfall is urgently needed to secure fodder production. In **Denmark** and **Sweden**, and to a lesser extent **Finland**, rainfall deficit has started to affect the productivity of grasslands.

In **Italy**, excessive rainfall since the beginning of May has slowed biomass accumulation of grassland and fodder, particularly in southern Italy, *Sardegna* and *Emilia Romagna*. In the latter region, anomalous floods occurred on 16 May[2]. Fodder crops were hampered in *Sicilia* by strong wind episodes (60-100 km/h) coupled with the storms in mid-June. Overall biomass formation for grasslands and fodder in Italy ranges from in line with to below an average season. In **Greece**, above-average rainfall and seasonal temperatures allowed good progress of biomass accumulation in pastures in the period May-June.

In **Spain** and **Portugal**, temperatures, radiation and lack of precipitation continued to hit record levels in the first dekad of May. The remaining period saw average temperatures and radiation, with abundant rainfall by the end of May (except in *Andalucía* and *Alentejo*, where rainfall remained below the LTA). The return of rain is not yet reflected in vegetation indicators, but positive effects can be expected in the coming weeks.

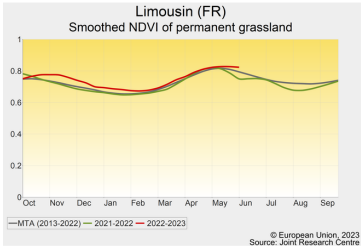




[2] https://emergency.copernicus.eu/mapping/list-of-components/EMSR664

France

Reference period: 01 May to 10 Jun 2023

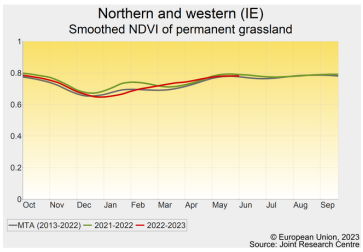


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Ireland

Reference period: 01 May to 10 Jun 2023

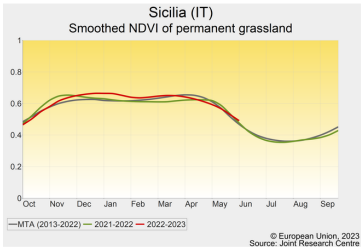


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Italy

Reference period: 01 May to 10 Jun 2023

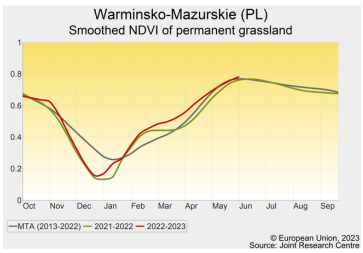


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Poland

Reference period: 01 May to 10 Jun 2023

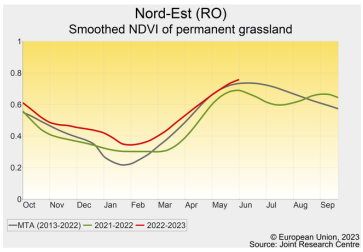


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Romania - East

Reference period: 01 May to 10 Jun 2023

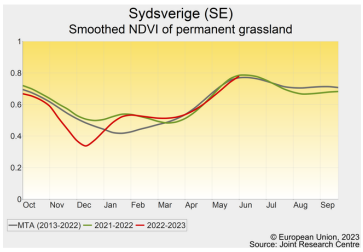


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Sverige

Reference period: 01 May to 10 Jun 2023



BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

4. Rice in Europe

Difficult start to the season on the Iberian Peninsula

The campaign in Europe was characterised by drought in large parts of the rice-growing regions in Italy (53% of EU production) and on the Iberian Peninsula (31% of EU production), where above-average temperatures also contributed to the difficult situation. While Italy has largely recovered from the drought thanks to abundant rainfall in April and May, on the Iberian Peninsula the rain in May was only marginally useful in replenishing water reservoirs. The yield forecast for rice for the EU as a whole is set at 6.45 t/ha, corresponding to 1.0% below the 5-year average.

In **Italy**, the sowing campaign this year was influenced by a lack of rain in the upper Po Valley (northern Italy) in winter 2022. The drought caused uncertainties among rice farmers, resulting in an estimated decrease of 7421 ha in the area sown with rice in 2023 (-3.4% compared with last year; -4.9% compared to the 5-year average). However, the period from 1 April to 10 June was wetter than usual: abundant rainfall replenished water levels in the Po Valley (great northern lakes and Po River) to a large extent, feeding the whole rice irrigation network. So far, rice growth has been moderately delayed by the frequent rain events of May but overall expectations for final yield are above average.

The 2023 agricultural season in **Spain** was hampered by above-average temperatures and long-lasting drought conditions. From January onwards, almost no meaningful rainfall has occurred in cropland areas, and the return of rain at the end of May was only marginally useful in replenishing water reservoirs. With restrictions imposed on water for irrigation in Spain in the spring, rice crops faced a decrease in areas sown. For the remaining areas (currently at the early vegetative stages), crop biomass accumulation – inferred from satellite imagery – is below average. Our yield forecast for rice in Spain is below the 5-year average.

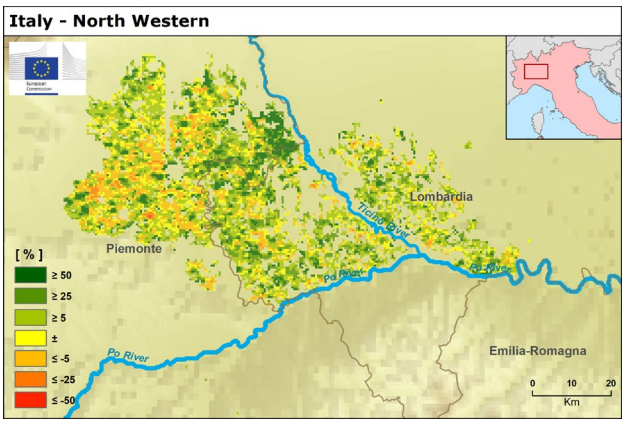
Rice sowing in **Greece** (*Kentriki Makedonia*) took place with an unusual delay of 2-3 weeks due to the rainy weather of April and May, which hindered preparatory fieldworks (i.e. land levelling, soil tillage). Despite the delay, plant emergence progressed well. Nitrogen fertilisation (top-dressing) is expected only around mid-July. Our forecast for rice yield is close to the 5-year average.

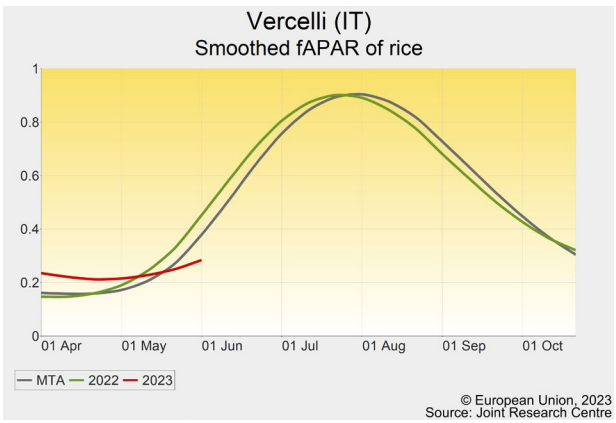
The rice season in **Portugal** was marked by drought, particularly in the districts south of the Tagus River (i.e. *Lezíria do Tejo* and *Alentejo Litoral* – 78% of national production). These regions have implemented restrictions on the use of irrigation water and as a result rice is currently growing below its potential. Meanwhile, in northern Portugal (*Região de Coimbra* – 20% of national production), rice is growing in line with an average season. Despite the drought, estimations for area sown this year are 5% above the 2018-2022 average (Instituto Nacional de Estatística). In view of the restrictions in place and the observed below-average biomass accumulation, our yield forecast is below the 5-year average.

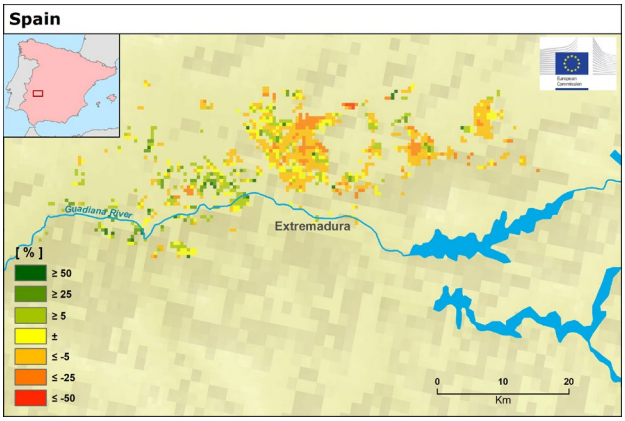
Seasonal weather conditions have prevailed in southern **France** (*Bouches-du-Rhône*) during the review period, with rainy events prevailing during May. Such weather conditions allowed for favourable progress of sowings and good emergence, resulting (so far) in good expectations for final production. Most of the yield variability will depend on temperatures during the coming months. Our yield forecast is in line with the trend.

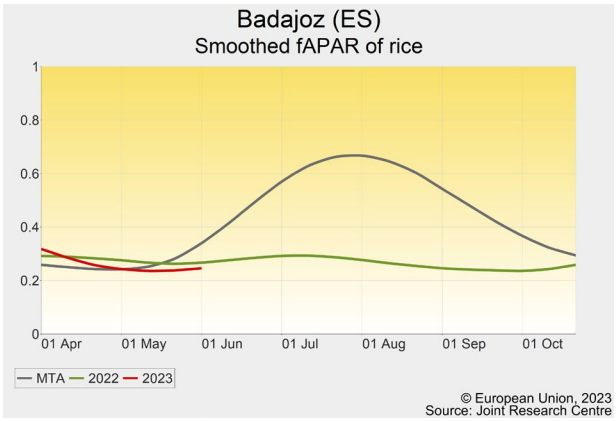
A 6-day cold spell occurred in **Bulgaria** (*Plovdiv* and *Stara Zagora*) around mid-May, after rice sowings. This event most likely delayed crop germination by nearly 10 days. Satellite images confirm a moderate delay in rice development. Our forecast is close to the 5-year average.

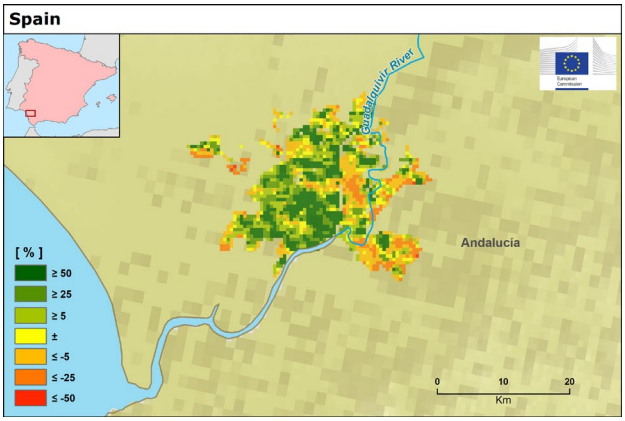
The rice-sowing campaign in **Romania** was on time, taking place from the last dekad of April to the first dekad of May without particular weather constraints. During the cold spell of mid-May, minimum temperatures dropped down to 3-4°C for 5 days, but without major consequences for rice crop development. Currently, rice is at the earliest vegetative growing stage and biomass accumulation (inferred by satellite imagery) has so far been above the MTA. Our yield outlook is above the 5-year average. In the second half of April and first dekad of May, moderate rainfall allowed adequate progress with rice sowing in **Hungary**. Seasonal daily temperatures and sufficient water supply in May and early June provided good growing conditions overall, confirmed by our crop model simulations which show rice crops slightly advanced in development and above-average biomass accumulation compared to an average season. Our forecast is above the 5-year average.

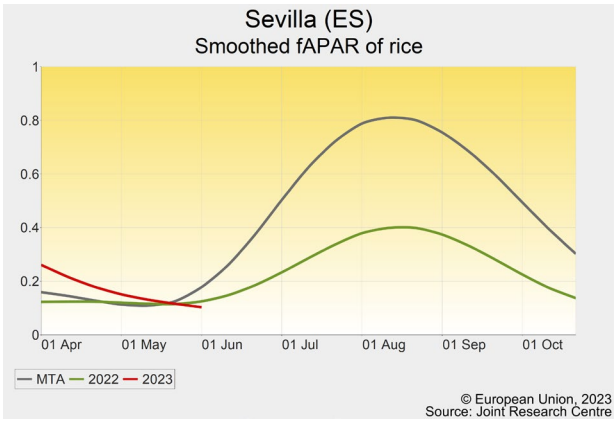

Italy - North Western
Piemonte
Lombardia
Emilia-Romagna
Ticino River
Po River
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50
0 10 20
Km

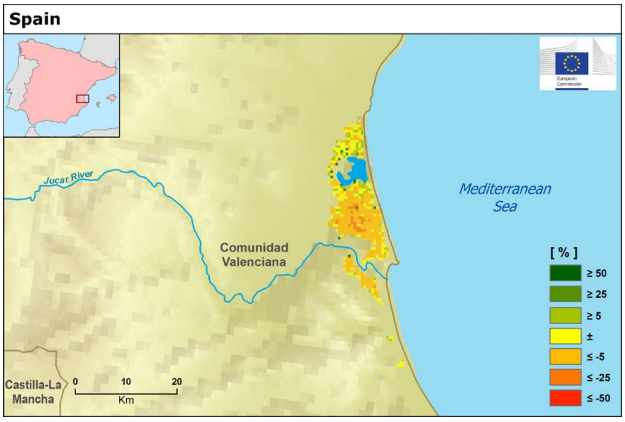

Vercelli (IT)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA 2022 2023
© European Union, 2023
Source: Joint Research Centre

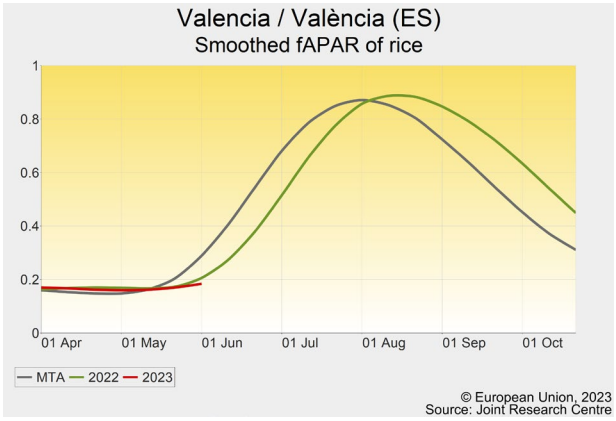

Spain
Extremadura
Guadiana River
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50
0 10 20
Km

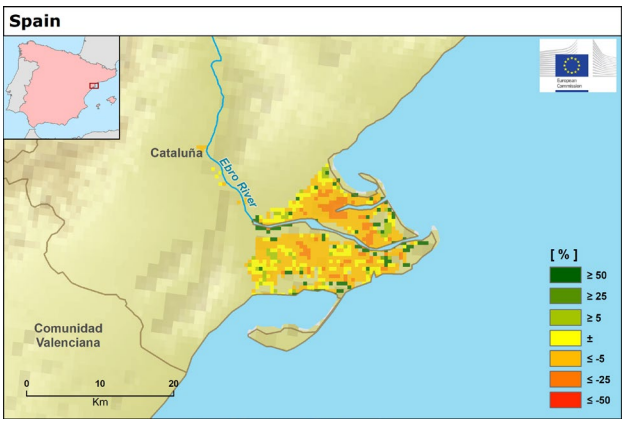

Badajoz (ES)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA 2022 2023
© European Union, 2023
Source: Joint Research Centre

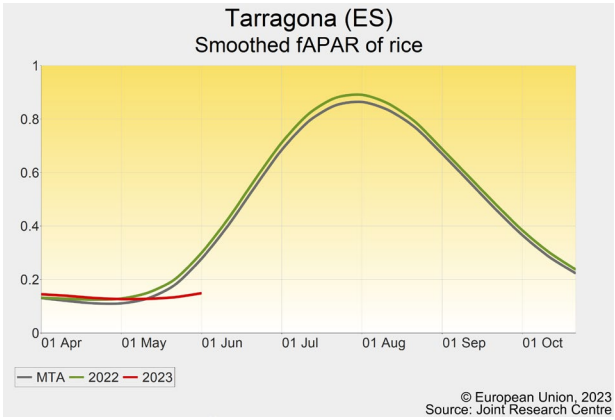

Spain
Andalucia
Guadalquivir River
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50
0 10 20
Km

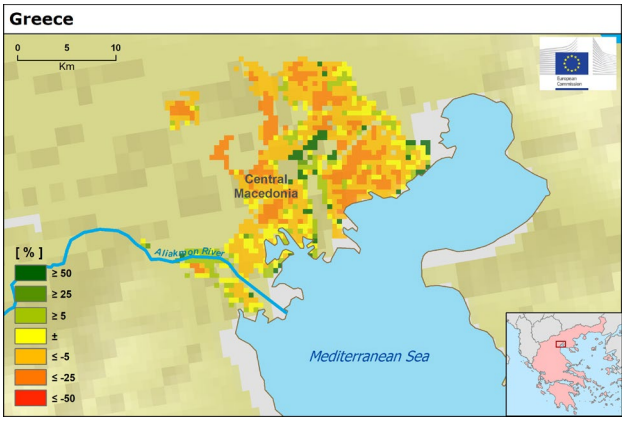

Sevilla (ES)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA 2022 2023
© European Union, 2023
Source: Joint Research Centre

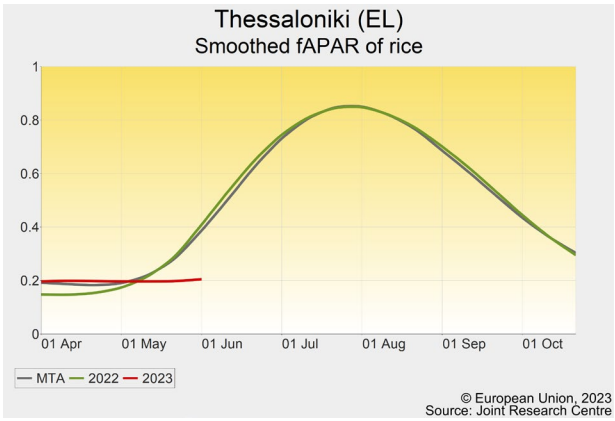

Spain
Mediterranean Sea
Comunidad Valenciana
Castilla-La Mancha
Jucar River
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50
0 10 20
Km

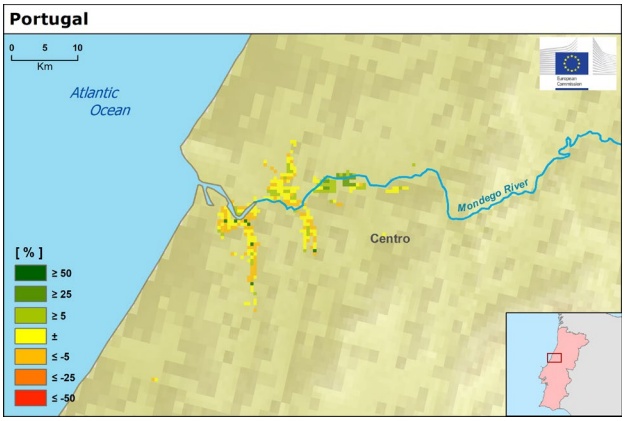

Valencia / València (ES)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA 2022 2023
© European Union, 2023
Source: Joint Research Centre

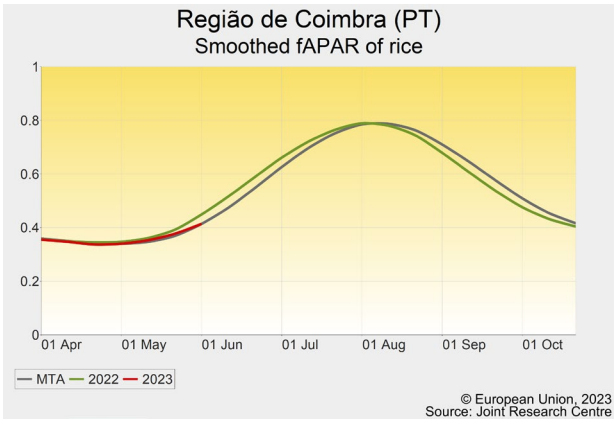

Spain
Cataluña
Ebro River
Comunidad Valenciana
0 10 20
Km
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50

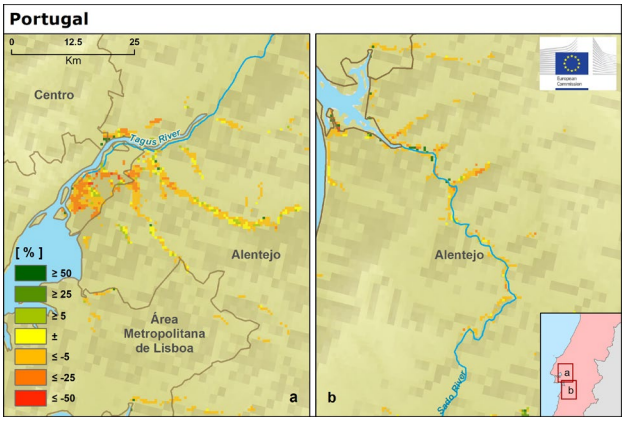

Tarragona (ES)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA
2022
2023
© European Union, 2023
Source: Joint Research Centre

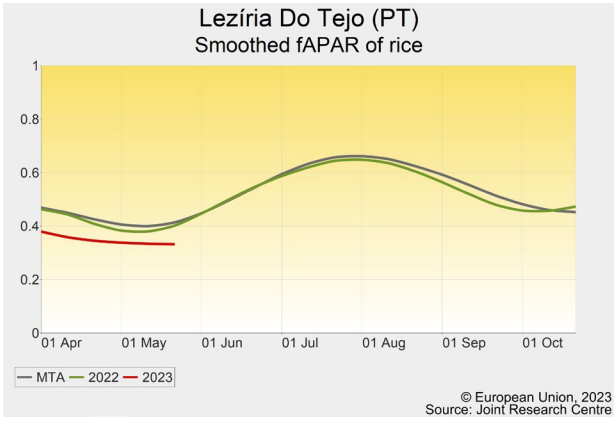

Greece
0 5 10
Km
Central Macedonia
Aliakmon River
Mediterranean Sea
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50

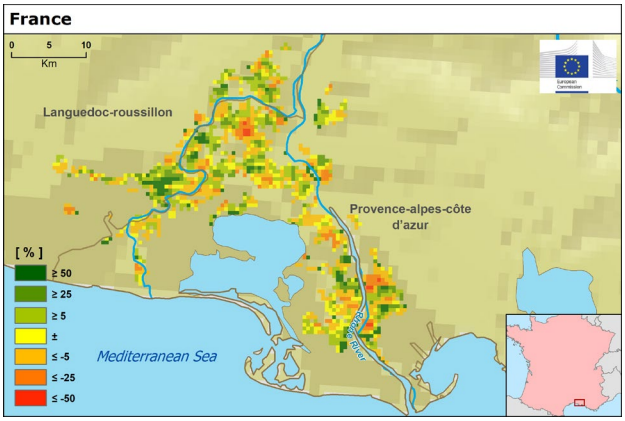

Thessaloniki (EL)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA
2022
2023
© European Union, 2023
Source: Joint Research Centre

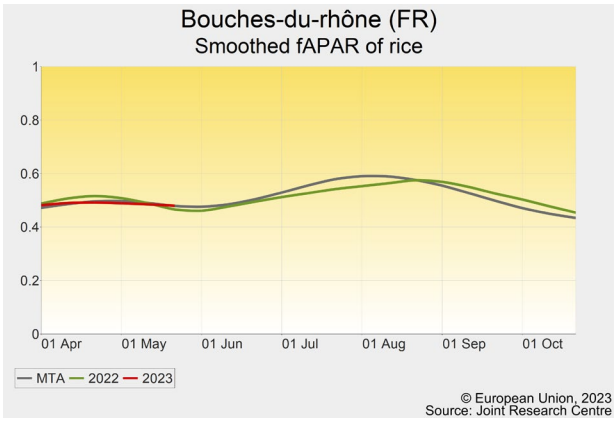

Portugal
0 5 10
Km
Atlantic Ocean
Mondego River
Centro
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50

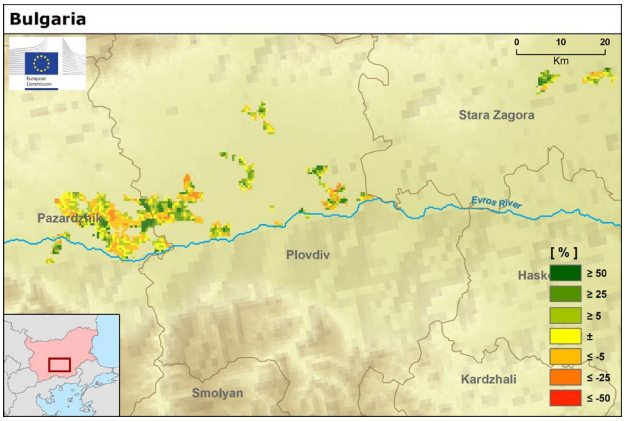

Região de Coimbra (PT)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA
2022
2023
© European Union, 2023
Source: Joint Research Centre

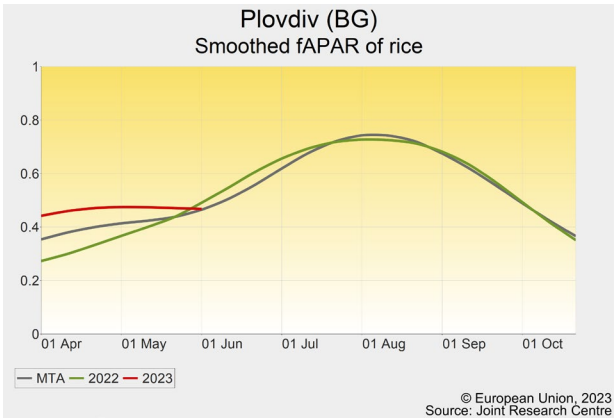

Portugal
0 12.5 25
Km
Centro
Tagus River
Alentejo
Área Metropolitana de Lisboa
a
b
[%]
≥ 50
≥ 25
≥ 5
±
≤ -5
≤ -25
≤ -50

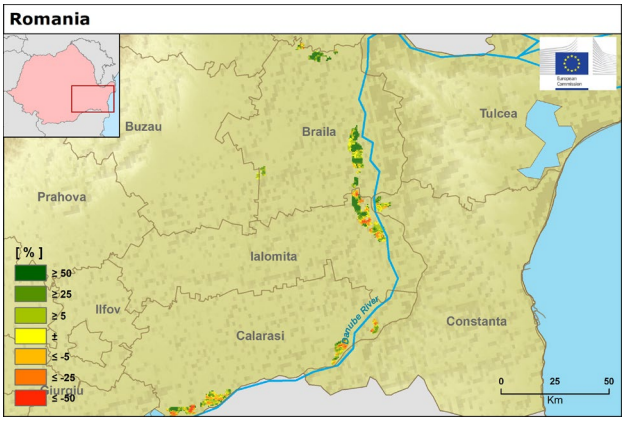

Lezíria Do Tejo (PT)
Smoothed fAPAR of rice
1
0.8
0.6
0.4
0.2
0
01 Apr
01 May
01 Jun
01 Jul
01 Aug
01 Sep
01 Oct
MTA
2022
2023
© European Union, 2023
Source: Joint Research Centre

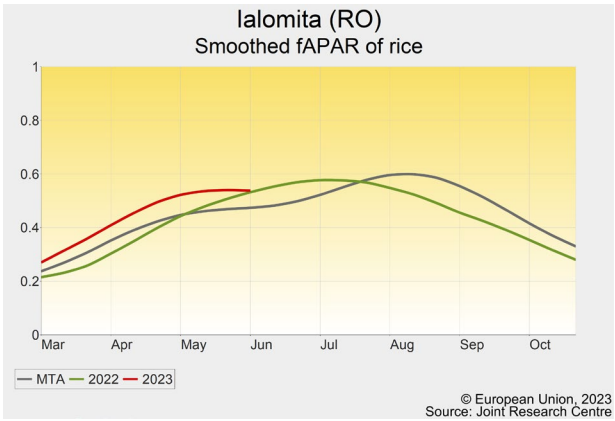


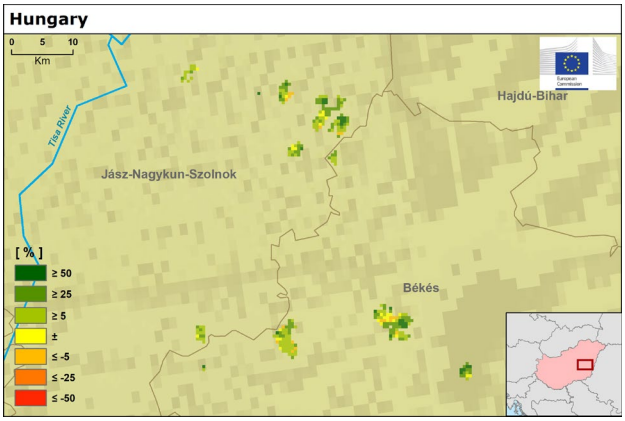


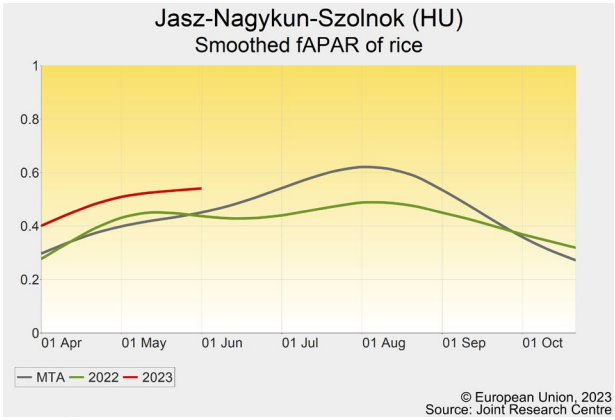












The maps display the difference between the fraction of absorbed photosynthetic active radiation (fAPAR) cumulated from 1 April to 10 June 2023 and the medium-term average (2013-2022) for the same period. Mask: Rice areas based on CLC 2018. Data source: JRC MARSOP6 remote sensing database / MODIS.

5. Country analysis

5.1. European Union

France

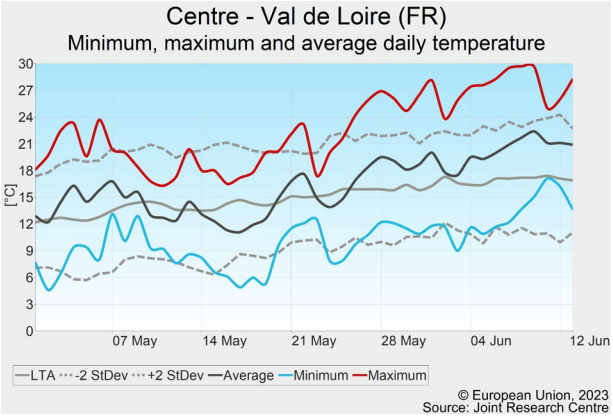
Continuing positive outlook for winter and spring crops

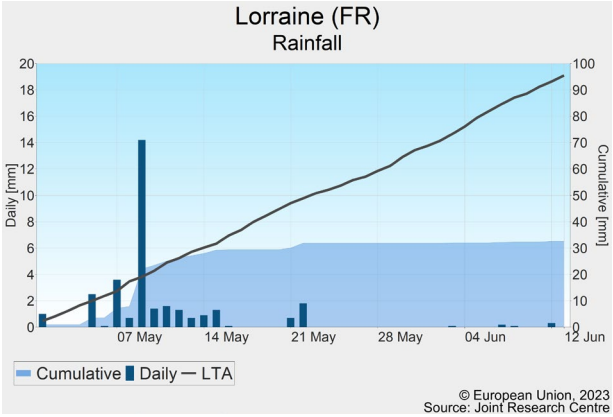
Crops have remained in good condition and benefited from significant water supply since early spring. The dry conditions since mid-May have started to raise concerns but the yield outlook remains positive.

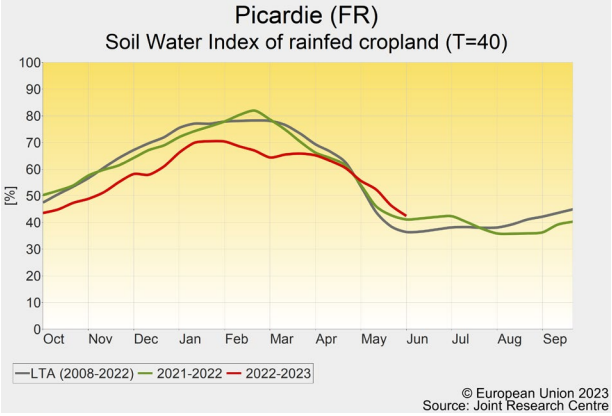
The wet period lasting since March ended around 15 May in north-western parts and in *Midi-Pyrénées*. Since then, the northern half of the country has experienced very dry conditions, combined with above-average radiation (10% to 25% higher than the LTA). Meanwhile, significant rainfall occurred in the Mediterranean arc, although this was not sufficient to compensate for the cumulative rain deficit since winter. Temperatures were slightly above the LTA throughout the review period.

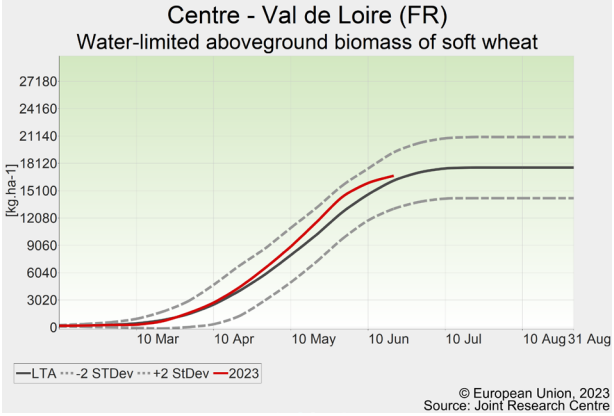
Winter cereals have accomplished flowering under favourable conditions. The dry spell in northern France is unlikely to compromise the positive outlook for winter crops, except in the north-east (e.g. *Lorraine*). Spring cereals reached flowering in most of the country in May and benefited from the high soil moisture content since March. For summer crops, the excessive rainfall in March and April disrupted sowings, which might have a negative effect on yields, particularly of sugar beet and potatoes. However, the above-average radiation and temperatures that prevailed during the current review period were beneficial, especially in fields with deep soils that were able to preserve a satisfactory water content. On shallow soils more rainfall is urgently needed, however. Water reservoirs have recovered from the dry winter conditions in most areas in the southern half of the country. Some irrigation restrictions are expected in the north if there is no significant rainfall in the coming weeks.

We maintain the yield forecast for winter and spring crops above the 5-year average, while we marginally reduce the forecast for summer crops.









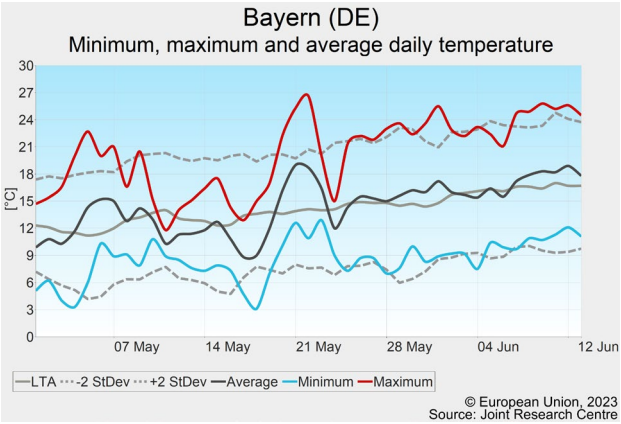
Germany

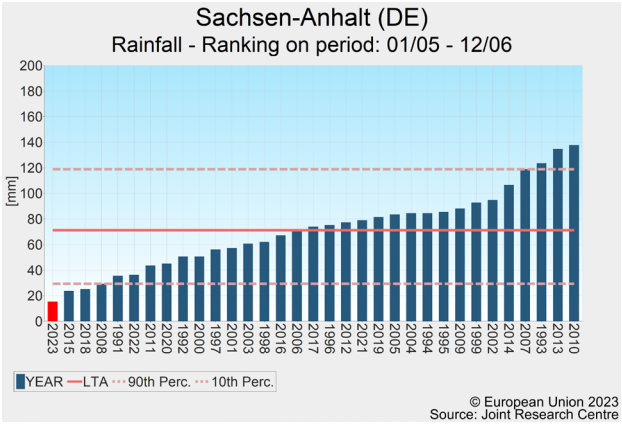
Positive crop development despite lack of rainfall

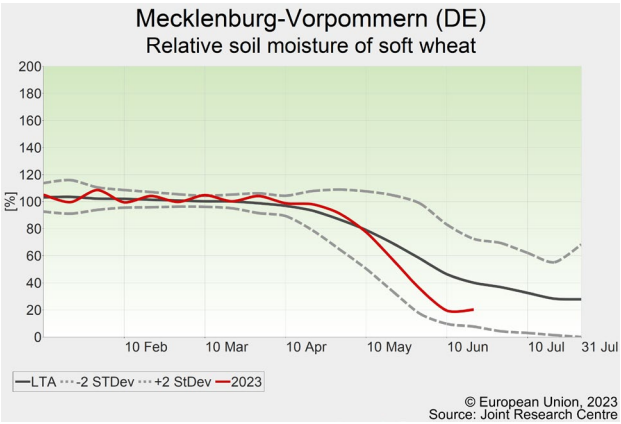
Since mid-May, a lack of rainfall has deteriorated soil moisture levels countrywide and especially in north-eastern Germany. While crop development for both winter and summer crops remains generally positive, precipitation in the coming weeks will be indispensable to maintain this positive development.

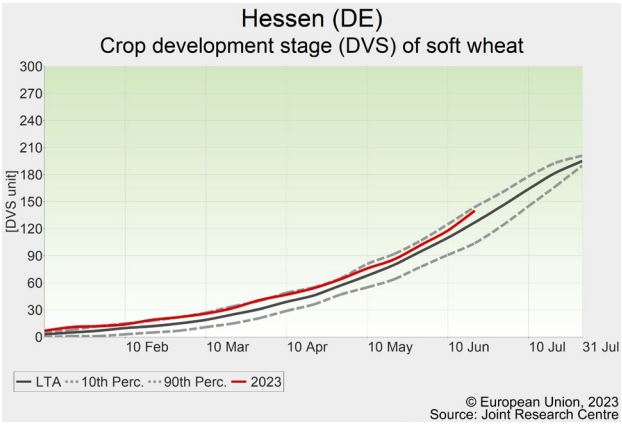
The first half of May was characterised by slightly colder-than-usual weather and episodic rainfall events, especially in southern and western Germany. Since then, above-average temperatures during the day and below-average temperatures at night have brought the temperature sum for the reporting period as a whole close to the LTA. The dry period led to a considerable rainfall deficit, with record-low precipitation totals since mid-May (only approximately 50% of the LTA in the country as a whole and a deficit of around 80% in the north-east). While abundant precipitation in the previous months had fully restored soil moisture in the west and south, northern and eastern Germany did not experience this beneficial rainfall and these areas are now facing severely decreased soil water levels (e.g. -25% in *Mecklenburg-Vorpommern*) and hence considerably reduced plant water availability.

Currently, these conditions have not yet affected plant growth and consequently our yield forecasts for winter crops remain above the 5-year average. Rainfall in the coming weeks will be crucial for grain filling and for maintaining yield expectations, and weather forecasts for the next week suggest the return of precipitation across Germany, even though it might remain below average. Summer crops, benefiting from the higher temperatures and radiation levels during the day, have so far gained ground after the delay in sowing but are still behind schedule. However, if conditions remain dry, the increasing soil moisture deficit may have a significant negative impact on crop development and yield. Our yield estimates for summer crops remain generally positive compared to both the 5-year average and 2022, but some were revised downwards (e.g. sugar beet, potatoes and sunflowers).









Poland

North and north-west too dry for winter and spring crops

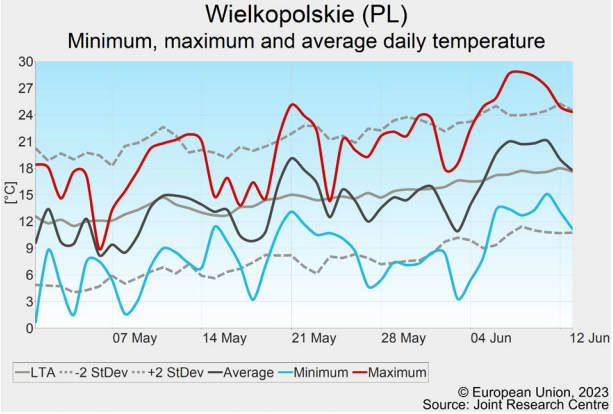
Beneficial showers in the third dekad of May alleviated dry conditions that had been developing over the first two dekads of the month due to a substantial rain deficit. Soil moisture conditions improved at the onset of winter cereal flowering and grain filling, but some areas remained dry. Agrometeorological conditions have improved since the end of May enhancing the development of spring and summer crops.

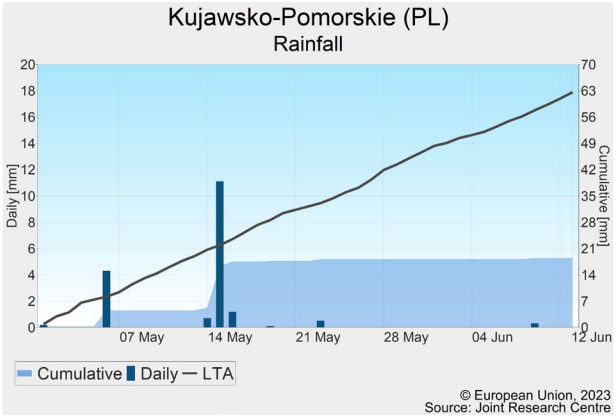
The first and second dekads of May were characterised by a substantial rainfall deficit and a deteriorating soil moisture deficit (mostly pronounced in central and north-west regions). Low intensity but frequent rain showers during the third dekad of May alleviated dry topsoil conditions (except for south-east regions). The first dekad of June was associated with above-average rainfall totals in the central north-south belt, and below-average precipitation in the west and south-east regions. In May temperatures were slightly below average in the north-east and above-average in the south-west, while the beginning of June was slightly warmer than usual.

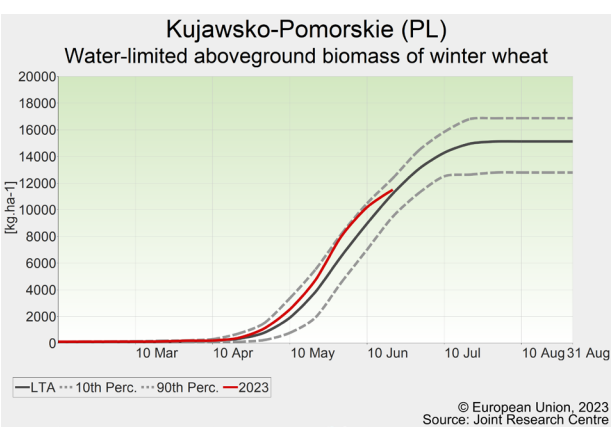
Agrometeorological conditions have improved considerably since the end of May sustaining the vegetative growth of spring cereals and grain filling of winter cereals. Nevertheless, earlier dry conditions could negatively affect yield potentials of spring cereals in the tillering stage, as well as winter cereals in the flowering and early grain filling stages, especially on lighter soils in dry regions. So far, mild temperatures have prevented plants from thermal stress during the flowering and grain filling stages.

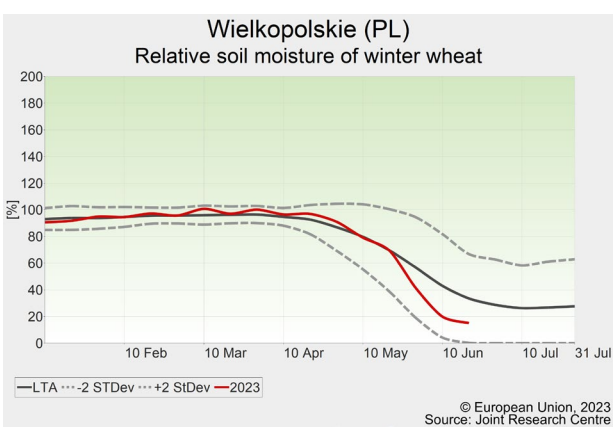
After the dry and cold start of the season, summer crops have been profiting from improved thermal and soil moisture conditions and have been recuperating their vegetative growth. Our crop model indicators show that the development and biomass accumulation of summer crops are currently close to seasonal average values. Nevertheless, some concerns have been raised due to pest pressure, especially for sugar beet.

Our yield expectations for winter and spring crops have been slightly reduced due to regionally dry conditions during the first two dekads of May. For summer crops we base our expectations on trends. As substantial water deficits are present after a dry spring, more rainfall during the coming weeks is essential for adequate crop development and maintaining this outlook.









Romania

Slightly reduced - but still positive – yield outlook for winter crops

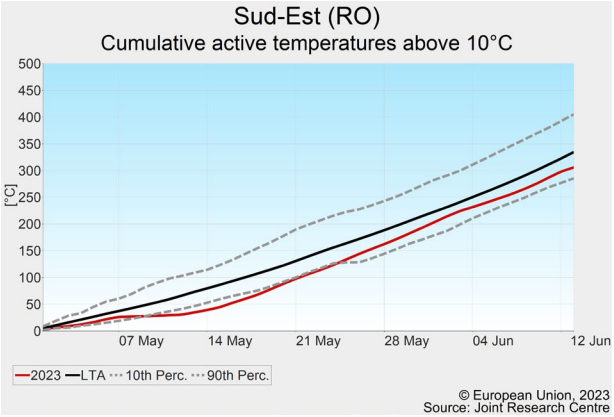
In western and southern regions, abundant rainfall kept soil moisture contents above average levels, ensuring adequate water supply for the grain filling of winter crops, but increasing pest pressure and potentially reducing grain quality. Summer crops are in poor shape as a consequence of the unfavorable conditions around sowing and early development.

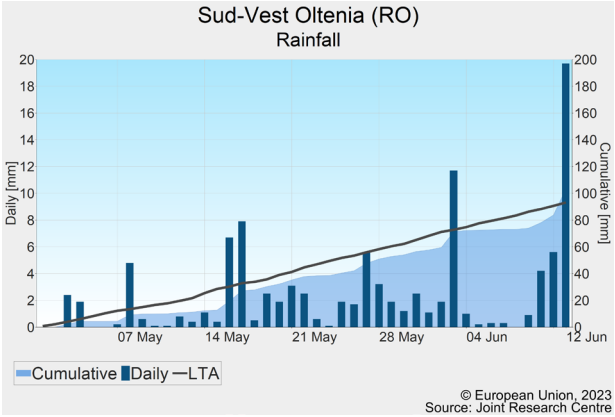
During the first half of May much colder–than-usual weather conditions ruled in Romania, especially in southern and eastern regions; consequently, the emergence of summer crops was unfavourably slow and long-lasting in these regions. Near-average temperatures prevailed later on, but summer crops were unable to significantly catch up on the delay. Daily maximum temperatures (slightly and just a few times) exceeded 30°C in the south-eastern areas only.

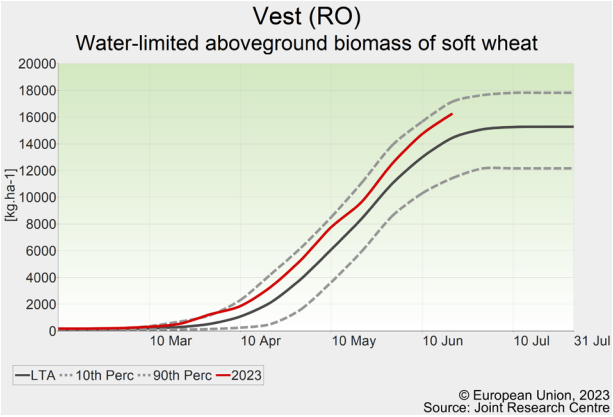
Rainfall in the western and southern regions was in the range of 50 to 120 mm, which is close to or slightly below the LTA. However, the central and northern regions experienced a 40-80 mm precipitation deficit.

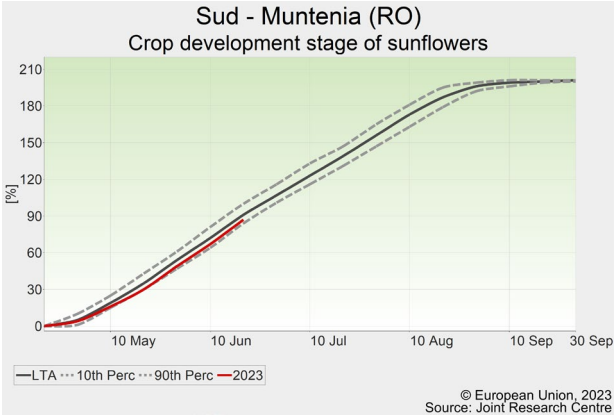
The reproductive phase of winter crops, which is crucial for yield formation, was beneficially extended thanks to the overall moderate temperatures. Soil water contents were mostly adequate, but depleted to below-average level in some north-western, central and north-eastern areas. According to our crop model simulations, biomass accumulation well exceeds the average at national level, but remains below average in *Centru* and *Nord-Est* due to limited water supply. A downside of the low temperatures and frequent rainfall of this spring is an increased pest pressure, wide-spread virus infections and a potential reduction of grain quality.

Considering the above-mentioned negative impact factors, our yield forecast for winter crops was slightly decreased, but remains above the 5-year average. Summer crops are lagging behind in growth and development, but soil moisture contents are at a favourable level, therefore their yield forecast is kept in line with the historical trend.









Spain and Portugal

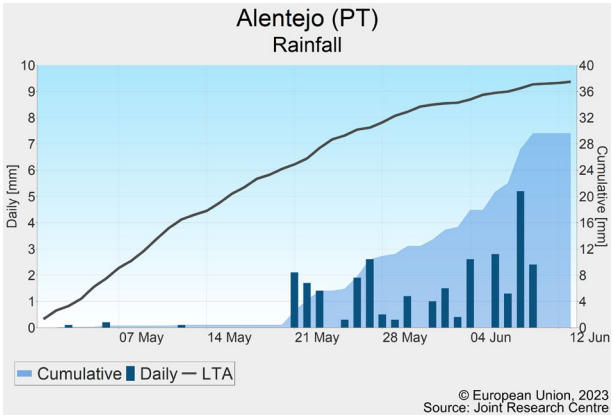
The return of rain did not save winter and spring crops

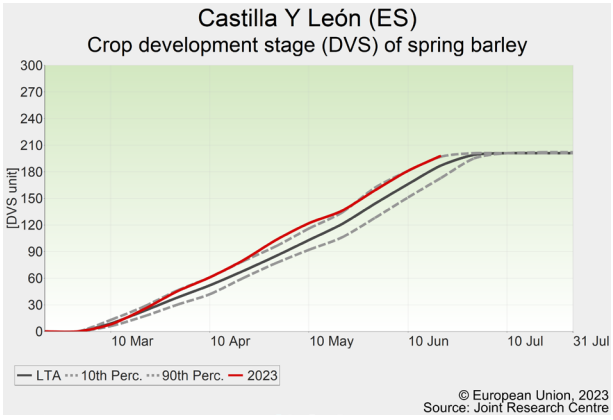
The last dekad of May saw the return of substantial rain in the Iberian Peninsula. For winter and spring crops, the rains arrived too late to be of benefit; summer crops may benefit, as they are in early development.

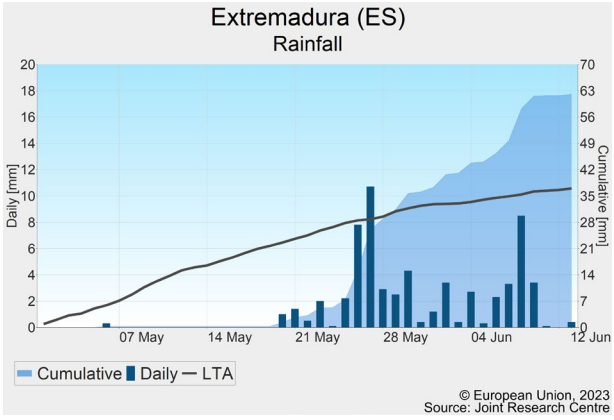
Over the review period as a whole, rainfall, temperature and radiation were in line with the LTA. However, rainfall returned only in the last dekad of May, and with high spatial and intensity variation. The extreme level of soil desiccation caused soils to become water repellent and much of the rain to be lost before it could be absorbed. Water reservoirs in Spain have marginally benefited from the rain and are close to the drought level of 2022[3]. In Portugal, water levels are still close to capacity in *Alentejo* and in reduced capacity in *Algarve*[4].

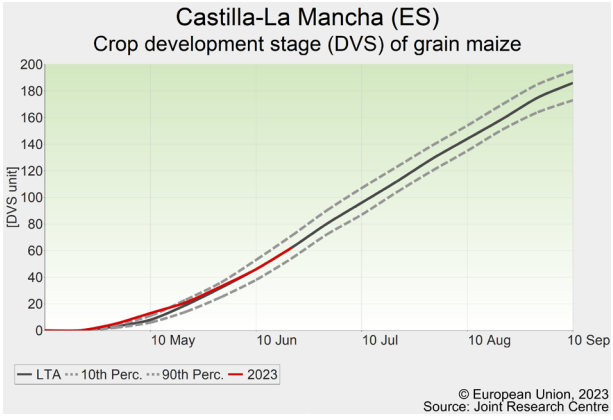
For winter and spring crops, the rains arrived too late to be of any significant benefit. Regarding summer crops, in central and northern Spain, where irrigation water quota allow, summer crops are in early vegetative stages and are faring well so far. The rainfall since the end of May has supplemented irrigation demand well. In southern-central and southern regions, irrigation quota are highly restricted, which has resulted in a strongly reduced area of summer crops. Where planted, grain maize is showing development in line with the LTA.

The yield forecasts for winter and spring crops are on a par with the May Bulletin, when they were already substantially decreased. The situation has not changed and is still very serious, with forecasts below last year's level. The yield forecasts for summer crops have been kept moderately below the 5-year average. The effects of the rainfall will have to be re-evaluated in the July Bulletin.









[3] www.embalses.net, 14 June 2023
[4] https://sir.dgadr.gov.pt/reservas, 14 June 2023

Hungary

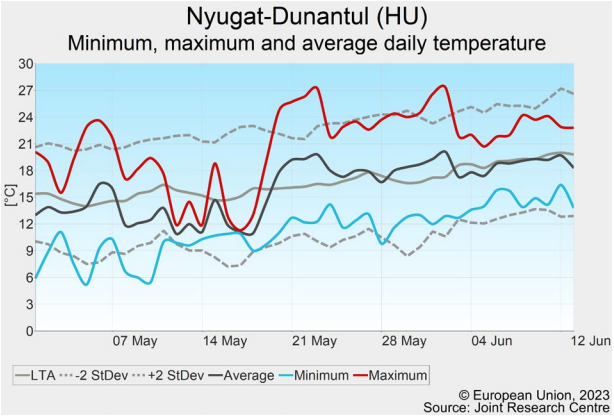
Abundant rainfall maintains high soil moisture reserve

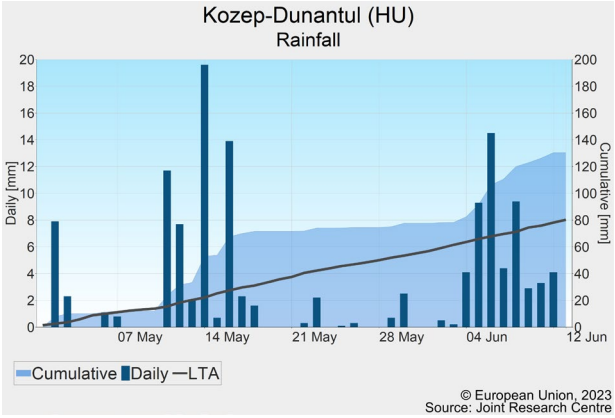
Abundant rainfall kept the soil moisture content high during flowering and grain-filling stages of winter cereals. While the humid conditions increased the possibility of fungal infections and weed pressure, winter crop yield expectations remain high. Summer crops are mostly underdeveloped, due to a delayed sowing campaign and delayed crop development.

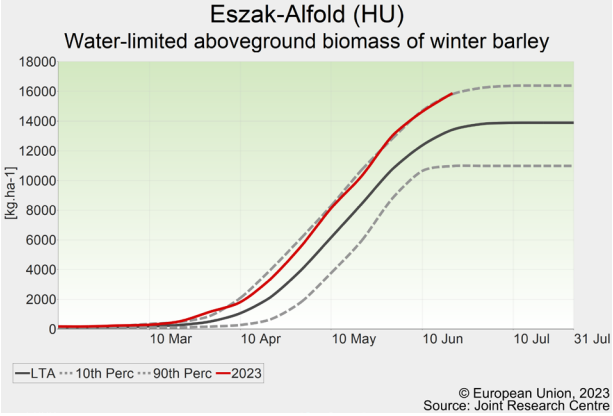
During the first two dekads of May, Hungary experienced a period that was 1°C to 2.5°C colder than usual, which was especially pronounced in the north-western regions. From 20 May onwards, daily temperatures fluctuated around the LTA, while daily maxima did not exceed 30°C. Frequent and abundant rainfall occurred throughout the analysis period, except in the last dekad of May. Rainfall totals often exceeded the seasonal average by 50-100%. Several times intense, torrential and locally devastating precipitation events, accompanied by hail, caused field damage and flash floods.

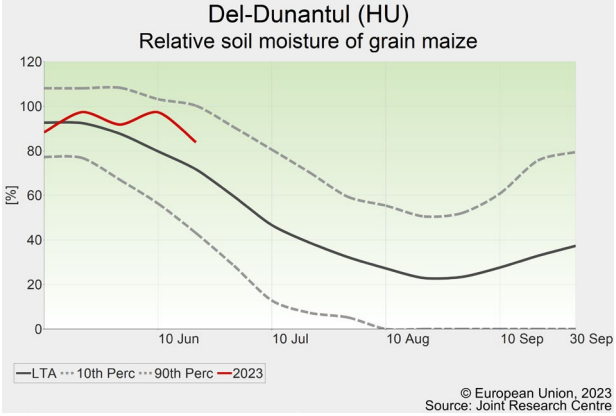
The moderate temperatures were favourable during the flowering of winter crops and beneficially elongated the early grain-filling period. The soil moisture content often exceeded the average and provided sufficient water supply to winter crops throughout the analysis period. Remote sensing imagery confirms the very good yield expectations for winter cereals and rapeseed. However, the wet conditions increased disease pressure and reduced the efficiency of pest control.

The wet topsoil conditions hampered the sowing of summer crops so that a slight decrease can be expected in cultivated areas of maize, sunflowers and soybean. The early development of summer crops was further delayed by low temperatures until 20 May. Consequently, these crop stands are now underdeveloped in terms of both leaf area index and biomass accumulation, as confirmed by our remote sensing analysis and crop model results. However, the high soil moisture levels are promising for the impending main flowering and grain-filling stages. Therefore, although summer crops are currently delayed in development, our yield forecast remains optimistic and slightly exceeds the long-term trend.









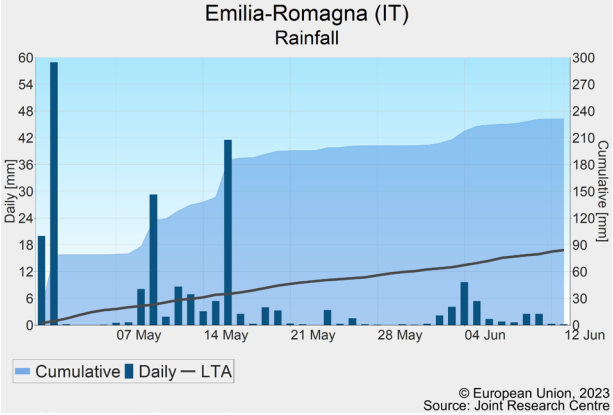
Italy

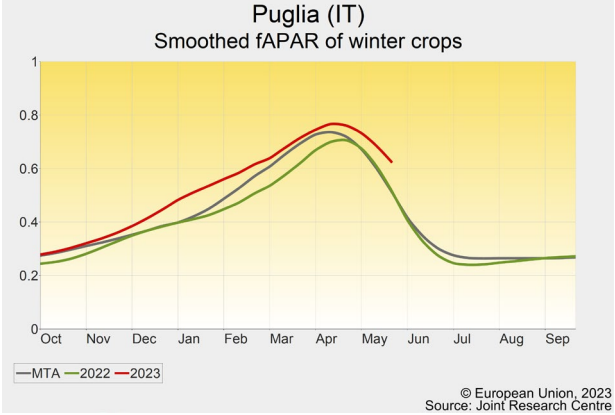
Floods and storms negatively impact winter cereals

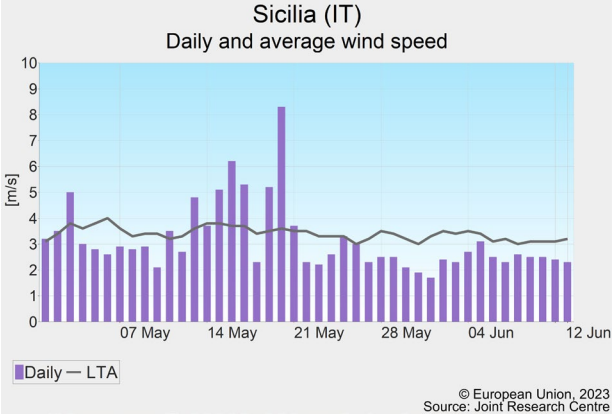
The weather was unfavourable for soft and durum wheat. Flood events hit large parts of the agricultural areas in Emilia-Romagna. Winter wheat in Sicilia was negatively impacted by strong winds and heavy rains. Summer crops are generally faring well.

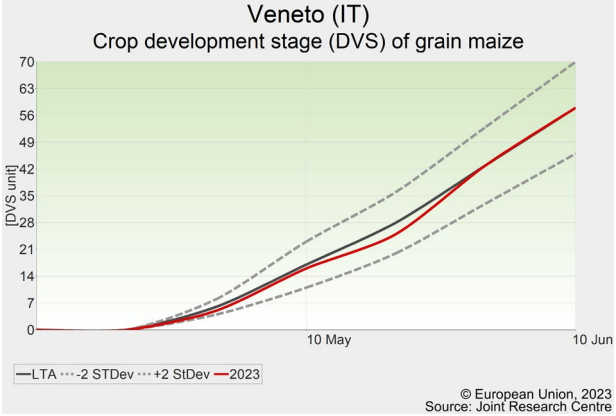
I n Italy, average daily temperatures remained moderately above the LTA, except in the second dekad of May, when they fell to 2°C to 4°C below the LTA in conjunction with heavy rainfall and windstorms. An exception to this was *Sicilia* where temperatures remained steadily 1°C to 2°C below average. Rainfall during the analysis period was abundant throughout the peninsula, with cumulative levels at least 50% above the LTA in several central and southern regions, representing record-high precipitation totals since 1979. These are best exemplified in *Emilia-Romagna* (231 mm compared with an LTA value of 84 mm) and in *Sicilia* (84 mm compared with 19 mm). In mid-May, extreme rain events occurred for the second time this season in *Emilia-Romagna*, broadening the area of previous concern and worsening the already critical conditions for crops. According to local authorities[5], 42% of agricultural area in this region (corresponding to 3.6% of national utilised agricultural area) is damaged by floods. In *Sicilia*, in the provinces of *Catania*, *Ragusa* and *Siracusa*, crops were hit by strong windstorms and heavy rains, which caused lodging in durum wheat fields.

After a generally favourable season for winter cereals in Italy, despite drought/dry conditions at the beginning of 2023, the extreme weather events shortly before harvest led to a general reduction in yield expectations for soft wheat (*Emilia-Romagna* accounting for nearly 35% of national production) and, to a lesser extent, durum wheat (i.e. *Sicilia*). Summer crops are overall faring well, with some slowdown in biomass accumulation for maize and soybean in *Veneto*. Crops are in full vegetative stage and our yield forecasts are positive.









[5] https://www.regione.emilia-romagna.it/notizie/2023/maggio/agricoltura-le-prime-stime-dellalluvione-colpito-il-42-della-superficie-agricola-danni-per-miliardi

Czechia, Austria and Slovakia

Positive winter crop yield expectations despite lack of rain in Czechia

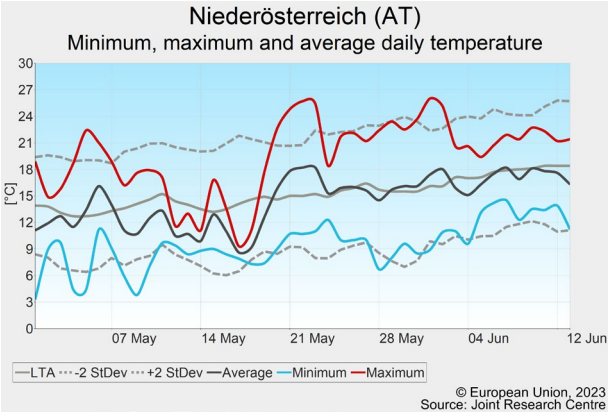
The review period was slightly colder than usual, with rainfall totals ranging from significantly below average in Czechia to well above average in western Slovakia and parts of Austria. Nevertheless, crops seem to be in good condition and yield expectations are positive.

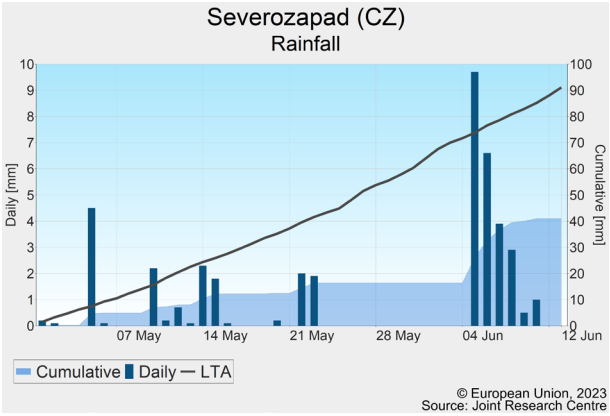
After a colder-than-average start to May, temperatures fluctuated around the LTA from mid-May until the end of the review period. Towards the end of May and at the beginning of June, maximum temperatures increased but rarely exceeded 25°C.

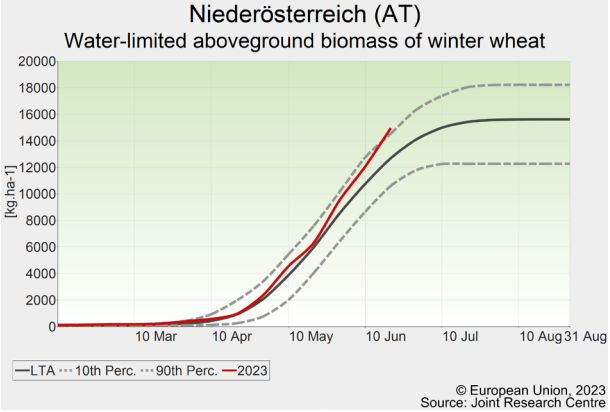
Rainfall totals for the review period were significantly below the LTA in most of Czechia (up to -50%, except in the south-east which was around average) and in *Oberösterreich* (-30%), leading to soil moisture depletion until rain at the end of the review period improved topsoil moisture conditions again. By contrast, in north-eastern and southern Austria (*Niederösterreich* and *Steiermark*), as well as in western Slovakia, rainfall totals were well above average (+20% to +60%).

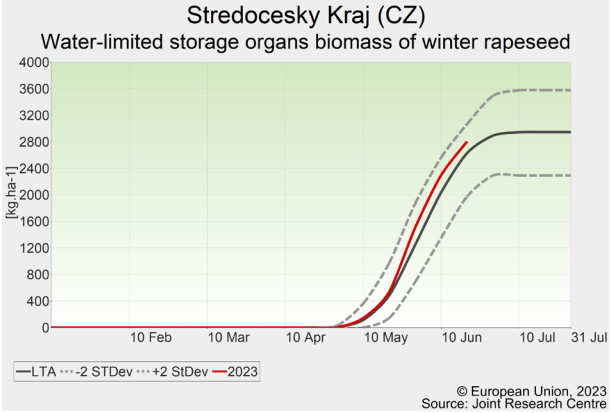
Winter and spring crops are generally in good condition, close to seasonal averages for development and growth. According to our model results, biomass and storage organs accumulation are close to or above average in the main producing regions of Austria and Slovakia, having benefited from the moderate temperatures and good water supply, while in north-eastern Czechia (*Severozápad* region) the rainfall deficit has impacted plant development. In all countries, rain will be essential in the coming weeks to maintain the yield potential of winter crops, currently at grain-filling stage.

Summer crops are slightly delayed in development due to late sowing followed by a cool spring. However, a warmer late May and early June accelerated vegetative growth. The yield outlook for winter, spring and summer crops has not substantially changed; yield expectations remain close to historical trends.









Bulgaria

Yield expectations of winter cereals slightly reduced

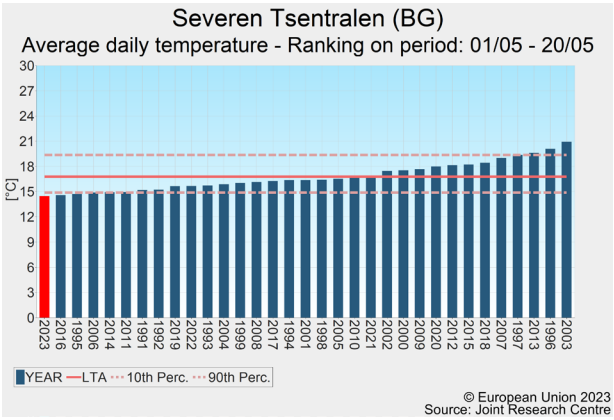
Cool and wet weather during the early grain filling of winter crops was adequate for yield formation, but increased pest pressure. In the northern half of Bulgaria, satellite images indicate weaker-than-usual crop status, mainly due to late sowing and delayed development of summer crops.

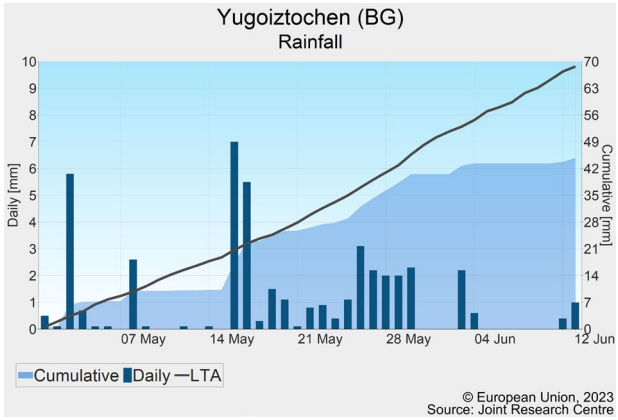
Bulgaria experienced significantly below-average temperatures during the first 20 days of May, with negative thermal anomalies reaching values between -1°C and -3.5°C. This was one of the coldest periods 1–20 May in our data archive (since 1991). Subsequently, temperatures increased and near-seasonal daily temperatures were recorded during the remainder of the review period (1 May – 12 June).

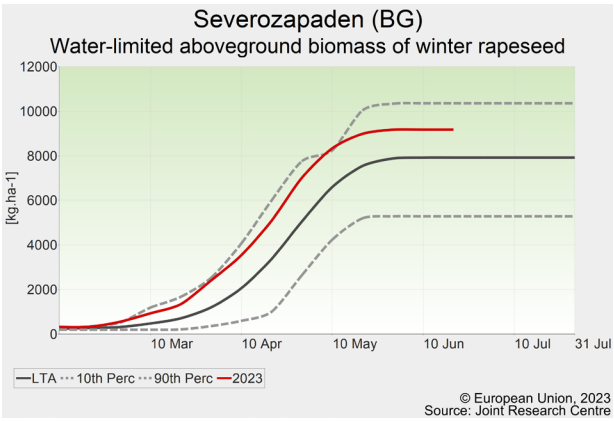
Precipitation was close to the LTA. The western regions enjoyed some (10-20 mm) rainfall surplus, while the eastern areas were slightly (by 10-20 mm) drier than usual. In the first half of June, little or no precipitation was observed in the eastern half of Bulgaria, but soil water availability remained adequate.

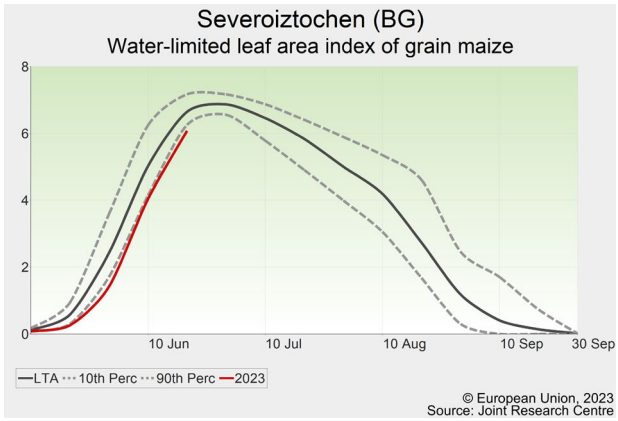
The colder-than-usual conditions of early May slowed down winter crop development. Significant precipitation in May beneficially aligned with the grain-filling phase of winter crops and sustained high crop biomass accumulation, particularly in southern and eastern regions. Summer crops experienced serious delay to growth, due to cold and wet weather conditions during sowing and early development; current soil moisture conditions are however beneficial. Remote sensing images indicate delayed and/or sub-optimal crop status in the northern half of Bulgaria, which is mainly attributed to the underdeveloped summer crops. Moreover, pest and disease pressure was high this spring, which can negatively affect final yields.

The yield forecast for winter cereals was slightly reduced all factors considered, but remains above the 5-year average. Summer crop forecasts are maintained in line with historical trends.









Denmark and Sweden

Negative yield outlook due to significant rainfall deficit

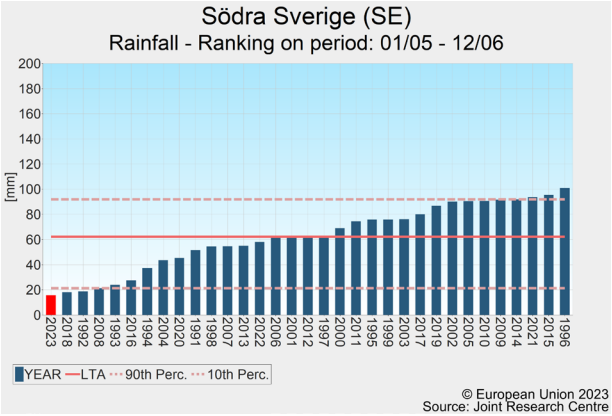
While temperatures and radiation were close to seasonal values, the review period has been characterised by exceptionally low rainfall. While no irreversible damage is expected yet, yield forecasts have been lowered in both countries, and rain will be needed in the short term to sustain plant development.

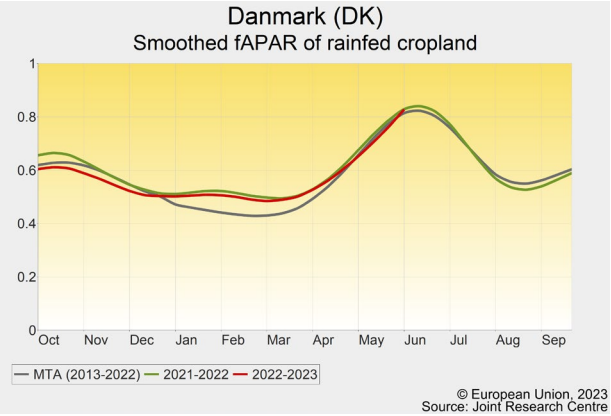
The review period was characterised by a significant precipitation deficit in both countries, with rainfall totals often only around 50% of seasonal values and close to the lowest levels on our records. Hardly any single rainfall event exceeded 5 mm per day. The first week of May was colder than usual in both countries, followed by a warmer second week. During the rest of the review period, temperatures remained close to the LTA. Cumulative temperatures are also close to the average for the review period as a whole. Radiation levels were above average by approximately 20%.

Our models indicate that soft wheat reached the flowering stage approximately one week in advance of the LTA in Denmark and southern Sweden, while in eastern Sweden the phenology is in line with normal values. Spring barley has reached the heading stage in both countries, close to the LTA.

Satellite imagery indicates close to average (MTA) fAPAR values in both countries.

Despite the exceptionally dry conditions, so far no major negative impacts are expected on winter crop yields. However, rainfall is urgently needed to sustain good plant development, especially for soft wheat, which has reached the water-sensitive flowering stage. The yield outlook for spring and summer crops is less optimistic, especially for the latter whose emergence coincided with the dry spell. Given the absence of rainfall and warmer-than-usual temperatures in the weather forecast for the coming week, our yield forecast will be lowered to close to the 5-year average for winter crops and below average for spring and summer crops.





Estonia, Latvia, Lithuania, Finland

Yield forecasts revised downward after a cold and dry period

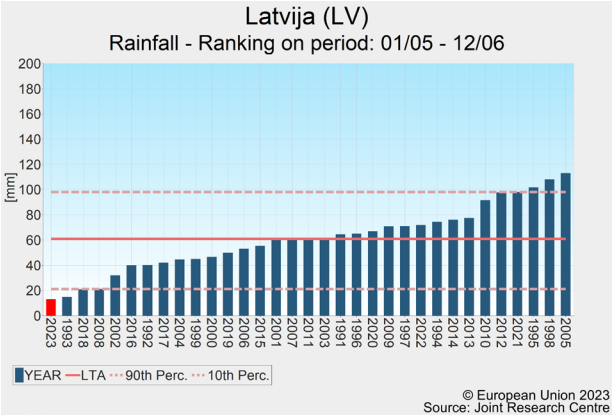
The review period was characterised by colder temperatures and a large precipitation deficit. No major impacts on crop yield are expected yet, but rainfall is urgently needed. Yields have been lowered to close to the 5-year average for the Baltic states, and maintained slightly above for Finland.

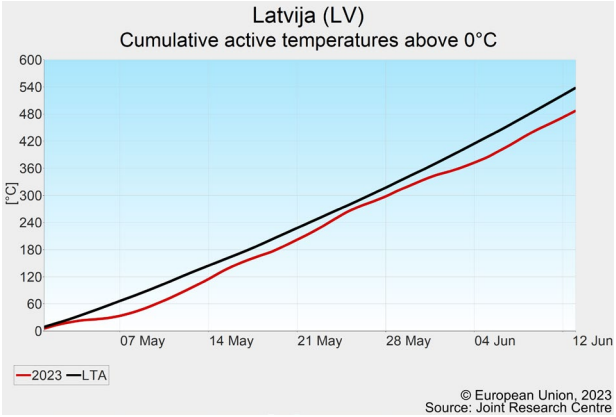
A rainfall deficit has been observed during the review period in all countries, although less pronounced in Finland. Rainfall totals of less than 20 mm are the lowest on our records for Latvia and Lithuania, reaching only 20-40% of the LTA for the Baltic states, while in southern Finland at least 50% of the LTA was reached. Prevailing temperatures were mainly below average, except for the second dekad of May. Cumulative temperatures (base 0°C) for the entire period stayed below the LTA for the Baltic states and slightly below the LTA for Finland. A positive anomaly for radiation was reported for the Baltic states due to frequent clear-sky conditions, while values were closer to the LTA for Finland.

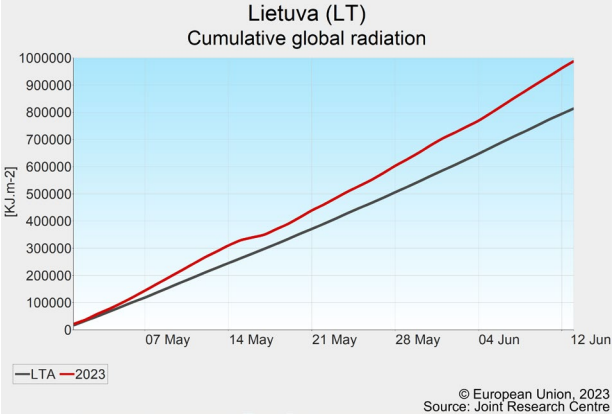
According to our models, spring barley has reached the heading stage in all countries in line with normal values. Soft wheat is still in line with seasonal values and has reached flowering in Lithuania, while in other countries the crop is still in its heading stage.

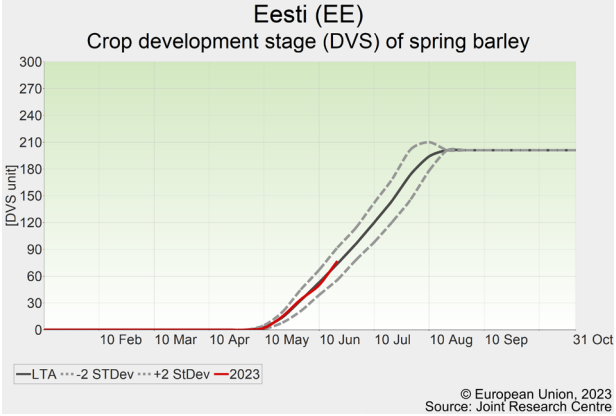
MODIS-derived NDVI is still close to the MTA, suggesting that the dry conditions have not yet had significant impacts on crops.

While the cool conditions of the past weeks did not harm crops in their development despite some delay, the sustained lack of rainfall in the Baltic states has impacted crop development for both winter crops, which are reaching the flowering stage, and emerging spring crops. As the weather forecast indicates warmer temperatures and continued lower-than-average precipitation for the coming week, our yield forecasts will be lowered to below the 5-year average for the Baltic states and maintained slightly above the 5-year average for Finland..









Greece

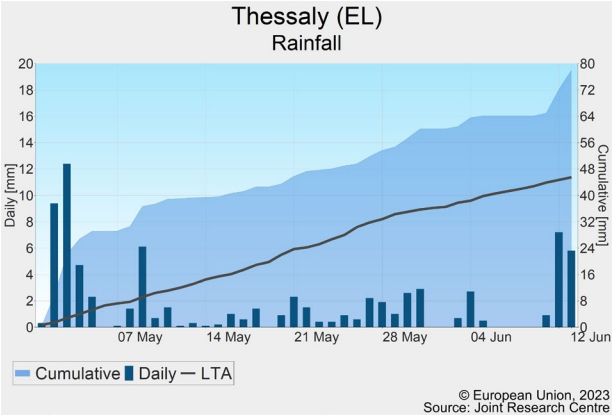
Rains delay the harvest of winter crops

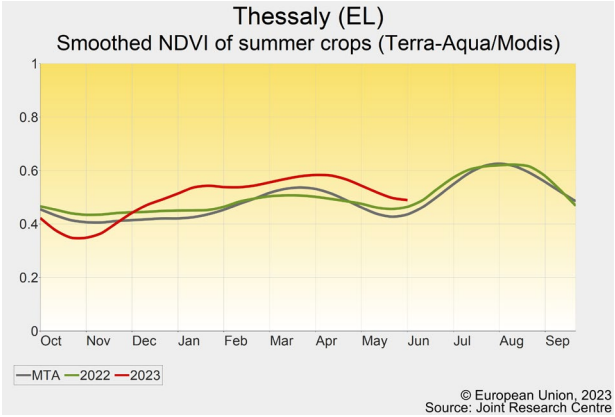
Greek farmers have successfully completed their winter crop season, but frequent daily rains are disrupting harvest operations, at the expense of grain quality.

After continuous delays caused by the rainy weather in May, the Greek barley harvest has finally started at the end of May in the major barley producing regions[6] of Central Greece and Thessaly (which represent 11% and 33% of the national production, respectively).

The other main producing region, Central Macedonia (25% of the national production), will be harvesting barley around mid-June, with delays also caused by rain. Wheat harvest will also begin in the coming days. The winter crops yields have not been affected by the slightly colder-than-usual temperatures (-0.5 to -2 °C compared with the LTA, during the period under review). The constant rainfall raises concerns for grain quality due to increased pest and disease pressure, together with an increase in the cost for drying before storing cereals.

Summer crops benefitted from the increasing temperatures in June and the frequent rain events, and are generally in good condition. Potatoes were locally negatively affected by rot or other infestations associated with the prolonged wet conditions. Our yield forecasts are maintained around the 5-year average. The forecasts for maize and potatoes were revised slightly upward; the forecasts for the other crops remain essentially unchanged.





[6] https://www.statistics.gr/en/statistics/-/publication/SPG06/-

Ireland

Good conditions for winter crops, less good for spring and summer crops

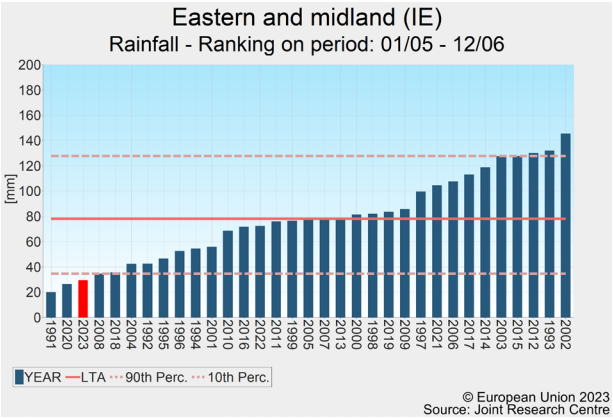
Dry and warm conditions prevailed throughout most of the review period. Winter cereals have reached grain filling in good condition, while spring cereals might suffer from the lack of precipitation. Yield forecasts have been decreased below the 5-year average for spring and summer crops and maintained above the 5-year average for winter crops.

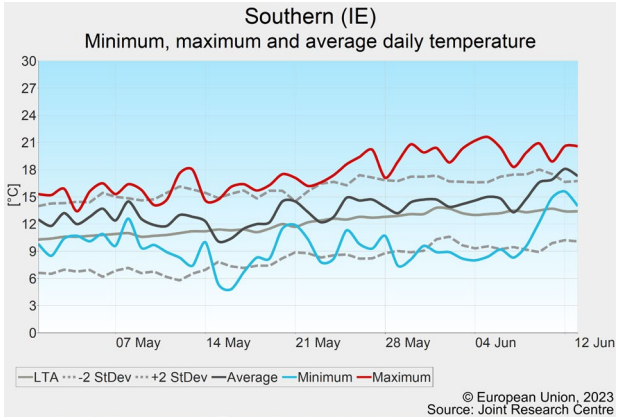
Rainfall occurred mostly during the first dekad of May, followed by 3 weeks with no significant precipitation. Cumulative rainfall values remain around 50% of the LTA, close to the minimum on our records. Temperatures prevailed above the LTA, resulting in a large positive anomaly for cumulative temperatures. Radiation remained slightly below average in May but increased in June, and showed a positive anomaly for the review period as a whole.

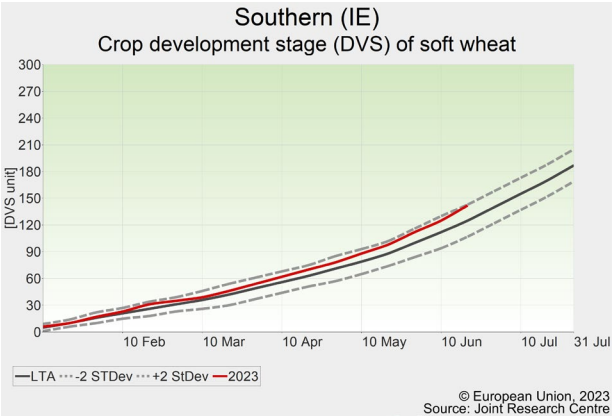
According to our models, winter wheat has reached the grain-filling stage approximately 2 weeks earlier than the normal time window. Spring barley is also estimated to have reached grain filling in advance, but the wide range of sowing dates for spring barley reported in the previous edition of the Bulletin renders the results somewhat uncertain.

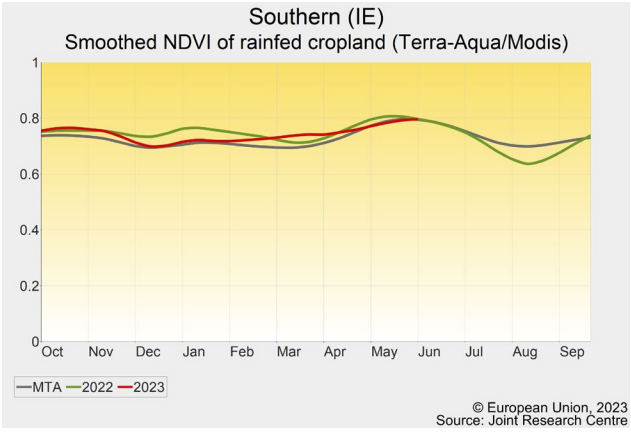
NDVI closely followed average development during the review period, suggesting that the warm but dry conditions of the review period did not affect crops.

Winter crops should have exited the water-sensitive flowering stage before the dry and warmer-than-usual conditions could impact their growth. Spring barley, on the other hand, will likely suffer more from the water deficit. Our yield forecasts will be maintained above the 5-year average for winter crops, but decreased to below the 5-year average for spring barley.









Belgium, Luxembourg and the Netherlands

Early summer onset demands more rain to come

Sunny and dry conditions since mid-May were initially welcomed, but have become a concern as soil water contents steeply decreased. Winter crops are still faring well. The yield forecast for potatoes was revised downward, but remains close to the 5-year average.

The period of excessive rainfall, which affected the region since the beginning of March, ended mid-May. Since then, sunny weather conditions, without any significant rainfall, prevailed throughout the region. Temperatures remained close to the LTA until the beginning of June, after which they increased to above-average levels, reaching around 30°C (up to 32°C in southern Netherlands and western Belgium) for several days around 10 June.

The arrival of the sunny and dry conditions in May allowed soils to be freed from excess water, facilitated field operations, and boosted photosynthesis, all to the benefit of crops. However, as dry conditions persisted with increasing temperatures, soil moisture levels rapidly depleted and started to affect the growth of crops. In Belgium, water withdrawal from surface waters has already seen first restrictions.

Winter crops are in flowering phase and generally in good condition, but growth limitations due to the dry spell have started to become visible. Assuming no significant impact from high temperatures on flower fertility, high yields can be still attained, provided significant rainfall as currently forecast, (but not too much) will arrive in the coming week.

For summer crops, the situation is mixed: Early-sown crops and crops benefitting from irrigation are generally faring well. However, most summer crops were sown late this season; partly at the end of May, when soils were already drying, which is leading to uneven stands. This affects particularly potatoes, of which the quality of seed material had already worsened due to the delayed sowing.

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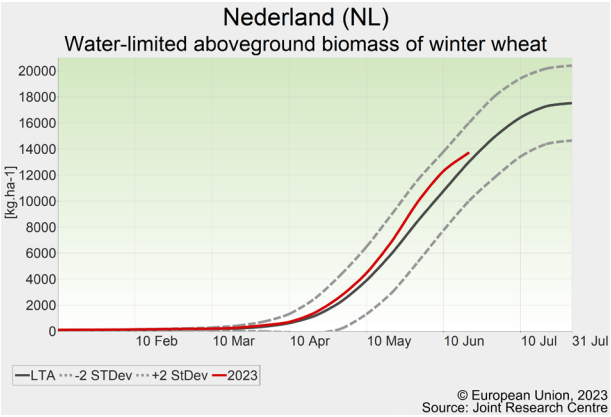
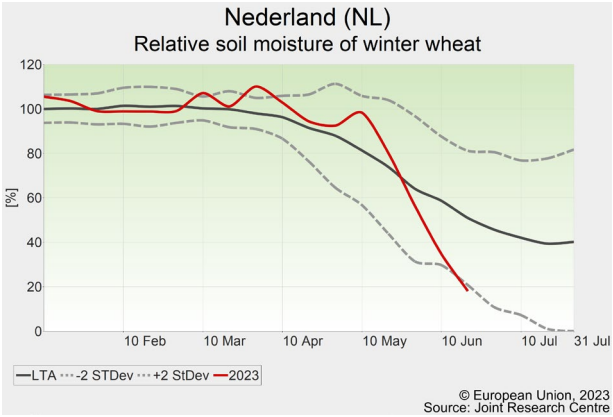




Slovenia and Croatia

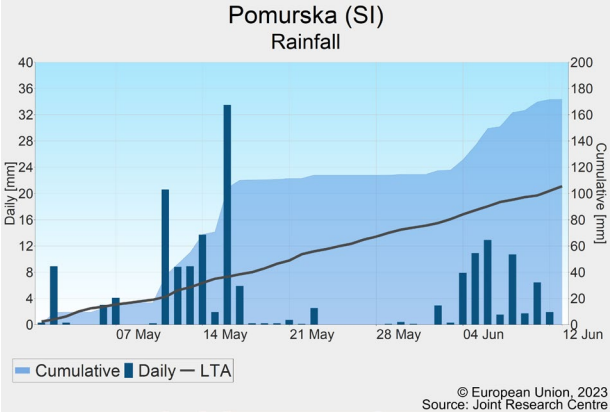
Delayed development of summer crops

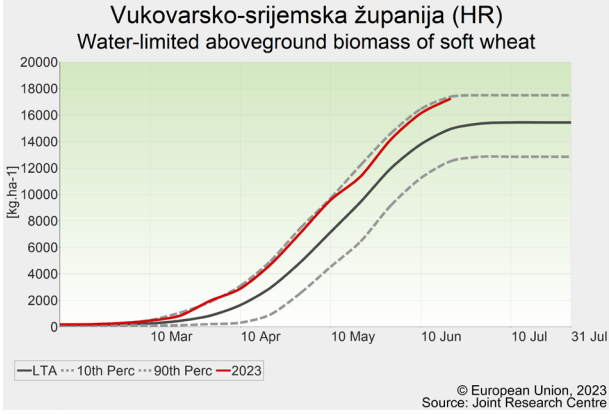
Rainy and cooler weather delayed sowing and early growth of summer crops. Moist weather conditions increased disease pressure. Winter crops, approaching ripening, benefited from good water supply so the yield outlook was moderately increased.

The first two dekads of May were substantially colder than usual, with temperature anomalies down to 2°C below the LTA. After 20 May, daily temperatures gradually increased to above-average values. During the analysis period, rainfall totals reached 130-200 mm in the most important agricultural areas (around 140-200% of the LTA). Mid-May and early June were particularly wet. The high number of rainy days resulted in below-average global radiation levels.

The moderate temperatures and good water supply positively contributed to the yield formation of winter cereals. However, winter crops experienced increased disease pressure due to the overly wet conditions; locally they were also affected by waterlogging. Our model simulations show above-average biomass levels in eastern Croatia (eastern *Kontinentalna Hrvatska*) while in the rest of Croatia and Slovenia, simulated biomass displays approximately seasonal values. Our previously pessimistic yield forecasts for winter crops have therefore been revised slightly upwards.

The cold and wet weather in May caused delays to sowing of summer crops and provided poor conditions for crop establishment in many agricultural regions. Currently, summer crops are under-developed and canopy expansion is delayed. On the other hand, the fully replenished soils could be a positive factor during flowering compared to an average year. As it is too early to evaluate the impact of the wet conditions with certainty, our yield forecasts for summer crops remain in line with the long-term trend.





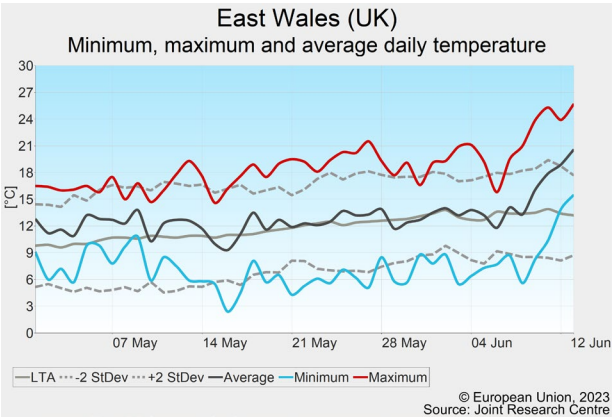
5.2. United Kingdom

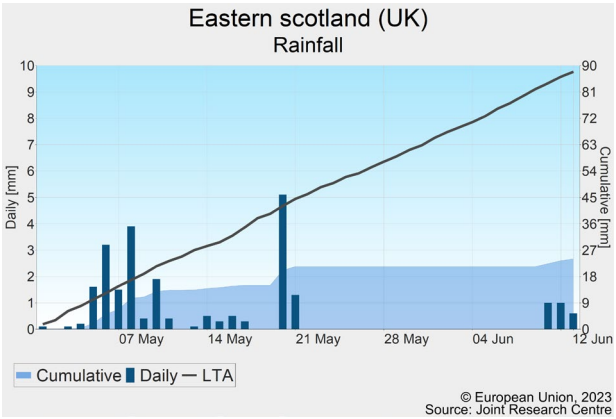
Overall positive outlook

The wet conditions in spring were overall favorable, and the dry spell end of May and early June has not yet compromised the positive outlook.

The majority of the country experienced higher than average temperatures, except for the southeast where temperatures remained normal. Following the rainy months of March and April, cumulative rainfall resulted around the LTA for the first half of May. However, starting from mid-May, the country entered a prolonged period of dry weather, accompanied by significantly higher radiation levels, particularly in the eastern and northern areas.

Overall, cereals are in good condition, as indicated by the remote sensing analysis, benefiting from the favorable wet conditions during spring. However, the decrease in soil moisture caused by the following dry period could become problematic, if persisting. Winter and spring cereals, which have poorly developed roots due to the wet spring, are more susceptible to prolonged dry periods. As of today, however, the positive impact of the wet spring period prevails, so that our yield forecasts for winter and spring crops were revised upward.





5.3. Black Sea Area

Ukraine

High levels of winter crop production expected

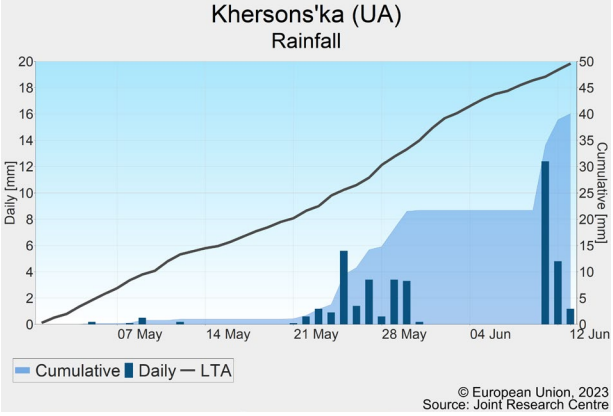
The end of spring was characterised by drier-than-usual conditions but without depletion of soil moisture below critical levels. Winter crops profited from the absence of thermal stress during the review period, which permitted favourable conditions during flowering and early grain-filling stages.

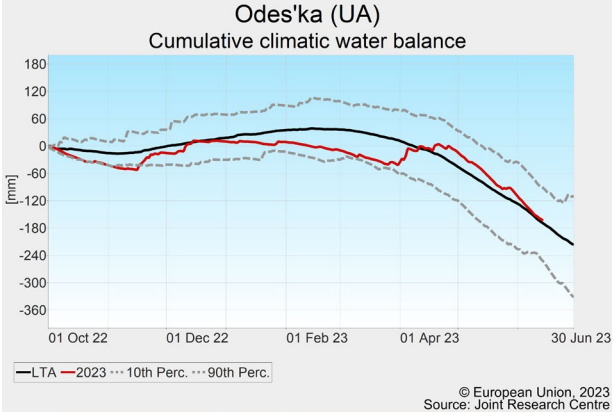
Following the record-high rainfall in April, drier-than-usual conditions prevailed in most oblasts during the period under review. Rainfall was 50% to 80% below the LTA in central and western parts of the country, and at near-seasonal levels in the east. Since early June, rainfall has returned to the western and northern oblasts.

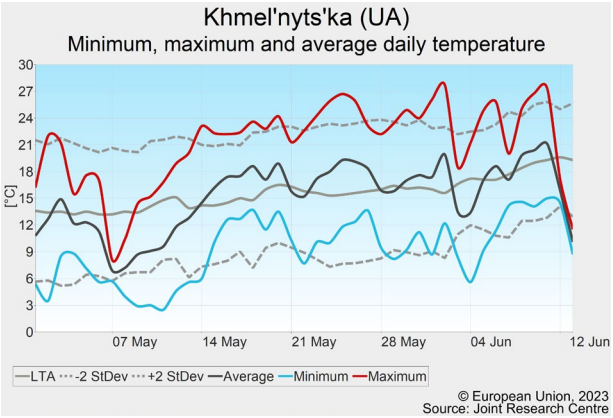
Temperatures were significantly cooler than usual (2-4°C below the LTA) during the first two dekads of May, but stayed up to 2°C above the LTA in most regions during the third dekad. Since early June, temperatures have returned to slightly below-average levels.

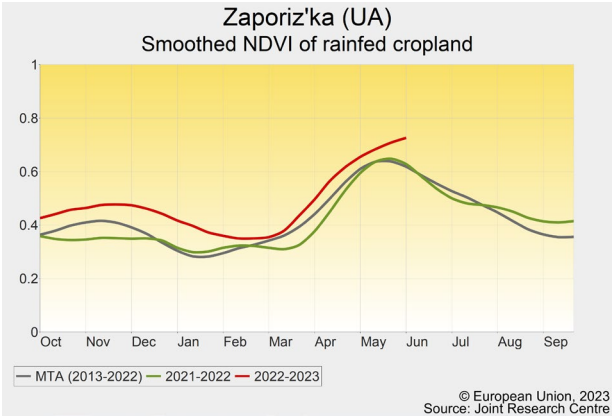
Winter crops entered the reproductive stages under sufficient soil moisture conditions and were not exposed to any thermal stress. These favourable conditions sustain an improved yield outlook. A more detailed analysis is provided in the June Bulletin on Ukraine in the Global Outlook series.[7]

Sowings of summer crops continued during the first week of June. The Ukrainian Ministry of Agrarian Policy and Food reported an increase in area planted with sunflowers, at the expense of grain maize.[8]









[7] https://publications.jrc.ec.europa.eu/repository/handle/JRC133193
[8] https://minagro.gov.ua/news/12-regioniv-ukrayini-zavershili-sivbu-yarih-kultur

Türkiye

Improved yield outlook for winter crops

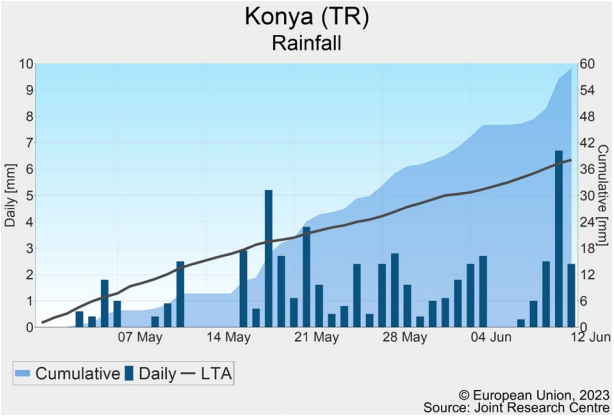
The absence of thermal stress and the adequate soil moisture conditions during the review period permitted favourable crop growth and development. Our yield forecast is currently above the 5-year average for winter crops.

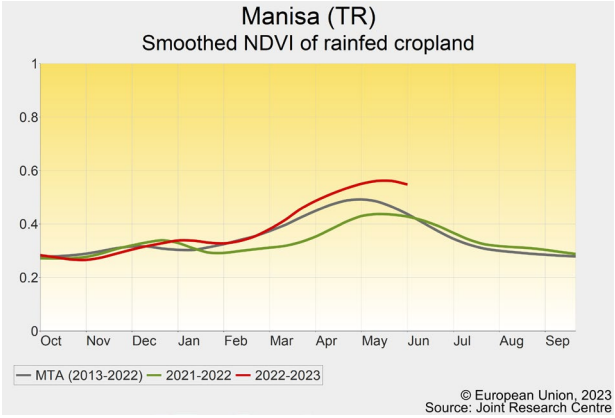
Wetter-than-usual conditions prevailed in western Türkiye during the review period, with rainfall totals mostly 80% to 100% above the LTA. In the east, rainfall was near seasonal levels, except for the south-east along the border with Syria where a rainfall deficit (50% to 80% below the LTA) was observed.

Temperatures stayed around 1°C to 2°C below the LTA in the west and in the eastern parts of central Anatolia, where the temperature accumulation was up to 30% below the LTA. The rest of the country experienced near-seasonal thermal conditions.

The rain maintained a good soil moisture supply throughout the country and the absence of any thermal stress throughout the spring resulted in fair to good growing conditions for winter crops. Our remote sensing analysis shows above-average biomass accumulation in most of the producing regions. Consequently, our yield forecast for winter crops was revised upwards and is currently above the 5-year average.

Summer crops also profited from the above-mentioned fair conditions, which were favourable for germination and early development. Our yield forecast is close to the historical trend.





5.4. European Russia and Belarus

European Russia

Fair to positive conditions for winter crops

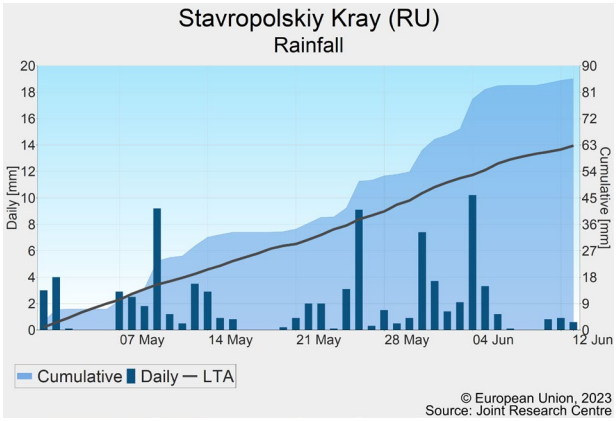
Adequate soil moisture conditions, combined with the absence of thermal stress, sustain a positive yield outlook for winter cereals in south-western regions. In the Volga okrug, the lack of rainfall combined with high temperatures could negatively affect yields.

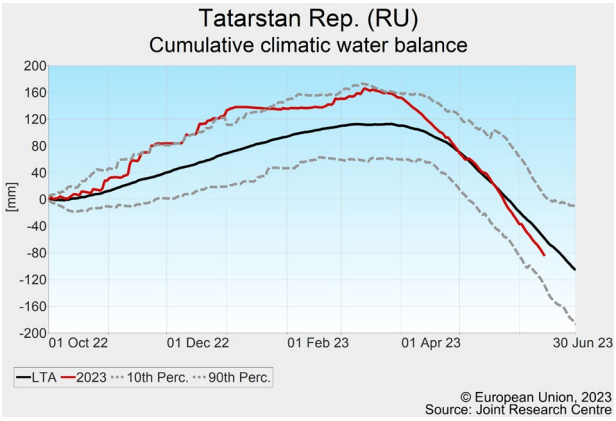
Most regions of European Russia experienced drier-than-usual conditions during the review period. The most distinct rainfall deficit (50% to 80% below the LTA) was recorded in the western half of the Central okrug and the northern parts of the Volga okrug. Wetter-than-usual conditions prevailed only in the south-western regions (e.g. *Stavropolskiy*), where rainfall was frequent and mostly 30% to 50% above the LTA.

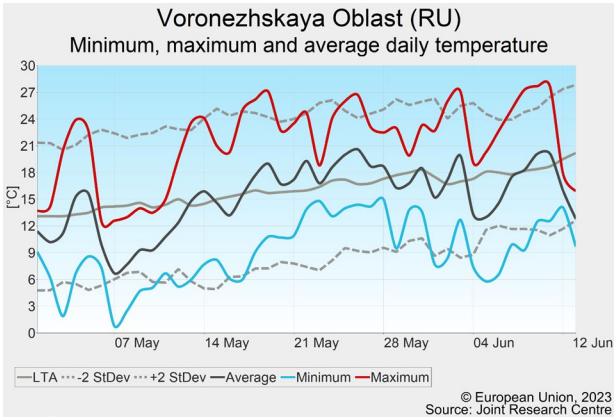
Temperature patterns varied among the regions. The Central okrug and the western part of the Southern okrug (e.g. *Krasnodarskiy*) experienced mostly cooler-than-usual conditions, with average temperatures 1°C to 2°C below the LTA. In the eastern half of the Southern okrug and in the North-Caucasian okrug, temperatures stayed near seasonal levels. Above-average temperatures (mostly 1°C to 2°C above the LTA) prevailed in the Volga okrug.

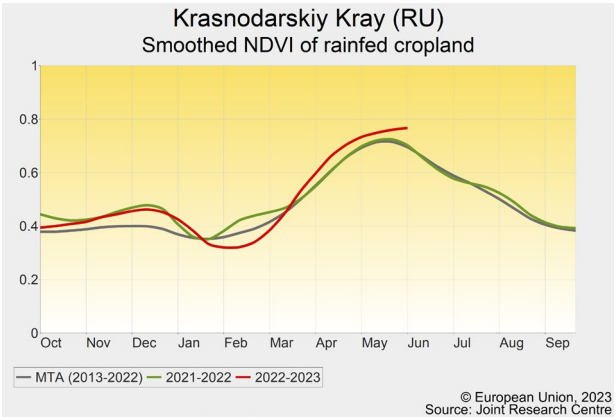
Consequently, winter crops remain in fair to good condition in most parts of European Russia. In the south-western and central regions, temperatures and soil moisture reserves stayed at adequate levels while winter cereals entered the flowering and early grain-filling stages. However, the condition of crops in the Volga okrug will rapidly deteriorate if drier- and warmer-than-usual conditions persist in the coming weeks.

A more detailed analysis, with quantitative yield and production forecasts, will be provided in the upcoming June Bulletin on Russia in the Global Outlook series[9].









[9] https://publications.jrc.ec.europa.eu/repository/handle/JRC133235 (to be published on 26 June 2023).

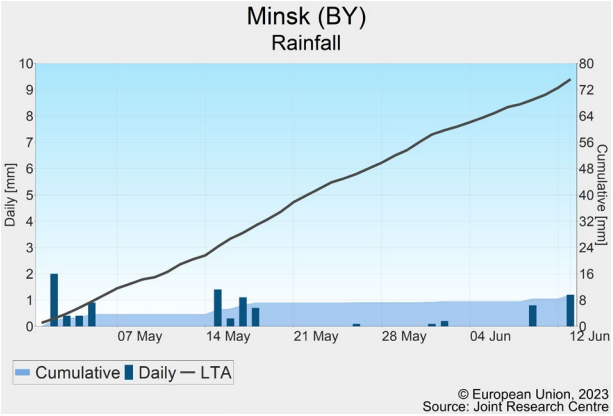
Belarus

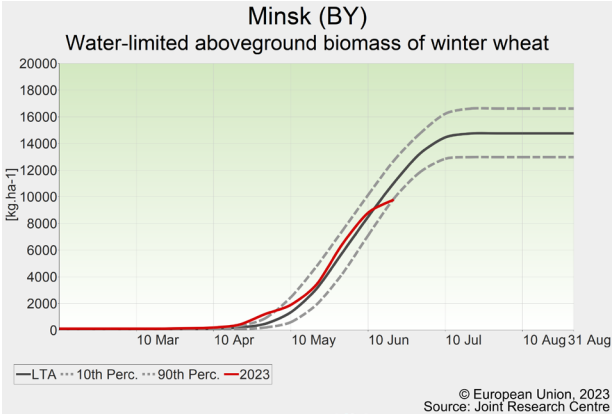
Dry conditions affecting growth of winter crops

Significant rainfall deficits negatively affected winter crops during flowering and grain filling in central and eastern Belarus. The dry and cool weather was also unfavourable for early development of maize.

After the colder-than-usual first dekad of May, temperatures approached average conditions, resulting in an overall deficit in the temperature sum of around 10% for the analysis period as a whole. No significant rainfall has been noted since the beginning of May in the central and eastern part of the country, while only few and limited rainfall events (> 5 mm/day) were observed in the west. Rainfall totals were significantly below the LTA throughout the country, ranging from -50% in the west to -80% in the centre and east. Rainfall deficits, in conjunction with increasing temperatures and above-average cumulative global radiation, resulted in progressively depleted soil moisture levels, especially in central and eastern Belarus. Our model simulations indicate phenological development of winter wheat around seasonal averages and currently at grain-filling stage. Conditions of winter crops vary across the country, reflecting the scattered rainfall during the review period. Biomass accumulation of winter wheat has lost momentum and is now close to the seasonal average in the north-west (*Grodno* region) and below average in the centre and south-east. Only in the south-west (*Brest* region), our biomass estimations from models remain above average. Similarly, remote sensing analysis based on fAPAR points to slightly above-average canopy development in the west, while in the rest of the country canopy development is below average.

After delayed sowing, summer crops are developing in line with an average seasonal timeline. However, the lack of rain affected the early growth of summer crops in the *Minsk*, *Mogilev* and *Vitebsk* regions, where biomass accumulation and leaf area index development are below normal levels. Yield expectations for winter wheat have been reduced due to dry conditions during flowering and grain filling; the yield outlook for maize has also been reduced.





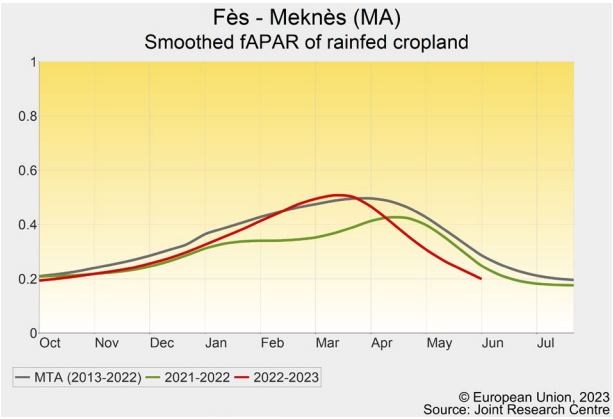
5.5. Maghreb

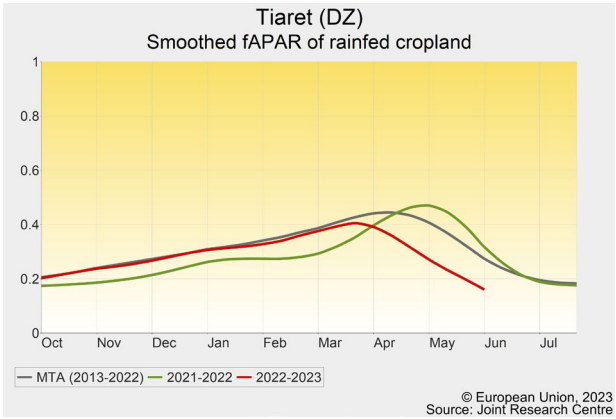
Morocco, Algeria and Tunisia

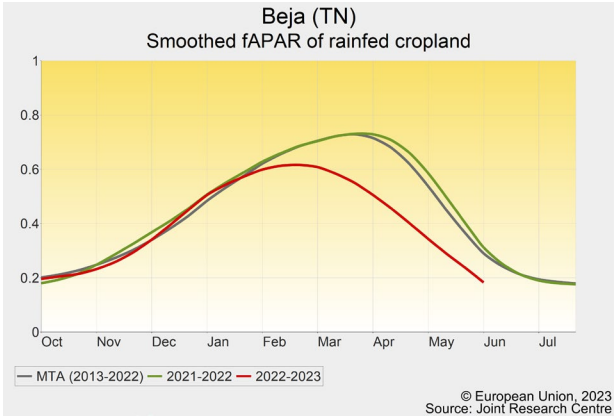
Negative outlook for cereals in the Maghreb countries

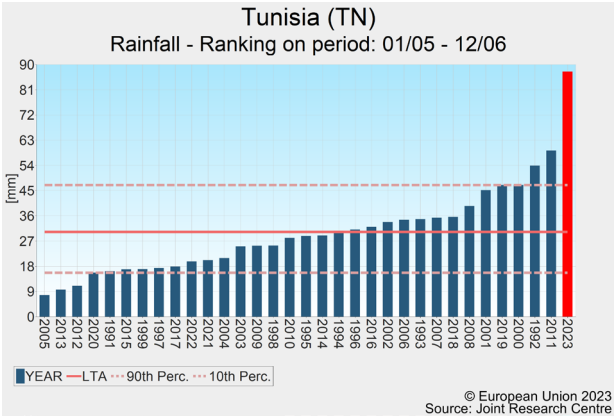
The yield outlook is well below average for both wheat and barley in the whole region. In most of the cereal producing areas, the combined effects of long-lasting drought and hot temperatures have hampered crops since the start of the season. Substantial rainfall since May arrived too late to benefit cereals.

The review period was marked by frequent and (in some regions) anomalous rain events. Cumulative rainfall in the analysis period was above average for the whole Maghreb area, with a few exceptions in Morocco (i.e. *Casablanca*) and north-western Algeria (e.g. *Tlemcen* and *Relizane*). In north-eastern Algeria and northern Tunisia, rainfall was 80% to 100% above the LTA (30-70 mm). Exceptional rains and flood events (with possible further damage to winter crops) occurred in Algeria in the provinces of *Skikda*, *Guelma* and *Souk Ahras*, and in Tunisia in the governorate of *Jendouba*. Here, 70-105 mm of cumulative rain was observed in the period 14-20 June. Despite the overall favourable weather conditions for crops since May, the rains arrived too late in the Maghreb area to improve the condition of crops, as they were already at the harvesting phase. The preceding long-lasting intensive drought conditions, especially during flowering and grain filling, severely reduced winter crop yield potentials for the 2022-2023 cereal season. Our yield forecasts are in line with the outlook in May and well below the 5-year average.



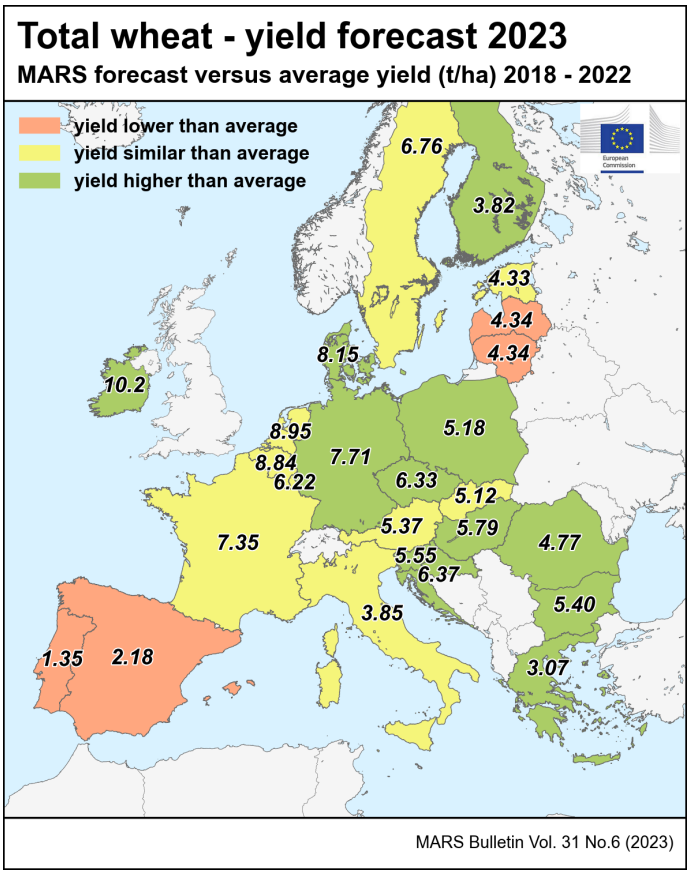




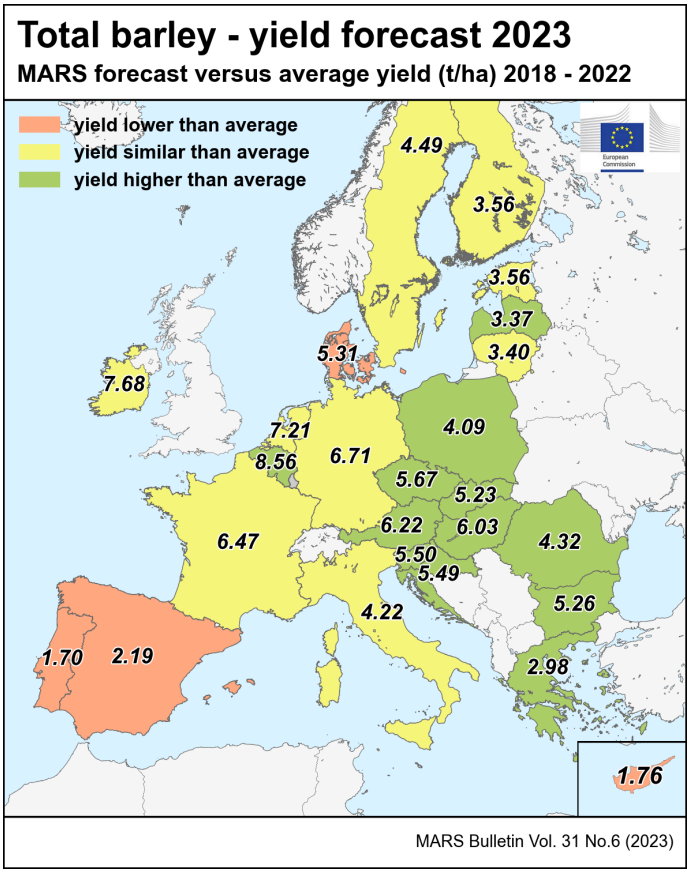


6. Crop yield forecast

Country	Total wheat (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	5.59	5.56	**5.70**	+ 2	+ 2
AT	5.52	5.73	**5.37**	– 3	– 6
BE	8.69	8.91	**8.84**	+ 2	– 1
BG	4.99	5.17	**5.40**	+ 8	+ 5
CY	—	—	**—**	—	—
CZ	5.93	6.07	**6.33**	+ 7	+ 4
DE	7.35	7.58	**7.71**	+ 5	+ 2
DK	7.80	8.47	**8.15**	+ 5	– 4
EE	4.38	4.72	**4.33**	– 1	– 8
EL	2.93	2.72	**3.07**	+ 5	+ 13
ES	3.52	2.79	**2.18**	– 38	– 22
FI	3.56	3.80	**3.82**	+ 7	+ 1
FR	7.18	7.08	**7.35**	+ 2	+ 4
HR	5.87	5.95	**6.37**	+ 9	+ 7
HU	5.23	4.40	**5.79**	+ 11	+ 32
IE	9.79	10.7	**10.2**	+ 4	– 5
IT	3.83	3.63	**3.85**	+ 1	+ 6
LT	4.54	4.74	**4.34**	– 4	– 8
LU	6.04	6.21	**6.22**	+ 3	+ 0
LV	4.59	4.72	**4.34**	– 6	– 8
MT	—	—	**—**	—	—
NL	8.95	9.47	**8.95**	– 0	– 6
PL	4.84	5.34	**5.18**	+ 7	– 3
PT	2.36	1.82	**1.35**	– 43	– 26
RO	4.30	4.18	**4.77**	+ 11	+ 14
SE	6.53	6.99	**6.76**	+ 4	– 3
SI	5.22	4.90	**5.55**	+ 6	+ 13
SK	5.06	4.69	**5.12**	+ 1	+ 9



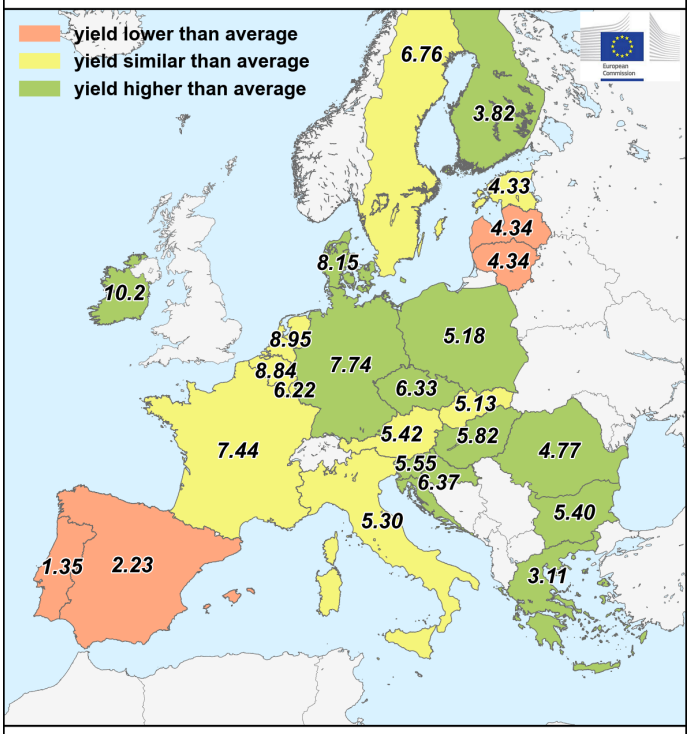
Country	Total barley (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	4.90	5.03	**4.76**	– 3	– 5
AT	5.92	6.19	**6.22**	+ 5	+ 1
BE	8.14	8.32	**8.56**	+ 5	+ 3
BG	4.76	4.97	**5.26**	+ 11	+ 6
CY	1.84	2.26	**1.76**	– 4	– 22
CZ	5.35	5.61	**5.67**	+ 6	+ 1
DE	6.56	7.08	**6.71**	+ 2	– 5
DK	5.83	6.79	**5.31**	– 9	– 22
EE	3.67	4.20	**3.56**	– 3	– 15
EL	2.82	2.44	**2.98**	+ 6	+ 22
ES	3.33	2.77	**2.19**	– 34	– 21
FI	3.51	3.82	**3.56**	+ 2	– 7
FR	6.27	6.12	**6.47**	+ 3	+ 6
HR	5.04	5.10	**5.49**	+ 9	+ 8
HU	5.41	4.80	**6.03**	+ 11	+ 26
IE	7.89	8.32	**7.68**	– 3	– 8
IT	4.13	4.20	**4.22**	+ 2	+ 1
LT	3.48	3.92	**3.40**	– 2	– 13
LU	—	—	**—**	—	—
LV	3.22	3.67	**3.37**	+ 5	– 8
MT	—	—	**—**	—	—
NL	7.05	7.77	**7.21**	+ 2	– 7
PL	3.83	4.43	**4.09**	+ 7	– 8
PT	2.97	2.47	**1.70**	– 43	– 31
RO	3.97	4.25	**4.32**	+ 9	+ 2
SE	4.51	5.50	**4.49**	– 0	– 18
SI	5.00	4.99	**5.50**	+ 10	+ 10
SK	4.73	4.72	**5.23**	+ 11	+ 11



Country	Soft wheat (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	5.81	5.79	**5.92**	+ 2	+ 2
AT	5.58	5.78	**5.42**	– 3	– 6
BE	8.69	8.91	**8.84**	+ 2	– 1
BG	4.99	5.17	**5.40**	+ 8	+ 5
CY	—	—	—	—	—
CZ	5.93	6.07	**6.33**	+ 7	+ 4
DE	7.37	7.61	**7.74**	+ 5	+ 2
DK	7.80	8.47	**8.15**	+ 5	– 4
EE	4.38	4.72	**4.33**	– 1	– 8
EL	2.98	3.01	**3.11**	+ 4	+ 3
ES	3.62	2.87	**2.23**	– 38	– 22
FI	3.56	3.80	**3.82**	+ 7	+ 1
FR	7.29	7.18	**7.44**	+ 2	+ 4
HR	5.87	5.95	**6.37**	+ 9	+ 7
HU	5.26	4.43	**5.82**	+ 11	+ 31
IE	9.79	10.7	**10.2**	+ 4	– 5
IT	5.36	5.12	**5.30**	– 1	+ 3
LT	4.54	4.74	**4.34**	– 4	– 8
LU	6.04	6.21	**6.22**	+ 3	+ 0
LV	4.59	4.72	**4.34**	– 6	– 8
MT	—	—	—	—	—
NL	8.95	9.47	**8.95**	– 0	– 6
PL	4.84	5.34	**5.18**	+ 7	– 3
PT	2.36	1.82	**1.35**	– 43	– 26
RO	4.30	4.18	**4.77**	+ 11	+ 14
SE	6.53	6.99	**6.76**	+ 4	– 3
SI	5.22	4.90	**5.55**	+ 6	+ 13
SK	5.07	4.65	**5.13**	+ 1	+ 10

Soft wheat - yield forecast 2023

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



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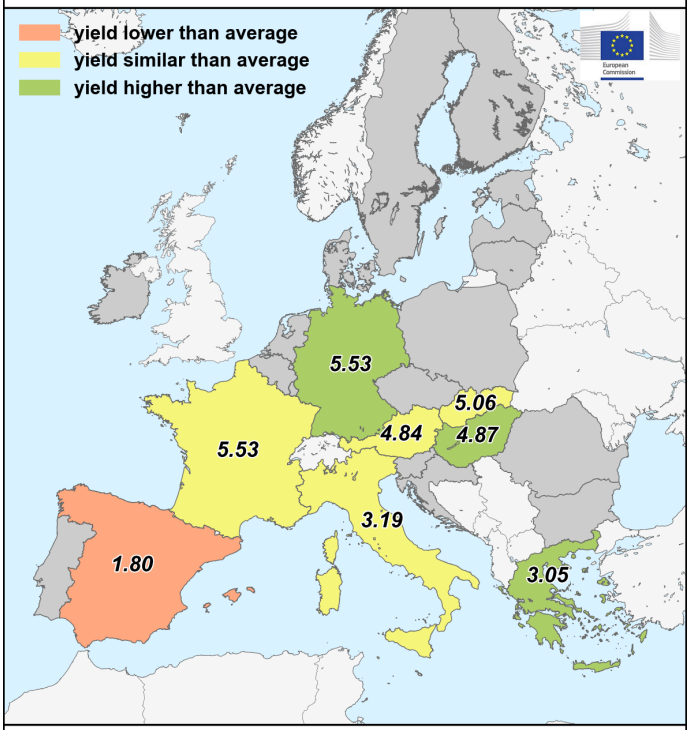
Country	Durum wheat (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	3.50	3.26	**3.40**	– 3	+ 5
AT	4.68	5.09	**4.84**	+ 3	– 5
BE	—	—	—	—	—
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	—	—	—	—	—
DE	5.18	5.35	**5.53**	+ 7	+ 3
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	2.91	2.59	**3.05**	+ 5	+ 18
ES	2.92	2.26	**1.80**	– 38	– 21
FI	—	—	—	—	—
FR	5.41	5.30	**5.53**	+ 2	+ 4
HR	—	—	—	—	—
HU	4.53	3.72	**4.87**	+ 7	+ 31
IE	—	—	—	—	—
IT	3.18	2.98	**3.19**	+ 0	+ 7
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	—	—	—	—	—
PT	—	—	—	—	—
RO	—	—	—	—	—
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	5.00	4.90	**5.06**	+ 1	+ 3

Durum wheat - yield forecast 2023

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



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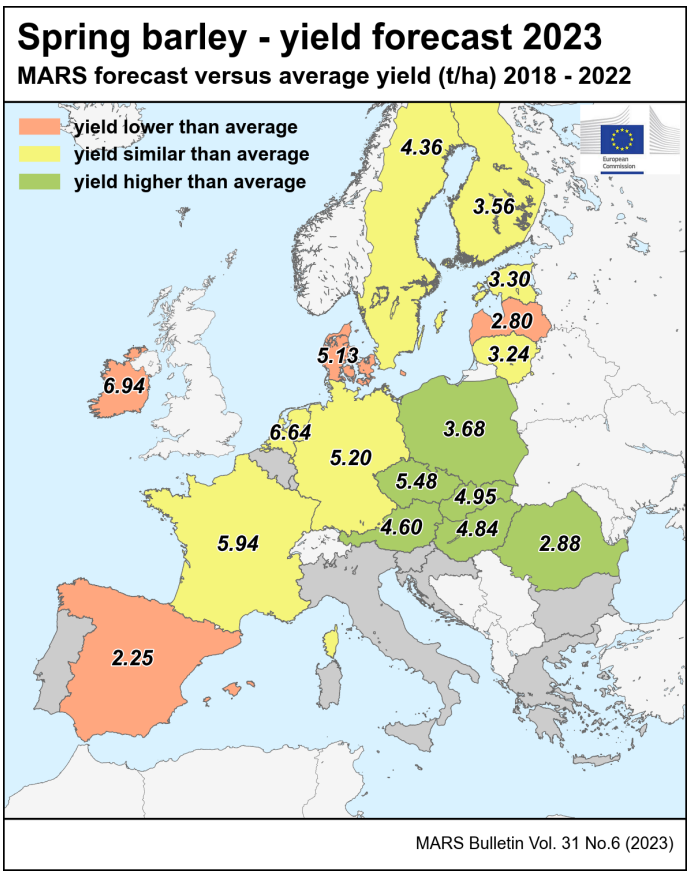
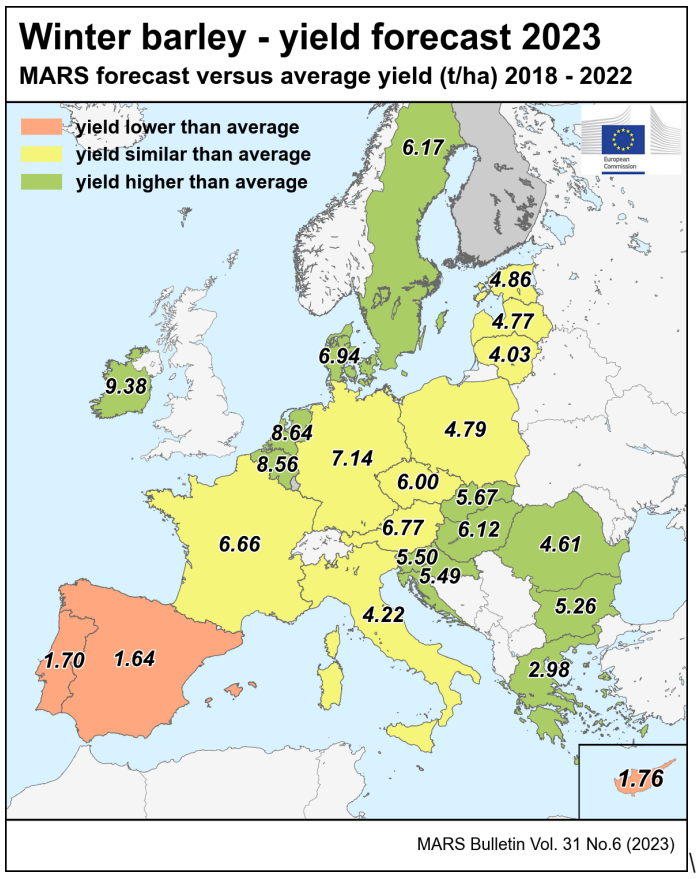
Country	Spring barley (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	4.19	4.21	**3.73**	– 11	– 11
AT	4.17	4.38	**4.60**	+ 10	+ 5
BE	—	—	—	—	—
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	5.11	5.31	**5.48**	+ 7	+ 3
DE	5.19	5.32	**5.20**	+ 0	– 2
DK	5.71	6.74	**5.13**	– 10	– 24
EE	3.43	3.99	**3.30**	– 4	– 17
EL	—	—	—	—	—
ES	3.38	2.81	**2.25**	– 34	– 20
FI	3.51	3.82	**3.56**	+ 2	– 7
FR	5.83	5.16	**5.94**	+ 2	+ 15
HR	—	—	—	—	—
HU	4.13	4.30	**4.84**	+ 17	+ 13
IE	7.28	8.10	**6.94**	– 5	– 14
IT	—	—	—	—	—
LT	3.37	3.81	**3.24**	– 4	– 15
LU	—	—	—	—	—
LV	2.99	3.24	**2.80**	– 6	– 14
MT	—	—	—	—	—
NL	6.64	7.40	**6.64**	+ 0	– 10
PL	3.44	3.95	**3.68**	+ 7	– 7
PT	—	—	—	—	—
RO	2.61	2.83	**2.88**	+ 11	+ 2
SE	4.41	5.44	**4.36**	– 1	– 20
SI	—	—	—	—	—
SK	4.41	4.26	**4.95**	+ 12	+ 16



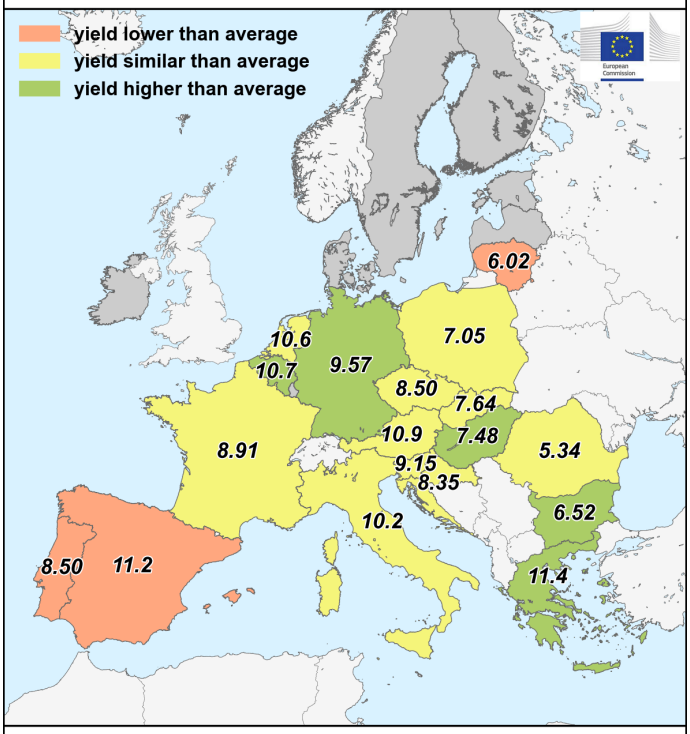
Country	Winter barley (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	5.77	5.92	**5.91**	+ 2	– 0
AT	6.54	6.66	**6.77**	+ 4	+ 2
BE	8.14	8.32	**8.56**	+ 5	+ 3
BG	4.76	4.97	**5.26**	+ 11	+ 6
CY	1.84	2.26	**1.76**	– 4	– 22
CZ	5.83	6.13	**6.00**	+ 3	– 2
DE	6.96	7.62	**7.14**	+ 3	– 6
DK	6.63	7.22	**6.94**	+ 5	– 4
EE	4.89	4.68	**4.86**	– 1	+ 4
EL	2.82	2.44	**2.98**	+ 6	+ 22
ES	2.86	2.41	**1.64**	– 43	– 32
FI	—	—	—	—	—
FR	6.49	6.55	**6.66**	+ 3	+ 2
HR	5.04	5.10	**5.49**	+ 9	+ 8
HU	5.54	4.84	**6.12**	+ 10	+ 27
IE	8.98	8.68	**9.38**	+ 4	+ 8
IT	4.13	4.20	**4.22**	+ 2	+ 1
LT	4.19	4.26	**4.03**	– 4	– 6
LU	—	—	—	—	—
LV	4.81	4.85	**4.77**	– 1	– 2
MT	—	—	—	—	—
NL	8.17	8.69	**8.64**	+ 6	– 1
PL	4.65	4.95	**4.79**	+ 3	– 3
PT	2.97	2.47	**1.70**	– 43	– 31
RO	4.27	4.43	**4.61**	+ 8	+ 4
SE	5.90	6.17	**6.17**	+ 5	+ 0
SI	5.00	4.99	**5.50**	+ 10	+ 10
SK	5.30	5.32	**5.67**	+ 7	+ 7



Country	Grain maize (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	7.48	5.90	**7.61**	+ 2	+ 29
AT	10.6	9.82	**10.9**	+ 3	+ 11
BE	10.0	9.27	**10.7**	+ 7	+ 15
BG	6.08	4.80	**6.52**	+ 7	+ 36
CY	—	—	—	—	—
CZ	8.35	7.95	**8.50**	+ 2	+ 7
DE	9.06	8.40	**9.57**	+ 6	+ 14
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	10.8	9.75	**11.4**	+ 5	+ 17
ES	12.1	11.7	**11.2**	– 7	– 4
FI	—	—	—	—	—
FR	8.61	7.54	**8.91**	+ 4	+ 18
HR	8.06	6.11	**8.35**	+ 4	+ 37
HU	7.04	3.42	**7.48**	+ 6	+ 119
IE	—	—	—	—	—
IT	10.0	8.31	**10.2**	+ 2	+ 23
LT	6.40	5.31	**6.02**	– 6	+ 14
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	10.5	10.8	**10.6**	+ 1	– 2
PL	6.79	6.98	**7.05**	+ 4	+ 1
PT	9.43	9.44	**8.50**	– 10	– 10
RO	5.39	3.01	**5.34**	– 1	+ 77
SE	—	—	—	—	—
SI	9.09	6.68	**9.15**	+ 1	+ 37
SK	7.37	4.47	**7.64**	+ 4	+ 71

Grain maize - yield forecast 2023

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



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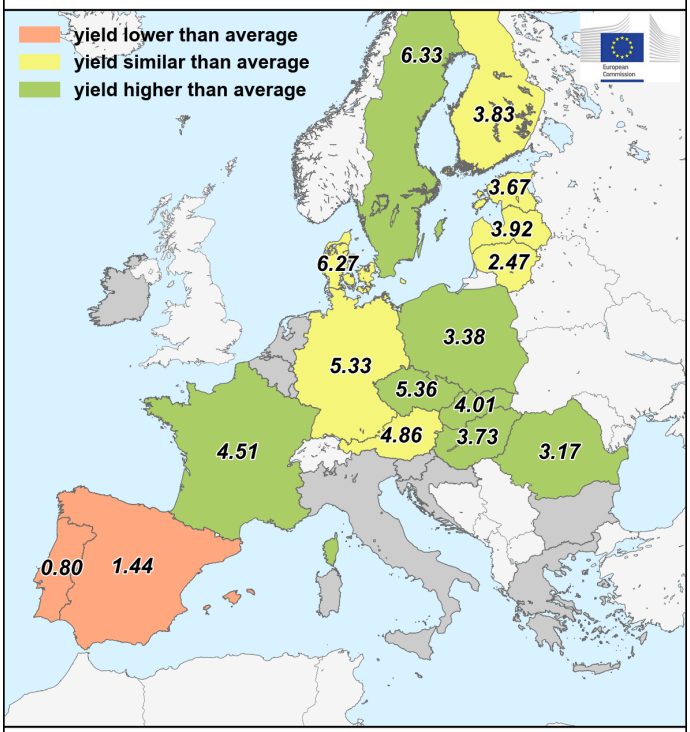
Country	Rye (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	3.98	4.29	**4.24**	+ 7	– 1
AT	4.72	4.87	**4.86**	+ 3	– 0
BE	—	—	—	—	—
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	5.14	5.31	**5.36**	+ 4	+ 1
DE	5.16	5.32	**5.33**	+ 3	+ 0
DK	6.06	6.42	**6.27**	+ 4	– 2
EE	3.75	3.85	**3.67**	– 2	– 5
EL	—	—	—	—	—
ES	2.42	1.87	**1.44**	– 41	– 23
FI	3.84	3.38	**3.83**	– 1	+ 13
FR	4.30	3.84	**4.51**	+ 5	+ 17
HR	—	—	—	—	—
HU	3.29	3.01	**3.73**	+ 13	+ 24
IE	—	—	—	—	—
IT	—	—	—	—	—
LT	2.56	2.41	**2.47**	– 4	+ 2
LU	—	—	—	—	—
LV	4.05	3.66	**3.92**	– 3	+ 7
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	3.07	3.58	**3.38**	+ 10	– 6
PT	1.11	1.03	**0.80**	– 28	– 22
RO	2.72	2.58	**3.17**	+ 17	+ 23
SE	5.99	6.22	**6.33**	+ 6	+ 2
SI	—	—	—	—	—
SK	3.60	3.84	**4.01**	+ 12	+ 5

Rye - yield forecast 2023

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



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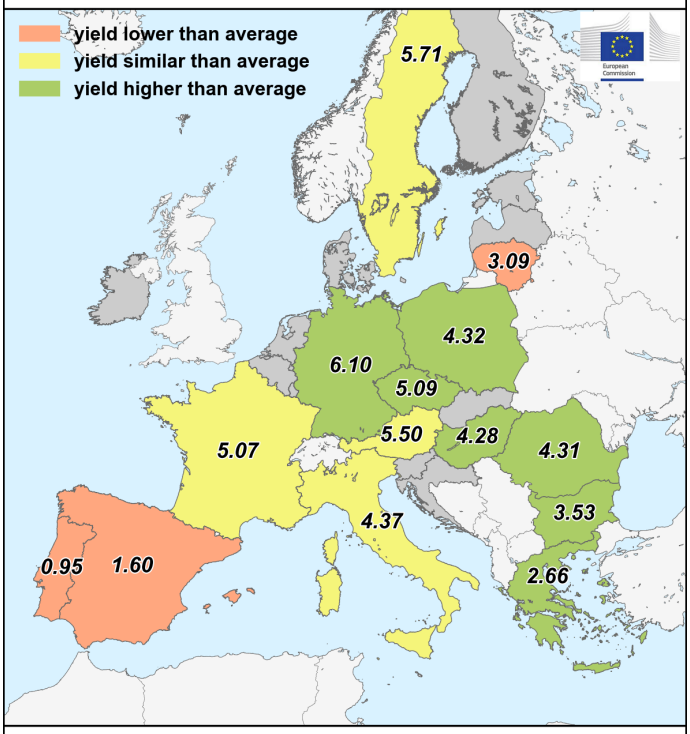
Country	Triticale (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	4.22	4.42	**4.33**	+ 3	– 2
AT	5.44	5.62	**5.50**	+ 1	– 2
BE	—	—	—	—	—
BG	2.96	3.00	**3.53**	+ 19	+ 18
CY	—	—	—	—	—
CZ	4.88	5.12	**5.09**	+ 4	– 1
DE	5.85	5.95	**6.10**	+ 4	+ 3
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	2.53	2.79	**2.66**	+ 5	– 5
ES	2.64	2.18	**1.60**	– 40	– 27
FI	—	—	—	—	—
FR	5.00	4.79	**5.07**	+ 1	+ 6
HR	—	—	—	—	—
HU	3.98	3.43	**4.28**	+ 8	+ 25
IE	—	—	—	—	—
IT	4.42	4.31	**4.37**	– 1	+ 1
LT	3.25	3.24	**3.09**	– 5	– 5
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	3.98	4.51	**4.32**	+ 9	– 4
PT	1.54	1.25	**0.95**	– 38	– 24
RO	3.86	3.80	**4.31**	+ 12	+ 13
SE	5.55	5.68	**5.71**	+ 3	+ 0
SI	—	—	—	—	—
SK	—	—	—	—	—

Triticale - yield forecast 2023

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

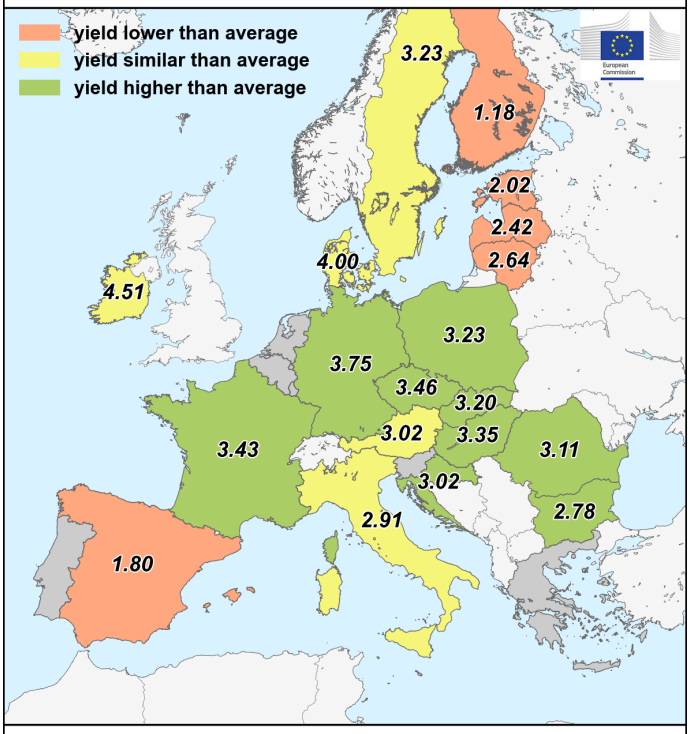


MARS Bulletin Vol. 31 No.6 (2023)

Country	Rape and turnip rape (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	3.10	3.33	**3.29**	+ 6	– 1
AT	3.06	3.21	**3.02**	– 1	– 6
BE	—	—	—	—	—
BG	2.57	2.29	**2.78**	+ 8	+ 21
CY	—	—	—	—	—
CZ	3.25	3.39	**3.46**	+ 6	+ 2
DE	3.47	3.95	**3.75**	+ 8	– 5
DK	4.08	4.49	**4.00**	– 2	– 11
EE	2.47	2.53	**2.02**	– 18	– 20
EL	—	—	—	—	—
ES	2.35	2.16	**1.80**	– 23	– 17
FI	1.31	1.37	**1.18**	– 10	– 14
FR	3.24	3.68	**3.43**	+ 6	– 7
HR	2.72	2.59	**3.02**	+ 11	+ 17
HU	2.88	2.50	**3.35**	+ 16	+ 34
IE	4.44	4.92	**4.51**	+ 2	– 8
IT	2.84	2.85	**2.91**	+ 3	+ 2
LT	2.80	2.57	**2.64**	– 6	+ 3
LU	—	—	—	—	—
LV	2.62	2.21	**2.42**	– 8	+ 9
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	3.05	3.38	**3.23**	+ 6	– 5
PT	—	—	—	—	—
RO	2.56	2.62	**3.11**	+ 21	+ 19
SE	3.20	3.35	**3.23**	+ 1	– 4
SI	—	—	—	—	—
SK	3.03	3.12	**3.20**	+ 6	+ 3

Rapeseed - yield forecast 2023

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

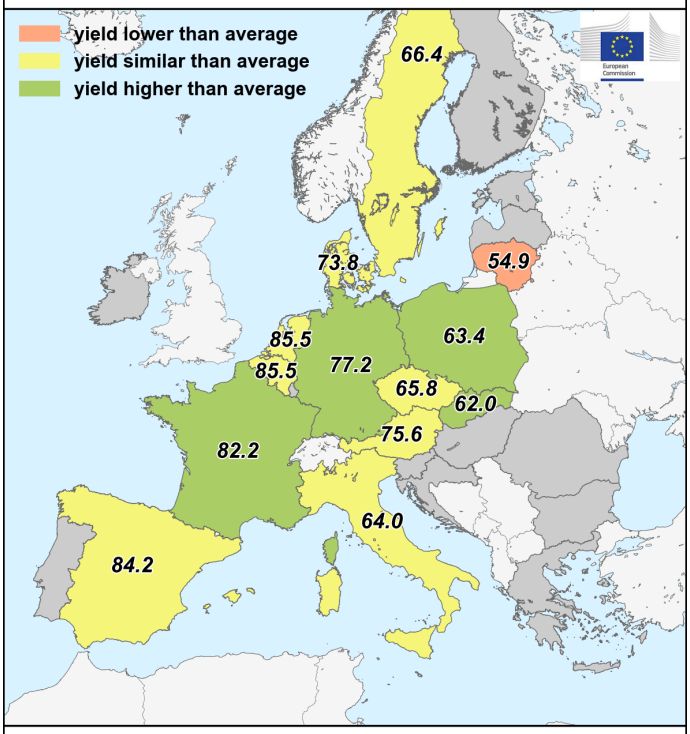


MARS Bulletin Vol. 31 No.6 (2023)

Country	Sugar beet (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	72.8	N/A	**75.9**	+ 4	N/A
AT	75.9	79.7	**75.6**	– 0	– 5
BE	85.3	89.3	**85.5**	+ 0	– 4
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	63.5	69.6	**65.8**	+ 4	– 6
DE	72.5	71.2	**77.2**	+ 7	+ 9
DK	73.6	72.3	**73.8**	+ 0	+ 2
EE	—	—	—	—	—
EL	—	—	—	—	—
ES	85.8	84.1	**84.2**	– 2	+ 0
FI	—	—	—	—	—
FR	78.7	78.6	**82.2**	+ 5	+ 5
HR	—	—	—	—	—
HU	—	—	—	—	—
IE	—	—	—	—	—
IT	63.1	N/A	**64.0**	+ 1	N/A
LT	63.2	62.5	**54.9**	– 13	– 12
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	82.4	88.8	**85.5**	+ 4	– 4
PL	60.6	63.8	**63.4**	+ 5	– 1
PT	—	—	—	—	—
RO	—	—	—	—	—
SE	66.5	64.7	**66.4**	– 0	+ 3
SI	—	—	—	—	—
SK	59.4	56.3	**62.0**	+ 4	+ 10

Sugar beet - yield forecast 2023

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

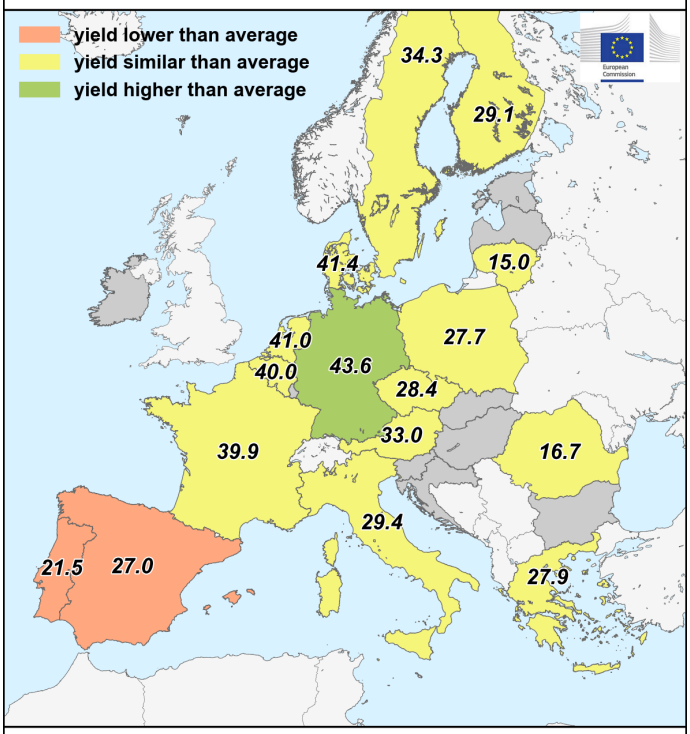


MARS Bulletin Vol. 31 No.6 (2023)

Country	Potato (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	34.1	35.3	**35.5**	+ 4	+ 1
AT	32.7	32.0	**33.0**	+ 1	+ 3
BE	39.1	38.6	**40.0**	+ 2	+ 4
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	28.3	30.2	**28.4**	+ 0	– 6
DE	40.3	40.1	**43.6**	+ 8	+ 9
DK	41.7	44.2	**41.4**	– 1	– 6
EE	—	—	—	—	—
EL	27.3	26.5	**27.9**	+ 2	+ 6
ES	31.7	30.5	**27.0**	– 15	– 11
FI	28.6	28.1	**29.1**	+ 2	+ 4
FR	40.2	38.0	**39.9**	– 1	+ 5
HR	—	—	—	—	—
HU	—	—	—	—	—
IE	—	—	—	—	—
IT	29.2	28.3	**29.4**	+ 1	+ 4
LT	15.6	14.9	**15.0**	– 3	+ 1
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	41.2	42.6	**41.0**	– 0	– 4
PL	27.8	30.8	**27.7**	– 0	– 10
PT	23.1	24.0	**21.5**	– 7	– 10
RO	16.2	15.9	**16.7**	+ 4	+ 6
SE	34.7	36.3	**34.3**	– 1	– 6
SI	—	—	—	—	—
SK	—	—	—	—	—

Potato - yield forecast 2023

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

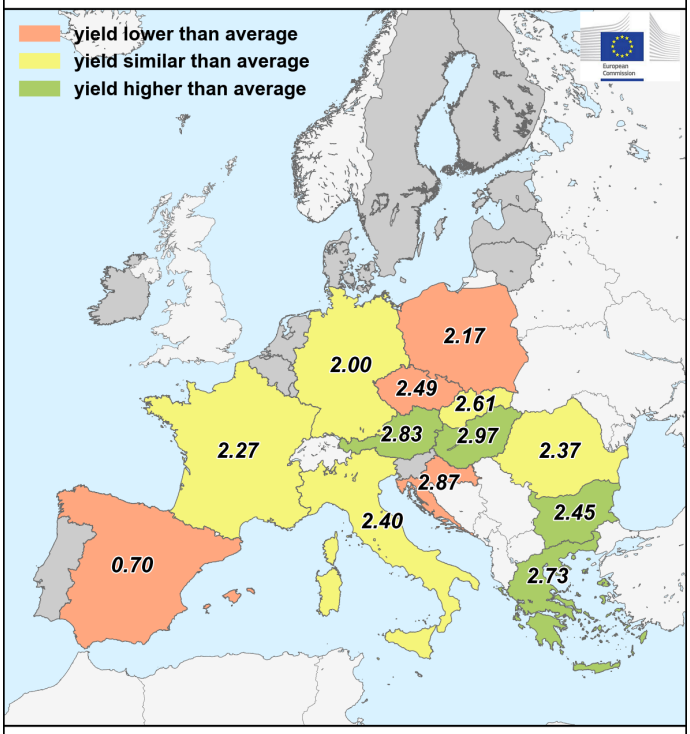


MARS Bulletin Vol. 31 No.6 (2023)

Country	Sunflower (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	2.21	1.87	**2.21**	+ 0	+ 18
AT	2.70	2.32	**2.83**	+ 5	+ 22
BE	—	—	—	—	—
BG	2.32	2.31	**2.45**	+ 6	+ 6
CY	—	—	—	—	—
CZ	2.60	2.65	**2.49**	– 4	– 6
DE	2.07	1.88	**2.00**	– 3	+ 6
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	2.59	2.67	**2.73**	+ 5	+ 2
ES	1.17	0.90	**0.70**	– 40	– 22
FI	—	—	—	—	—
FR	2.25	2.07	**2.27**	+ 1	+ 10
HR	3.02	2.99	**2.87**	– 5	– 4
HU	2.64	1.84	**2.97**	+ 13	+ 61
IE	—	—	—	—	—
IT	2.42	2.39	**2.40**	– 1	+ 1
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	2.27	2.40	**2.17**	– 5	– 10
PT	—	—	—	—	—
RO	2.43	1.92	**2.37**	– 3	+ 23
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	2.62	2.33	**2.61**	– 1	+ 12

Sunflower - yield forecast 2023

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

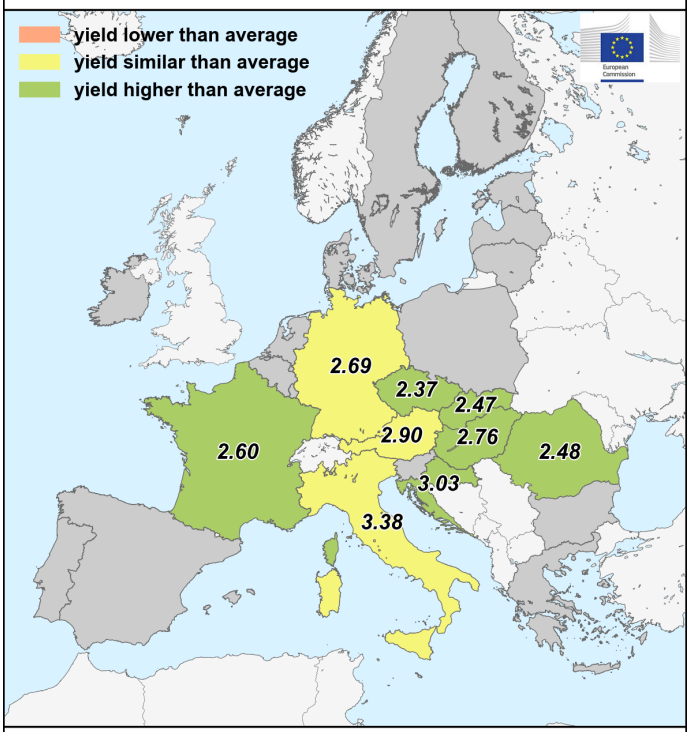


MARS Bulletin Vol. 31 No.6 (2023)

Country	Soybean (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	2.76	2.24	**2.89**	+ 5	+ 29
AT	2.88	2.62	**2.90**	+ 1	+ 11
BE	—	—	—	—	—
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	2.26	2.30	**2.37**	+ 5	+ 3
DE	2.67	2.34	**2.69**	+ 1	+ 15
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	—	—	—	—	—
ES	—	—	—	—	—
FI	—	—	—	—	—
FR	2.44	2.05	**2.60**	+ 7	+ 27
HR	2.83	2.16	**3.03**	+ 7	+ 40
HU	2.58	1.85	**2.76**	+ 7	+ 50
IE	—	—	—	—	—
IT	3.30	2.64	**3.38**	+ 2	+ 28
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	—	—	—	—	—
PT	—	—	—	—	—
RO	2.33	1.80	**2.48**	+ 6	+ 38
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	2.22	1.45	**2.47**	+ 11	+ 71

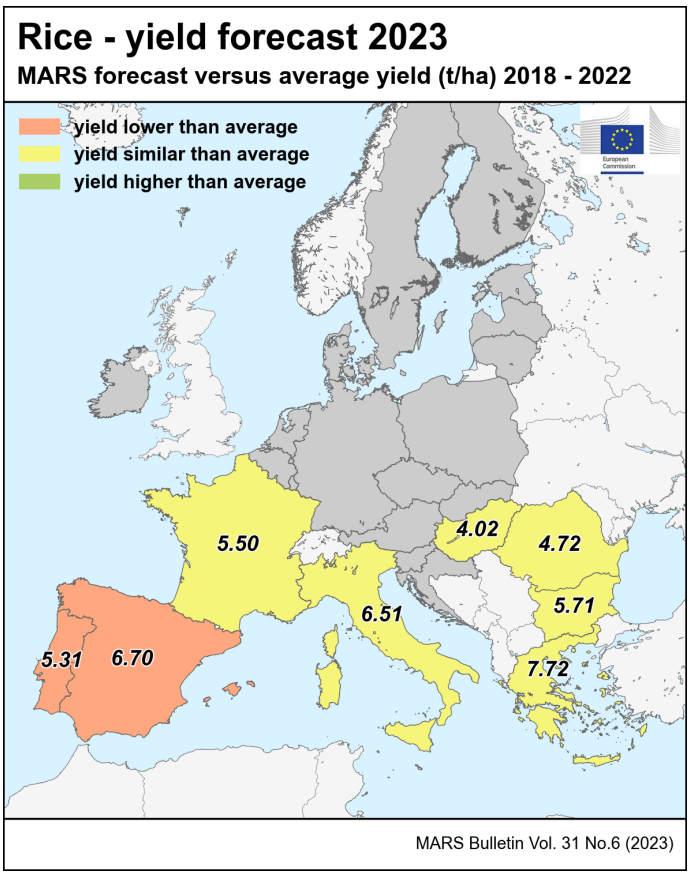
Soybean - yield forecast 2023

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



MARS Bulletin Vol. 31 No.6 (2023)

Country	Rice (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
EU	6.49	5.36	**6.45**	– 1	+ 20
AT	—	—	—	—	—
BE	—	—	—	—	—
BG	5.75	6.50	**5.71**	– 1	– 12
CY	—	—	—	—	—
CZ	—	—	—	—	—
DE	—	—	—	—	—
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	7.44	5.74	**7.72**	+ 4	+ 34
ES	7.42	6.78	**6.70**	– 10	– 1
FI	—	—	—	—	—
FR	5.45	5.57	**5.50**	+ 1	– 1
HR	—	—	—	—	—
HU	3.99	3.68	**4.02**	+ 1	+ 9
IE	—	—	—	—	—
IT	6.29	4.90	**6.51**	+ 4	+ 33
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	—	—	—	—	—
PT	5.54	5.44	**5.31**	– 4	– 2
RO	4.55	4.54	**4.72**	+ 4	+ 4
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	—	—	—	—	—



Country	Wheat (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
BY	3.42	3.48	**3.47**	+ 2	– 0
DZ	1.70	N/A	**1.28**	– 25	N/A
MA	1.79	1.11	**1.48**	– 17	+ 34
TN	2.00	2.42	**1.62**	– 19	– 33
TR	2.83	2.99	**2.97**	+ 5	– 1
UA	4.07	4.12	**4.58**	+ 13	+ 11
UK	8.10	8.60	**8.41**	+ 4	– 2

Country	Barley (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
BY	2.76	2.75	**3.03**	+ 10	+ 10
DZ	1.22	N/A	**1.06**	– 14	N/A
MA	1.21	0.62	**0.99**	– 18	+ 60
TN	1.05	1.72	**0.74**	– 30	– 57
TR	2.48	2.63	**2.62**	+ 6	– 0
UA	3.38	3.47	**3.59**	+ 6	+ 4
UK	6.25	6.67	**6.59**	+ 6	– 1

Country	Grain maize (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
BY	5.61	5.57	**5.78**	+ 3	+ 4
DZ	—	—	—	—	—
MA	—	—	—	—	—
TN	—	—	—	—	—
TR	9.32	9.33	**9.46**	+ 2	+ 1
UA	6.99	6.69	**7.10**	+ 2	+ 6
UK	—	—	—	—	—

Country	Soybean (t/ha)				
	Avg 5yrs	2022	MARS 2023 forecasts	%23/5yrs	%23/22
BY	—	—	—	—	—
DZ	—	—	—	—	—
MA	—	—	—	—	—
TN	—	—	—	—	—
TR	4.23	4.08	**4.59**	+ 9	+ 13
UA	2.40	2.43	**2.45**	+ 2	+ 1
UK	—	—	—	—	—

NB: Yields are forecast for crops with more than 10 000 ha per country with sufficently long and coherent yield time series (for rice more than 1 000 ha per country).

Sources: 2018-2023 data come from DG Agriculture and Rural Development short-term-outlook data (dated May 2023, received on 30.05.2023), Eurostat Eurobase (last update: 24.05.2023), ELSTAT, Statistics Netherlands (CBS) and EES (last update: 15.11.2017).

2023 yields come from MARS Crop Yield Forecasting System (output up to 10.06.2023).

EU aggregate after 1.2.2020 is reported.

N/A = Data not available.

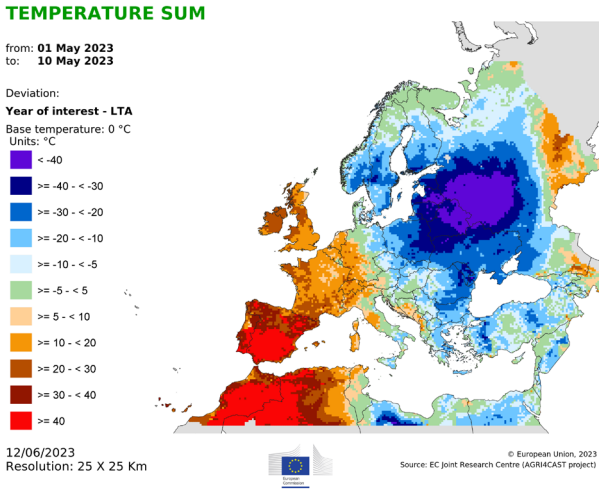
The column header '%23/5yrs' stands for the 2023 change with respect to the 5-year average(%). Similarly, '%23/22' stands for the 2023 change with respect to 2022(%).

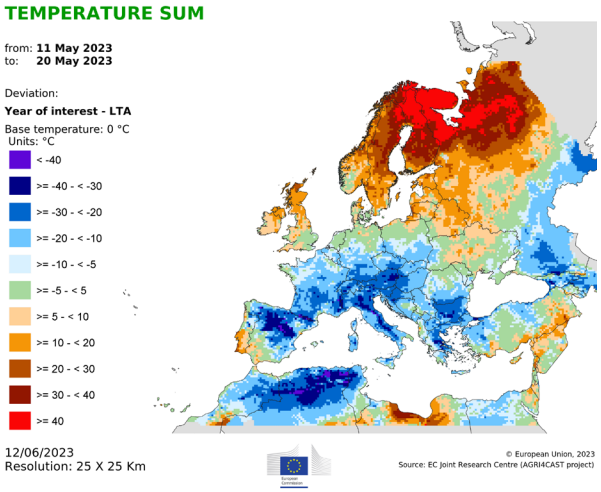
Cop name	Eurostat Crop name	Eurostat Crop Code	Official Eurostat Crop definition*
Total wheat	Wheat and spelt	C1100	Common wheat (*Triticum aestivum* L. emend. Fiori et Paol.), spelt (*Triticum spelta* L.), einkorn wheat (*Triticum monococcum* L.) and durum wheat (*Triticum durum* Desf.).
Total barley	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.
Soybean	Soya	I1130	Soya (*Glycine max* L. Merril) harvested as dry grains.
Rice	Rice	C2000	Rice (*Oryza sativa*, L.).

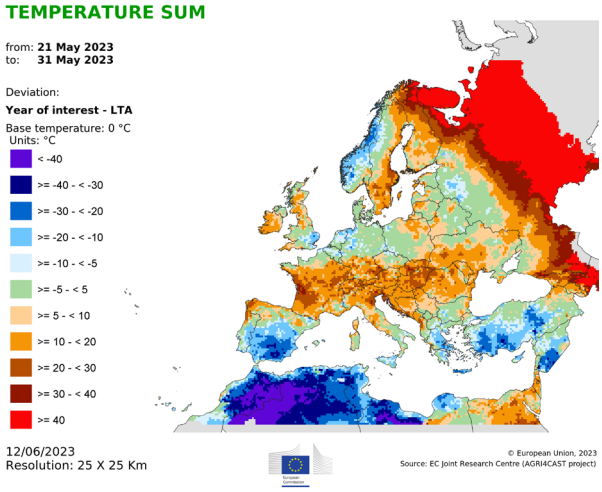
* *Source:* Eurostat - Annual crop statistics (Handbook 2020 Edition)

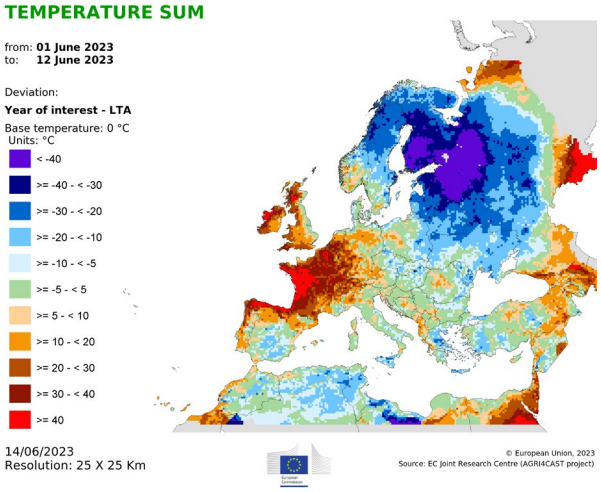
7. Atlas

Temperature regime

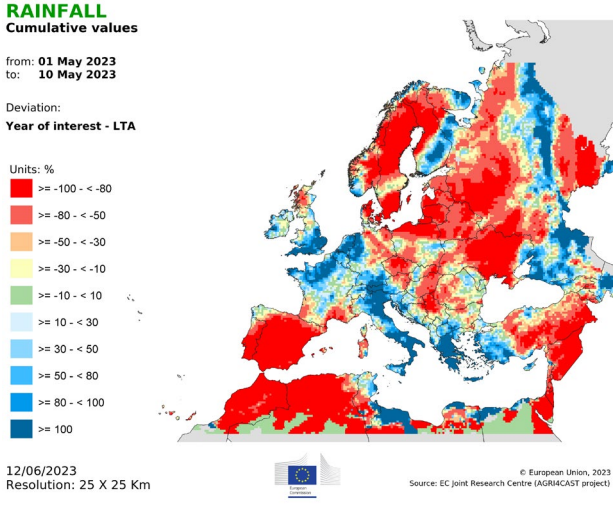


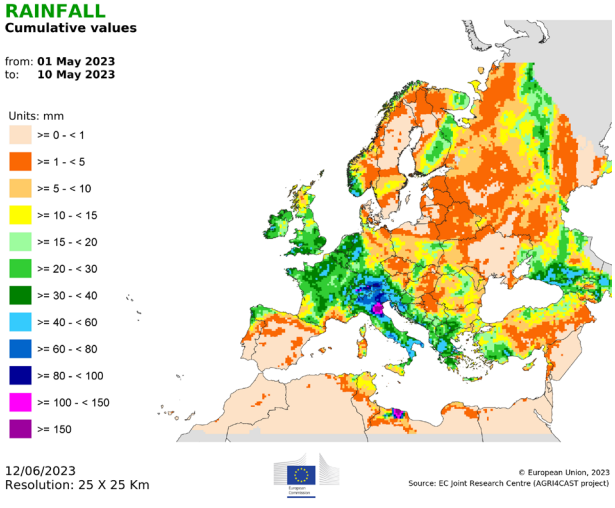






Precipitation



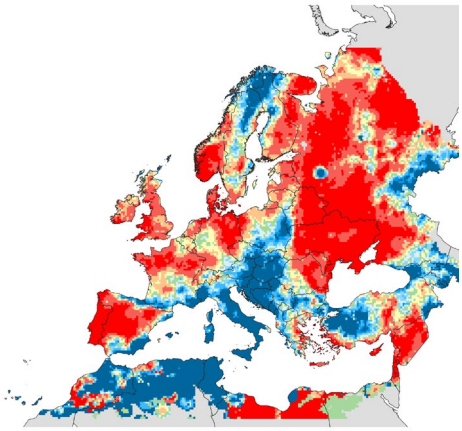


RAINFALL
Cumulative values

from: **11 May 2023**
to: **20 May 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



12/06/2023
Resolution: 25 X 25 Km

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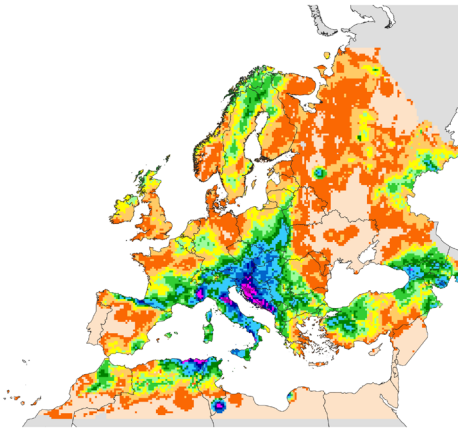
Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: **11 May 2023**
to: **20 May 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



12/06/2023
Resolution: 25 X 25 Km

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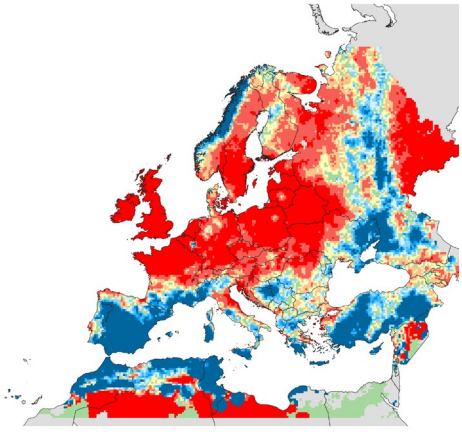
Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: **21 May 2023**
to: **31 May 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



12/06/2023
Resolution: 25 X 25 Km

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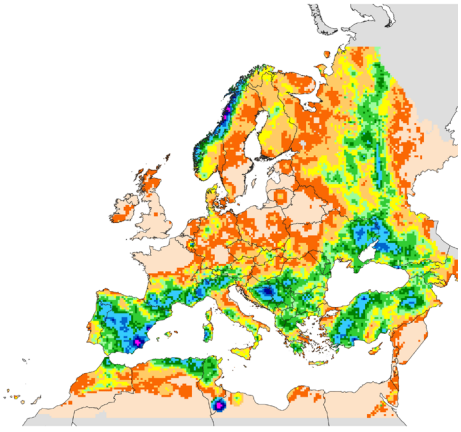
Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: **21 May 2023**
to: **31 May 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



12/06/2023
Resolution: 25 X 25 Km

© European Union, 2023
Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: **01 June 2023**
to: **12 June 2023**

Deviation:
Year of interest - LTA

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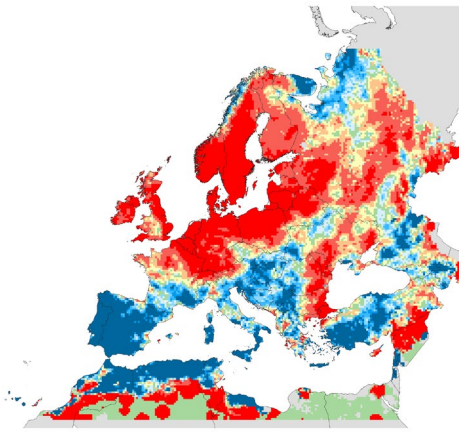
- >= -50 - < -30
- >= -30 - < -10
- >= -10 - < 10
- >= 10 - < 30
- >= 30 - < 50
- >= 50 - < 80
- >= 80 - < 100
- >= 100



14/06/2023
Resolution: 25 X 25 Km

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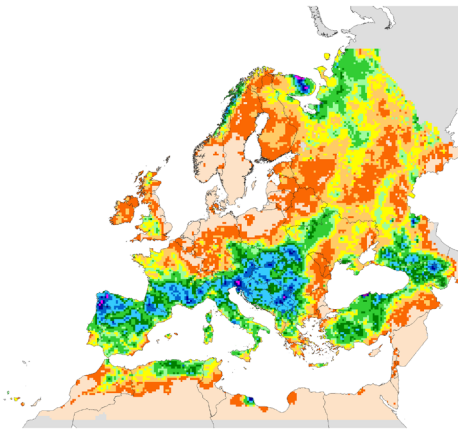
Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: **01 June 2023**
to: **12 June 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



14/06/2023
Resolution: 25 X 25 Km

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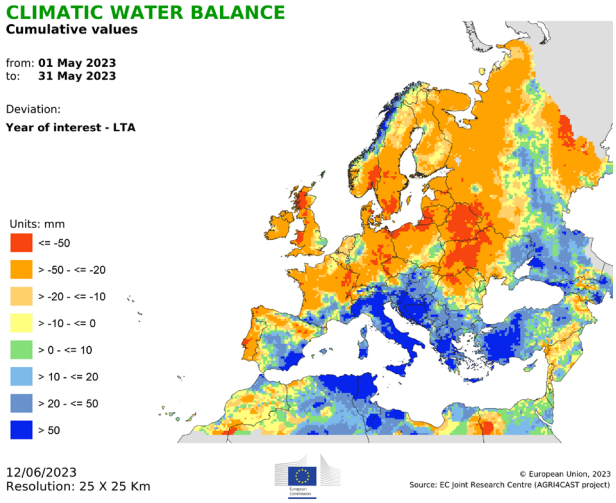
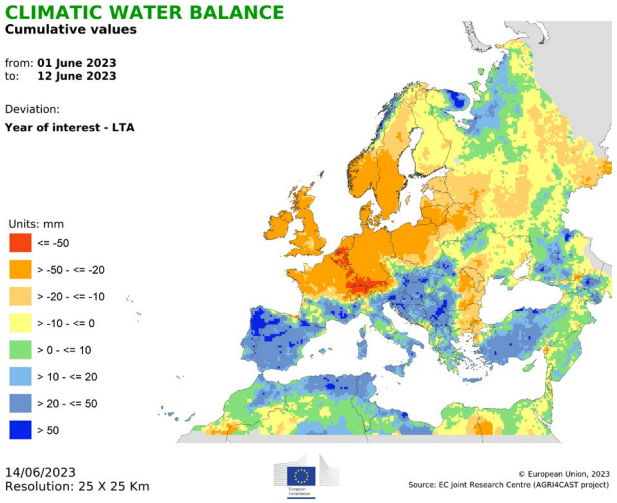
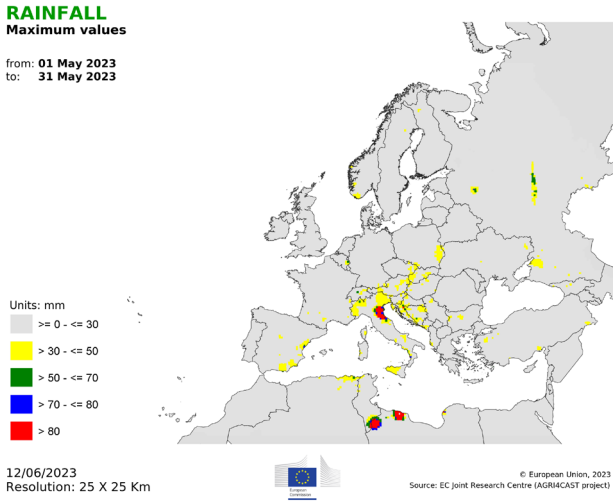
Source: EC Joint Research Centre (AGRI4CAST project)

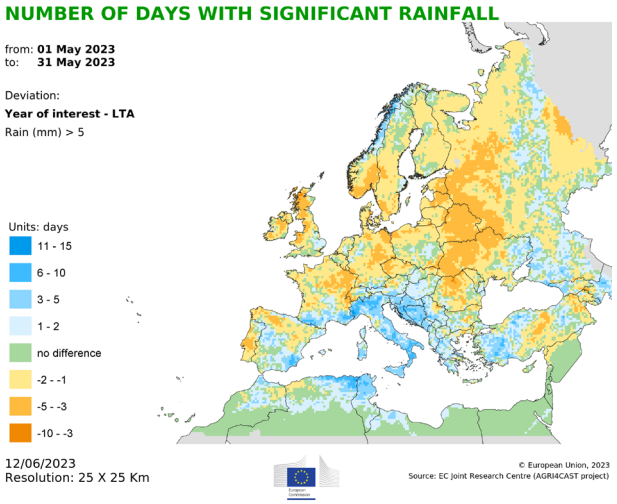
Climatic water balance

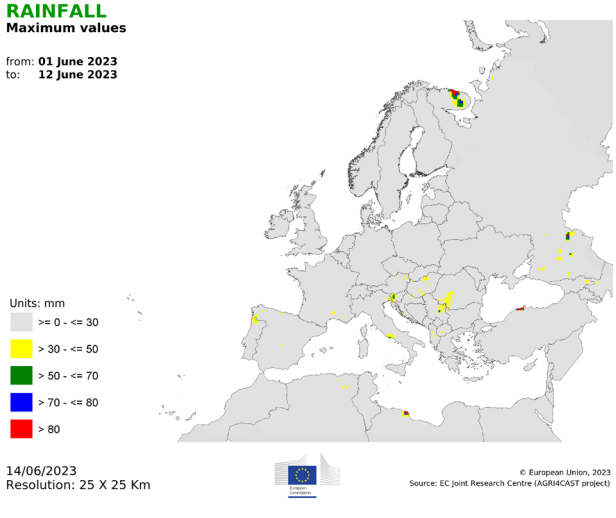


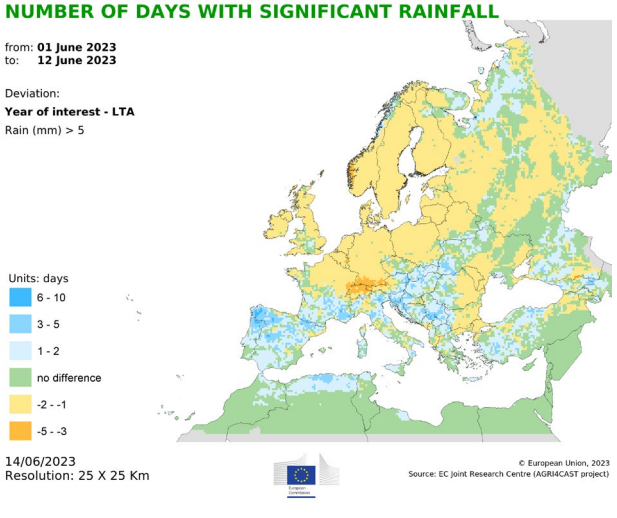


Weather events





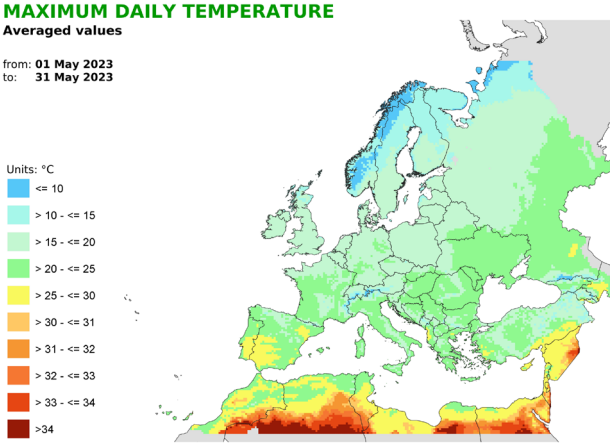




MAXIMUM DAILY TEMPERATURE

Averaged values

from: **01 May 2023**
to: **31 May 2023**



12/06/2023
Resolution: 25 X 25 Km

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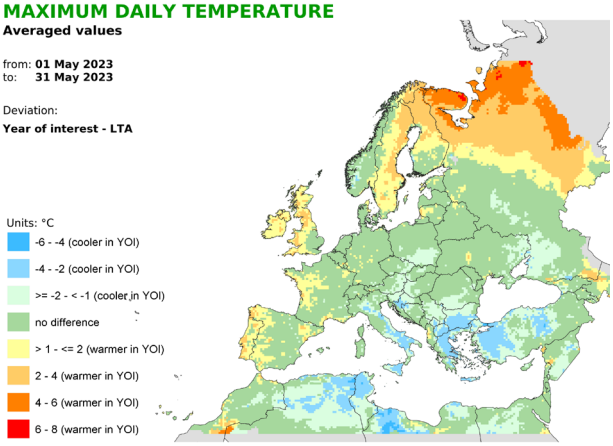
MAXIMUM DAILY TEMPERATURE

Averaged values

from: **01 May 2023**
to: **31 May 2023**

Deviation:
Year of interest - LTA



12/06/2023
Resolution: 25 X 25 Km

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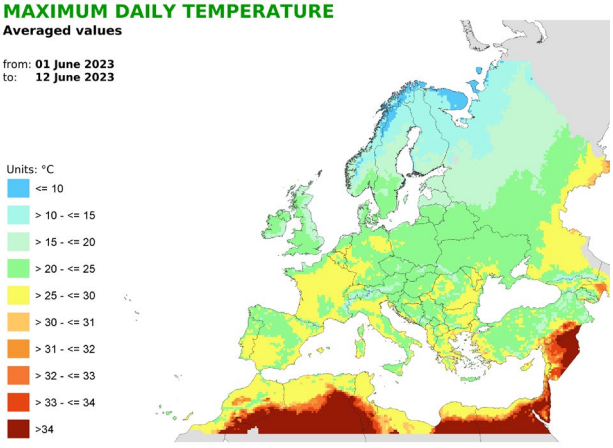
Source: EC Joint Research Centre (AGRI4CAST project)

MAXIMUM DAILY TEMPERATURE

Averaged values

from: **01 June 2023**
to: **12 June 2023**



14/06/2023
Resolution: 25 X 25 Km

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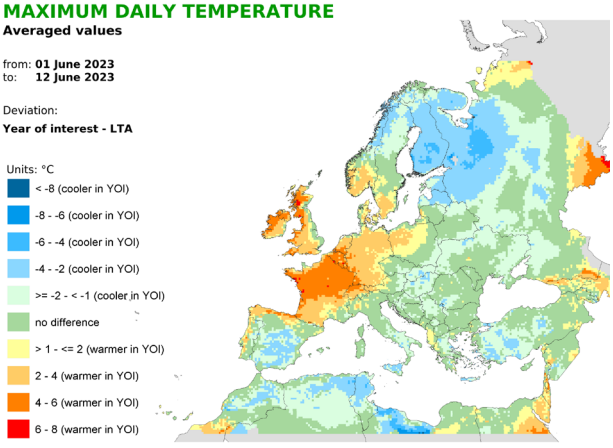
Source: EC Joint Research Centre (AGRI4CAST project)

MAXIMUM DAILY TEMPERATURE

Averaged values

from: **01 June 2023**
to: **12 June 2023**

Deviation:
Year of interest - LTA



14/06/2023
Resolution: 25 X 25 Km

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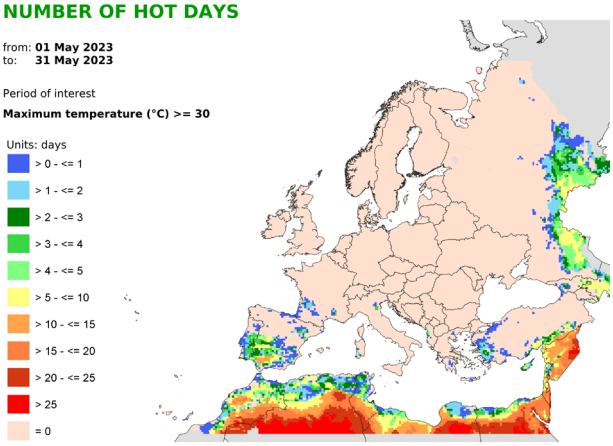
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF HOT DAYS

from: **01 May 2023**
to: **31 May 2023**

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



12/06/2023
Resolution: 25 X 25 Km

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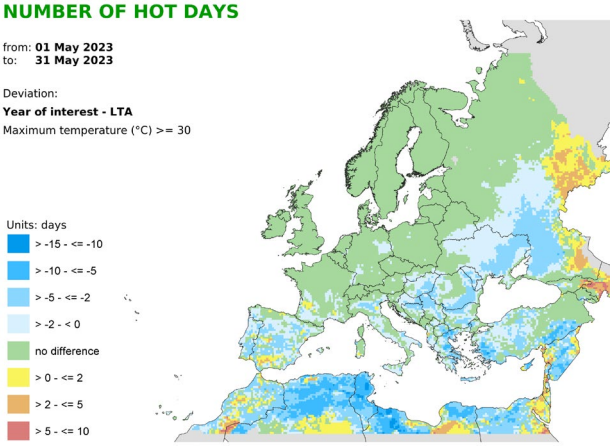
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF HOT DAYS

from: **01 May 2023**
to: **31 May 2023**

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



12/06/2023
Resolution: 25 X 25 Km

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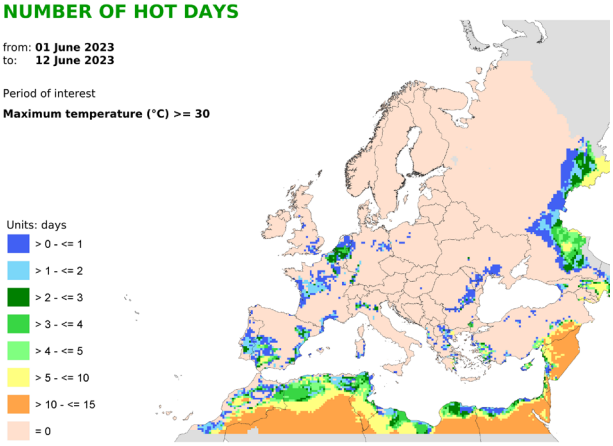
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF HOT DAYS

from: **01 June 2023**
to: **12 June 2023**

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



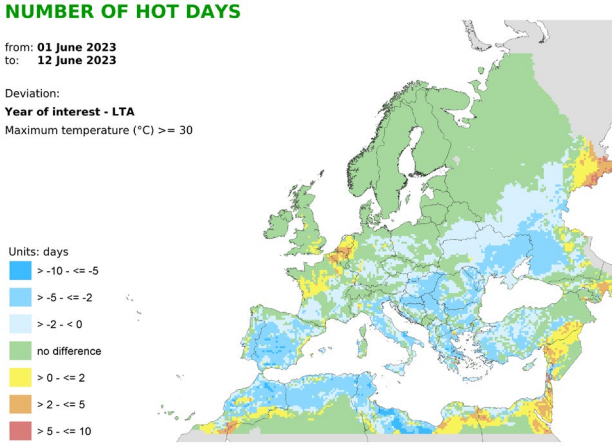
14/06/2023
Resolution: 25 X 25 Km

© European Union, 2023
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF HOT DAYS

from: **01 June 2023**
to: **12 June 2023**

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



14/06/2023
Resolution: 25 X 25 Km

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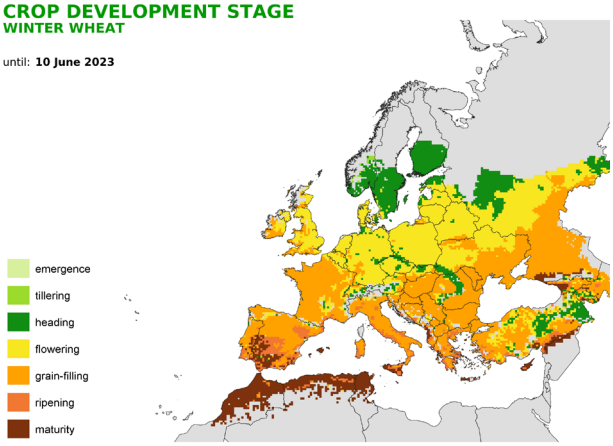
Source: EC Joint Research Centre (AGRI4CAST project)

Crop development stages and precocity

CROP DEVELOPMENT STAGE
WINTER WHEAT

until: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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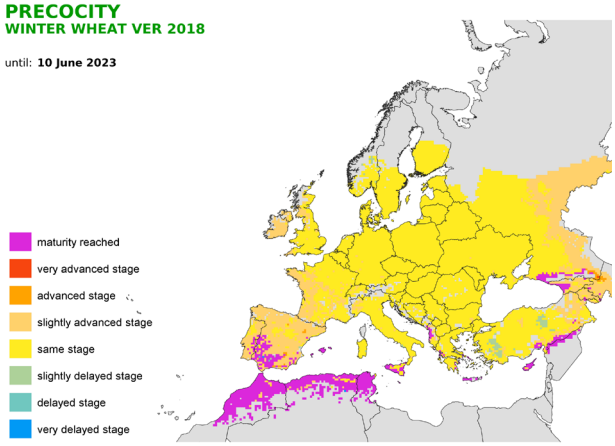
Source: EC Joint Research Centre (AGRI4CAST project)

PRECOCITY
WINTER WHEAT VER 2018

until: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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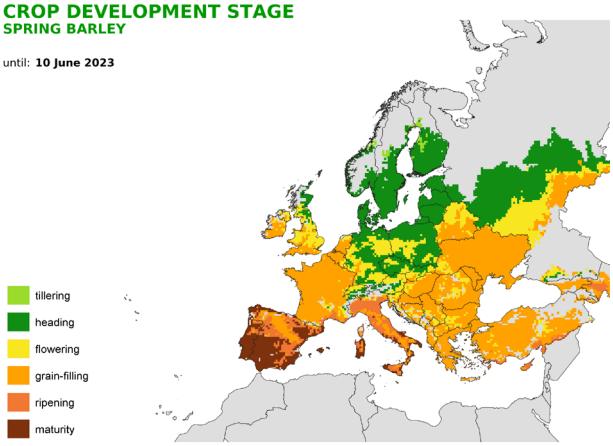
CROP DEVELOPMENT STAGE
SPRING BARLEY

until: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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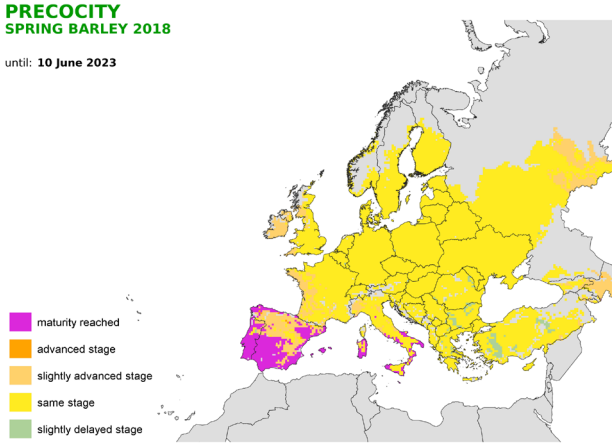
Source: EC Joint Research Centre (AGRI4CAST project)

PRECOCITY
SPRING BARLEY 2018

until: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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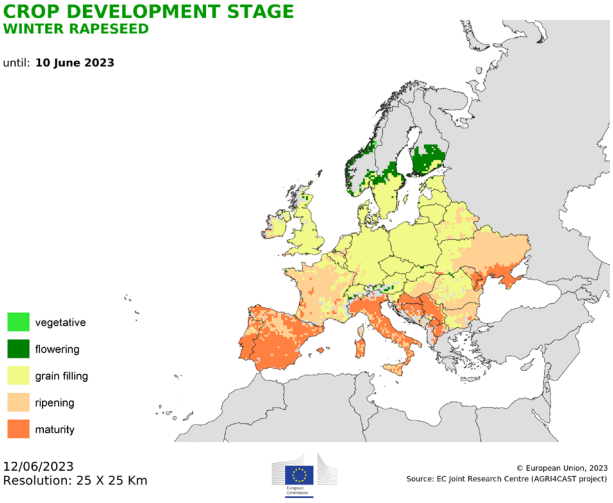
Source: EC Joint Research Centre (AGRI4CAST project)

CROP DEVELOPMENT STAGE
WINTER RAPESEED

until: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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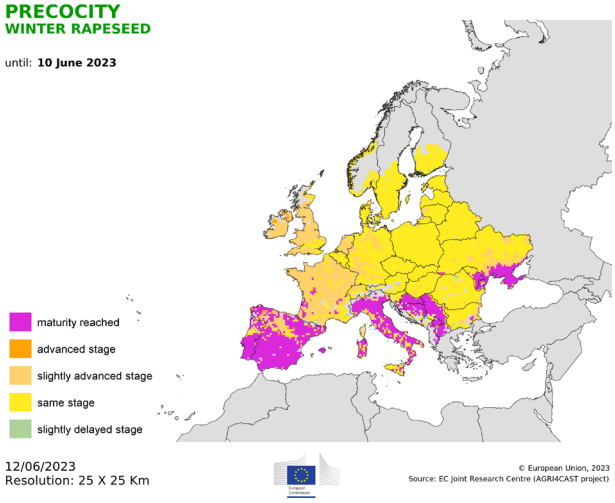
Source: EC Joint Research Centre (AGRI4CAST project)

PRECOCITY
WINTER RAPESEED

until: **10 June 2023**



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Resolution: 25 X 25 Km

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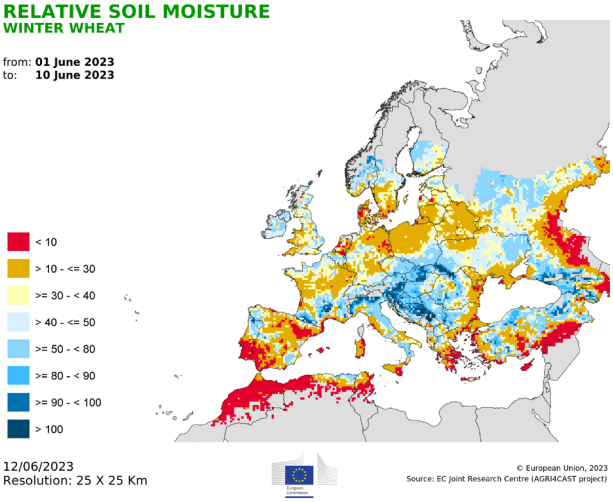
Relative soil moisture

RELATIVE SOIL MOISTURE
WINTER WHEAT

from: **01 June 2023**
to: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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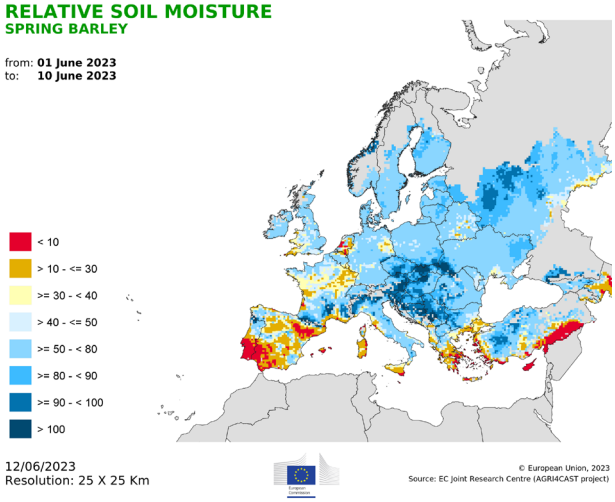
Source: EC Joint Research Centre (AGRI4CAST project)

RELATIVE SOIL MOISTURE
SPRING BARLEY

from: **01 June 2023**
to: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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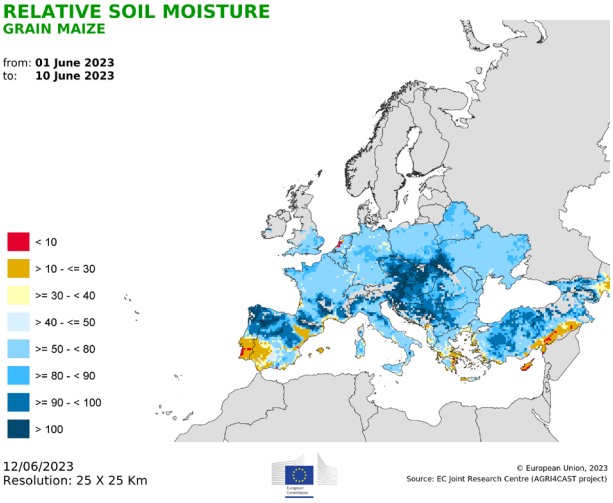
Source: EC Joint Research Centre (AGRI4CAST project)

RELATIVE SOIL MOISTURE
GRAIN MAIZE

from: **01 June 2023**
to: **10 June 2023**



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Resolution: 25 X 25 Km

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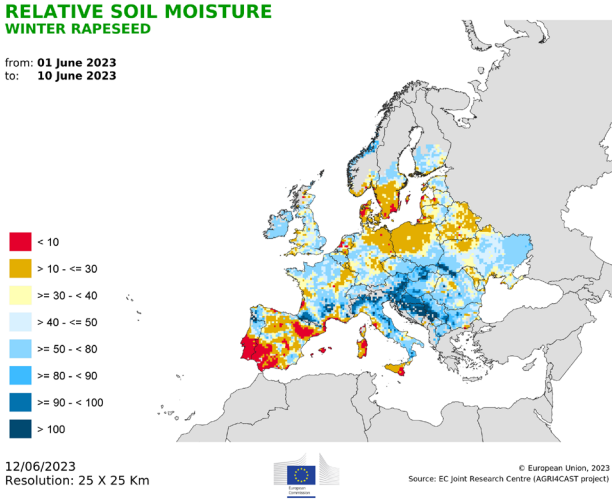
RELATIVE SOIL MOISTURE
WINTER RAPESEED

from: **01 June 2023**
to: **10 June 2023**



12/06/2023
Resolution: 25 X 25 Km

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Source: EC Joint Research Centre (AGRI4CAST project)

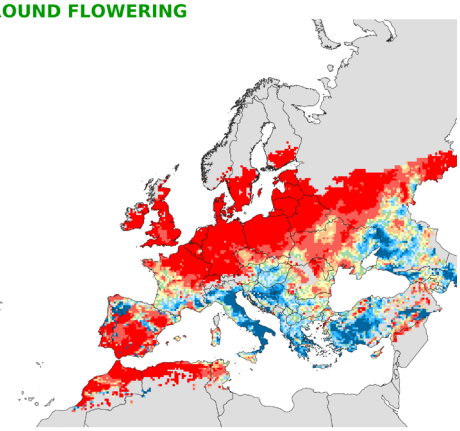
Precipitation and temperatures around flowering

RAINFALL AROUND FLOWERING
WINTER WHEAT
Cumulated values

Offset (days) -10
Duration (days) 21

Deviation:
Year of interest - LTA
Season of interest: 2023

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



12/06/2023
Resolution: 25 X 25 Km

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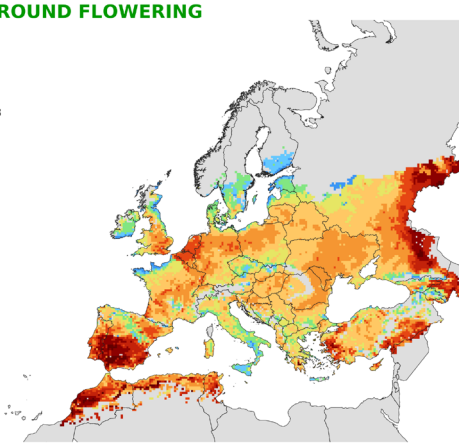
Source: EC Joint Research Centre (AGRI4CAST project)

MAX. TEMP. AROUND FLOWERING
WINTER WHEAT
Highest values

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

Units: °C
- > 10 - <= 15
- > 15 - <= 20
- > 20 - <= 22
- > 22 - <= 24
- > 24 - <= 26
- > 26 - <= 28
- > 28 - <= 30
- > 30 - <= 32
- > 32 - <= 34
- > 34 - <= 36
- > 36



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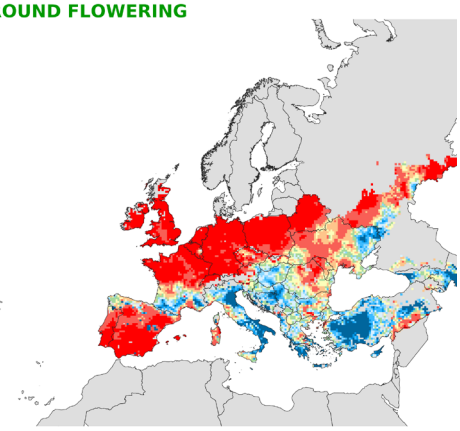
RAINFALL AROUND FLOWERING
SPRING BARLEY
Cumulated values

Offset (days) -10
Duration (days) 21

Deviation:
Year of interest - LTA
Season of interest: 2023

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



12/06/2023
Resolution: 25 X 25 Km

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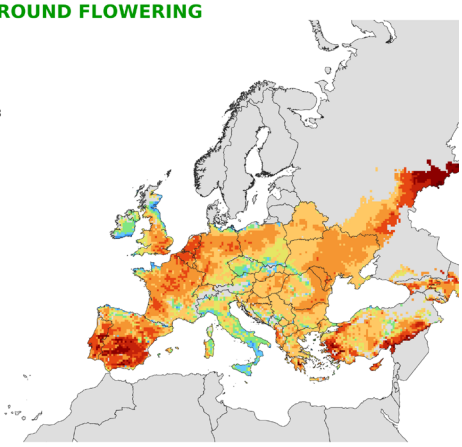
MAX. TEMP. AROUND FLOWERING
SPRING BARLEY
Highest values

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

Units: °C
- > 15 - <= 20
- > 20 - <= 22
- > 22 - <= 24
- > 24 - <= 26
- > 26 - <= 28
- > 28 - <= 30
- > 30 - <= 32
- > 32 - <= 34
- > 34 - <= 36
- > 36



12/06/2023
Resolution: 25 X 25 Km

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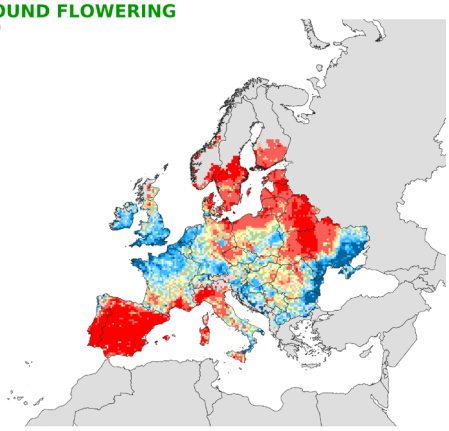
RAINFALL AROUND FLOWERING
WINTER RAPESEED
Cumulated values

Offset (days) -10
Duration (days) 21

Deviation:
Year of interest - LTA
Season of interest: 2023

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



12/06/2023
Resolution: 25 X 25 Km

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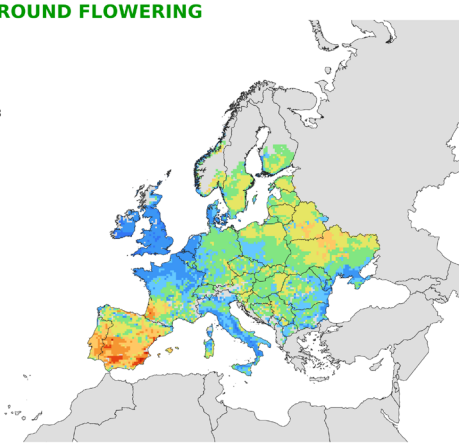
Source: EC Joint Research Centre (AGRI4CAST project)

MAX. TEMP. AROUND FLOWERING
WINTER RAPESEED
Highest values

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

Units: °C
- > 10 - <= 15
- > 15 - <= 20
- > 20 - <= 22
- > 22 - <= 24
- > 24 - <= 26
- > 26 - <= 28
- > 28 - <= 30
- > 30 - <= 32
- > 32 - <= 34
- > 34 - <= 36



12/06/2023
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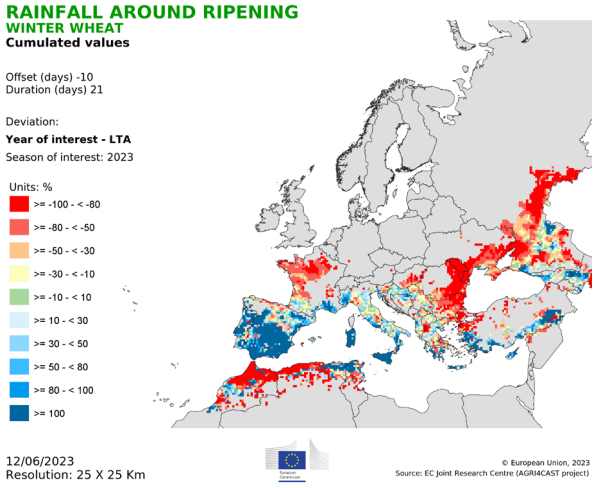
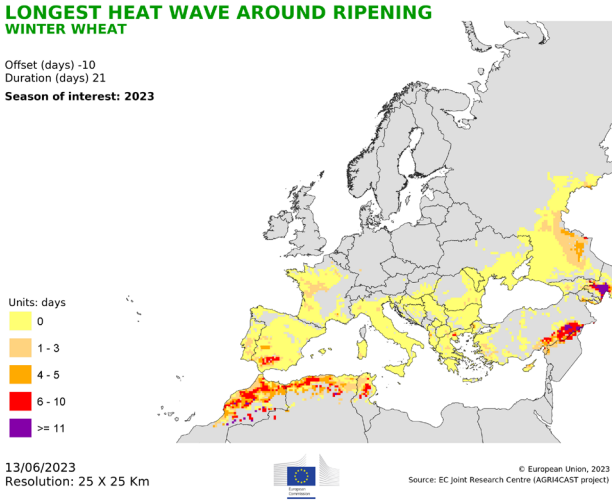
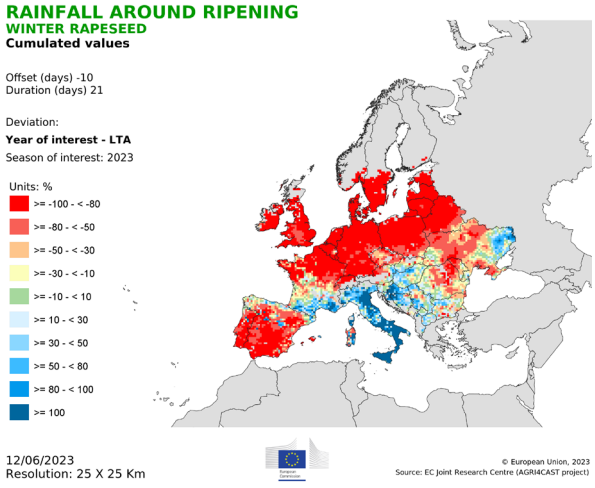
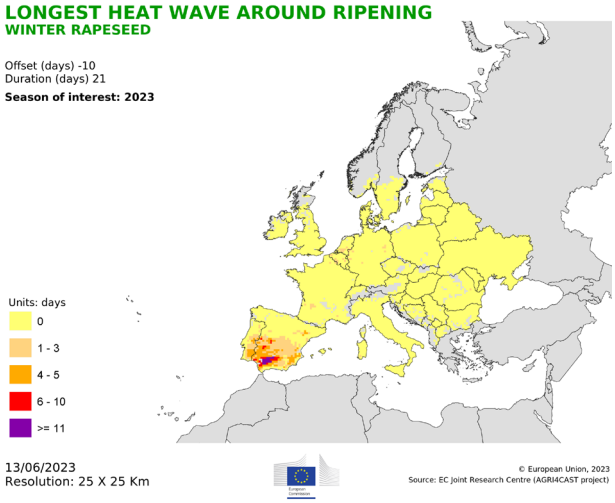
Precipitation and longest heat wave around ripening

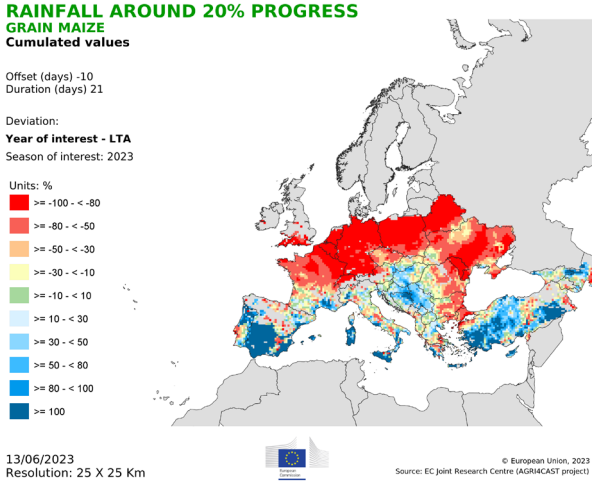


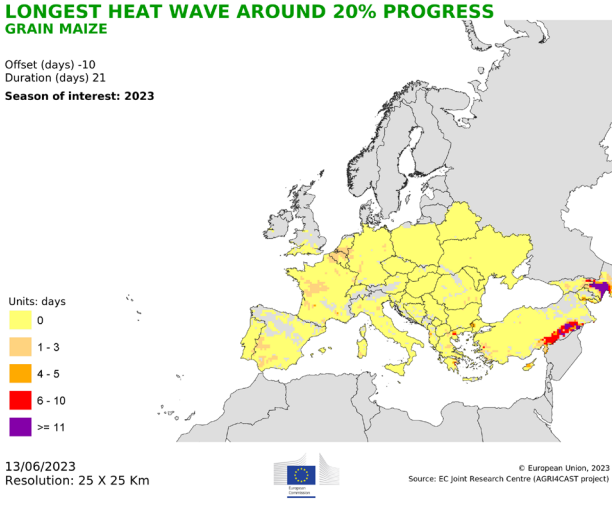






Maize: precipitation and temperatures around crop development





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, grassland analysis, yield forecast	Vol. 31 No 3
24 Apr	Agromet analysis, remote sensing, grassland analysis, sowing conditions, yield forecast	Vol. 31 No 4
22 May	Agromet analysis, remote sensing, grassland analysis, sowing update, yield forecast	Vol. 31 No 5
19 Jun	Agromet analysis, remote sensing, grassland analysis, rice analysis, yield forecast	Vol. 31 No 6
24 Jul	Agromet analysis, remote sensing, grassland analysis, harvesting conditions, yield forecast	Vol. 31 No 7
21 Aug	Agromet analysis, remote sensing, grassland update, harvesting update, yield forecast	Vol. 31 No 8
18 Sep	Agromet analysis, remote sensing, grassland analysis, rice analysis, harvesting update, yield forecast	Vol. 31 No 9
23 Oct	Agromet analysis, grassland 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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AGRI4CAST Resources are available at https://agri4cast.jrc.ec.europa.eu

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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