Issued: 19 September 2022
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European Commission

JRC MARS Bulletin

Crop monitoring in Europe

September 2022

Rain arrived too late for summer crops

Yield forecasts further reduced

The summer drought that kept its grip on Europe came to an end in most regions. However, the improved weather conditions arrived too late to significantly benefit summer crops. In some regions, hot and dry conditions continued well into the current review period, resulting in a further reduction of yield expectations.

In Italy, rain brought some relief in north-eastern regions, but central and north-western regions continued suffering from low soil moisture and reduced water availability for irrigation. In the Benelux countries, western Germany and Croatia, drought conditions continued until the first days of September, with negative impacts on grain maize, green maize, sugar beet and potatoes. In Hungary and Romania, two consecutive heat waves negatively impacted the already weakened summer crops.

Rainfall since mid-August did improve soil conditions for seedbed preparation and sowing of winter crops - particularly rapeseed - in most regions. However, in northern Europe, sowing was hampered due to dry soils, whereas overly wet conditions caused damage to recently sown stands of winter crops in southern Poland.

In Spain, the drought conditions continue. Even though the cropping season is coming to an end, such conditions raise concerns for the next season, as soils are very dry and water reservoirs will need much more rainfall than usual to be restored.

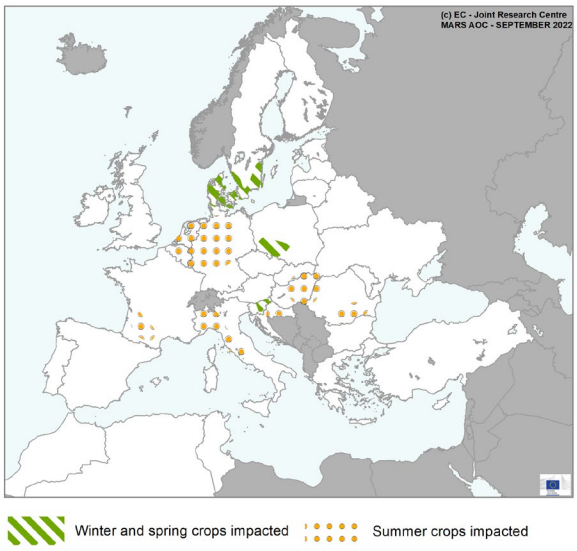
This issue of the Bulletin features a special section on rice, which is particularly vulnerable to water stress. The yield forecast at EU level is 21% below the 5-year average.

Contents:

1. Agrometeorological overview
2. Remote sensing – observed canopy conditions
3. Pastures in Europe – regional monitoring
4. Rice analysis
5. Country analysis
6. Crop yield forecast
7. Atlas

Covers the period from 1 August until 10 September

AREAS OF CONCERN - SUMMER/WINTER CROPS



Crop	Yield t/ha				
	Avg 5yrs	August Bulletin	MARS 2022 forecasts	%22/5yrs	% Diff August
Spring barley	4.13	4.12	**4.16**	+ 1	+ 1
Grain maize	7.87	6.63	**6.39**	- 19	- 4
Potato	34.2	34.2	**33.4**	- 2	- 3
Sugar beet	75.0	75.3	**73.2**	- 2	- 3
Sunflower	2.34	2.06	**2.05**	- 13	- 0
Soybean	2.88	2.46	**2.40**	- 17	- 2
Green maize	41.6	38.6	**37.5**	- 10	- 3
Rice	6.77	—	**5.34**	- 21	—

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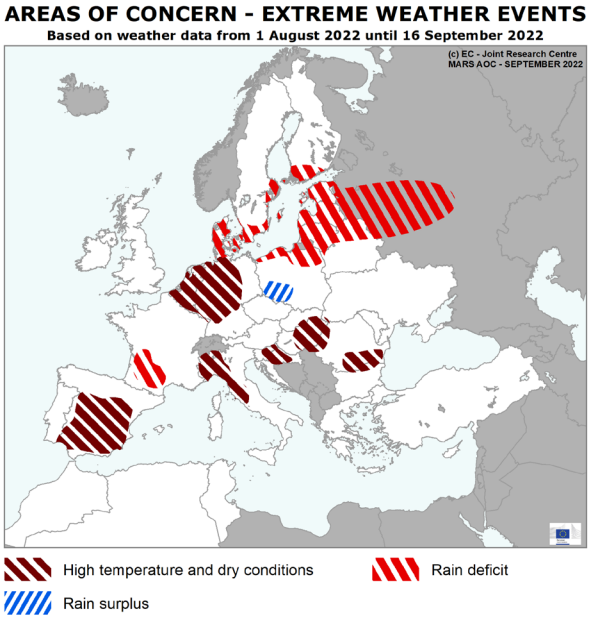
Joint Research Centre

1. Agrometeorological overview

1.1. Areas of concern



The analysis period presents still some of the elements that characterised this summer in southern, central and western Europe. The extremely hot and dry conditions came to an end in most regions but in some still left their mark; notably in Spain, western Italy, the Benelux countries, Germany, Slovenia, Croatia, Hungary, and Romania.

In Spain, the drought conditions continue, and even though the cropping season is coming to an end, such weather conditions are raising concerns for the next season, as the soils are very dry, and water reservoirs will need much more rainfall than usual to be restored.

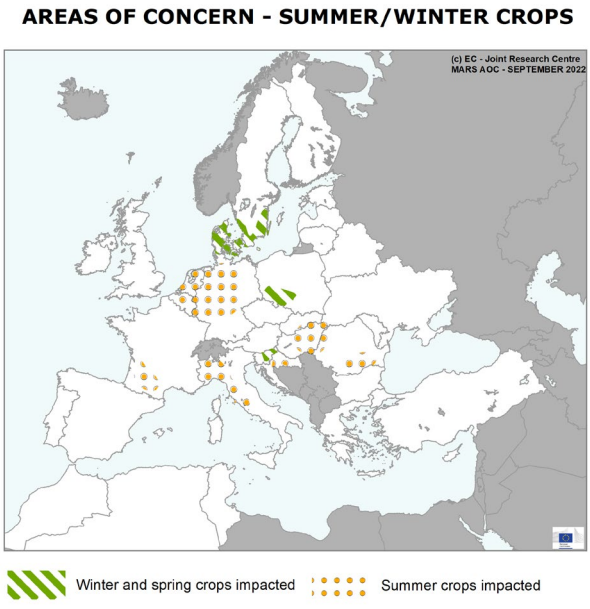
In Italy, rains brought some relief in north-eastern regions, but central and north-western regions are still suffering from low soil moisture and reduced water availability for irrigation. Very late planted maize is still in the field under suboptimal conditions: early senescence/ripening due to water stress and unusual high temperatures. Similar weather conditions and consequent impacts on summer crops (particularly maize, sugar beet and potatoes) are observed in the Benelux countries, in western Germany and in Croatia.

In southern France, the heat stress is no more a concern, but the lack of significant precipitation continued to harm summer crops, now in the final stages of development.

In Hungary and Romania, two consecutive heat waves prolonged the dry and hot summer and negatively impacted the already weakened summer crops. Subsequent abundant precipitation (since late August), came too late to brought any relief to the crops still in the field.

Rainfall deficit in most of northern Europe (Denmark, Sweden, Baltic countries and Finland) created suboptimal conditions for the sowing of winter crops and causes some delay. A similar problem is observed in Slovenia.

Overly wet conditions in southern Poland caused damage to recently sown stands of winter crops, which in some cases needed to be re-sown.



1.2. Meteorological review (1 August –10 September 2022)

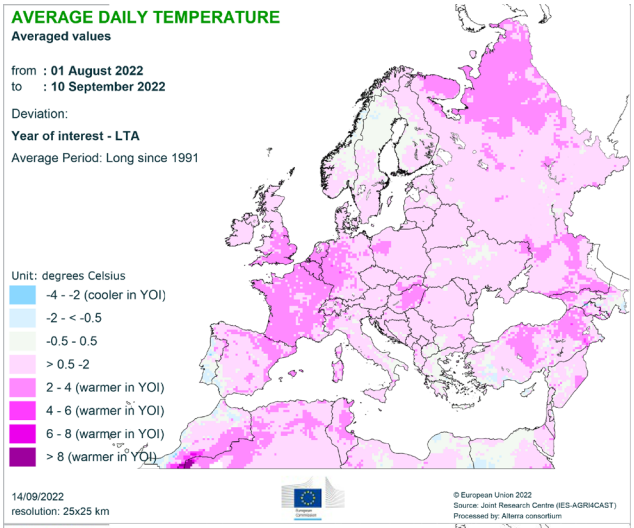
Warmer-than-usual conditions persisted throughout most of Europe. Wetter-than-usual conditions occurred in the Balkan Peninsula, coastal Scandinavia, and parts of central and western Europe.

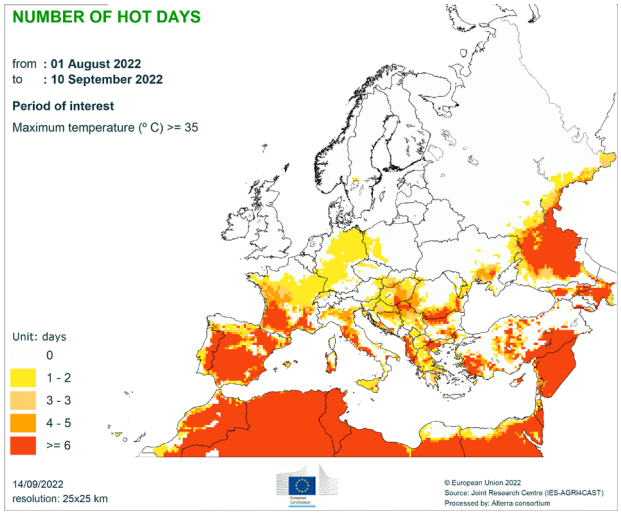
Warmer-than-usual conditions compared to the 1991-2021 long-term average (LTA) were observed in almost all of Europe. Daily mean temperatures were between 0.5°C and 2°C above the LTA in most of Europe, with more distinct positive temperature anomalies (up to 4°C above the LTA) in parts of Spain, most of France, the south of the United Kingdom, the Benelux countries, parts of northern Italy, western and central Germany, western Poland, eastern Hungary, and parts of Slovakia as well as in northern and parts of southern European Russia and central and eastern Turkey. Six or more days with maximum temperature exceeding 35°C were observed in most of the Iberian Peninsula, southern France, along the Mediterranean coast of Italy, parts of the Balkan countries, Turkey, and in the Caspian Depression.

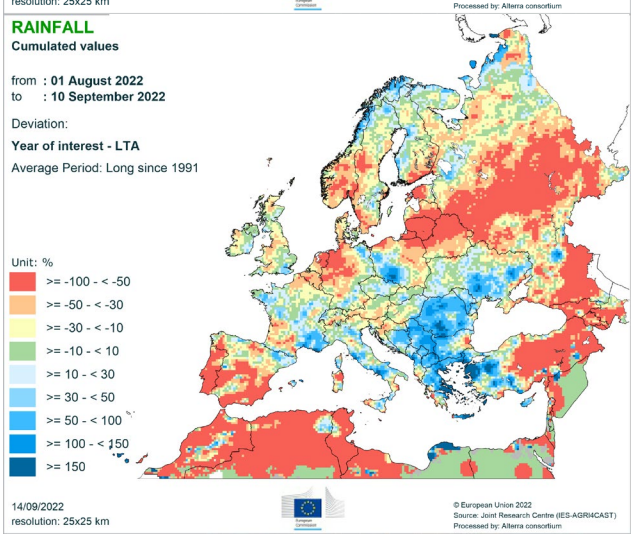
Slightly colder-than-usual conditions, with temperature anomalies of -0.5°C to -2°C compared with the LTA were observed in parts of Portugal, southern Spain, and small parts of Scandinavia and Turkey.

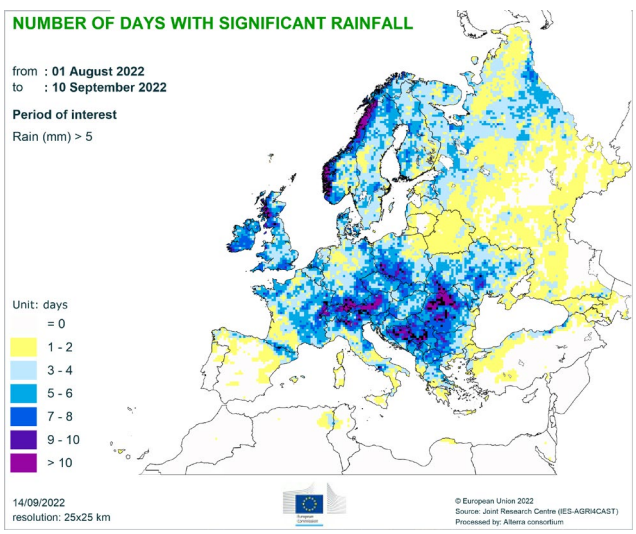
Drier-than-usual conditions with precipitation anomalies of -50% or more (with respect to the LTA) were observed in most of the Iberian Peninsula, north-western Germany, the Netherlands, parts of southern Scandinavia, the Baltic countries, northern Belarus, central and southern European Russia, and central and eastern Turkey. Only up to 2 days with rainfall exceeding the 5 mm threshold were observed in these regions.

Wetter-than-usual conditions (50% or more compared to the LTA) were observed in western Turkey, the Balkan countries, Romania, and southern Ukraine as well as locally in coastal Scandinavia and European Russia, parts of south-western Poland, Italy, southern France, and the Pyrenees. More than 10 days with rainfall above 5 mm were observed in western Scotland, coastal Scandinavia, and the mountainous regions of central Europe.









1.3. Summer review (June, July, August)

Due to warm air masses originating in the Azores region off the west African coast and over the Barents Sea in the Arctic settling in over Europe, the summer has been characterised by the persistence of warmer and drier-than-usual conditions with substantial hydrological and agricultural drought events as well as record high temperatures during a series of heatwaves across southern and western Europe.

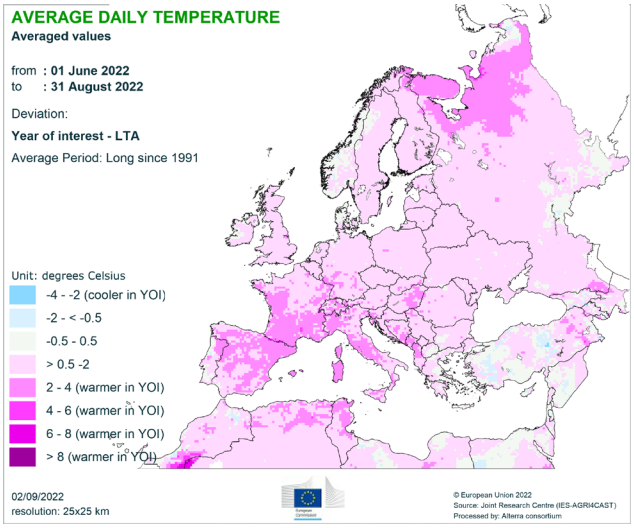
Warmer-than-usual conditions compared to the 1991-2021 long-term average (LTA) were observed in almost all of Europe. Daily mean temperatures reached up to 2°C above the LTA in most of Europe. More distinct positive anomalies (up to 4°C above the LTA) were observed in most of Spain, northern Portugal, southern and south-western France, northern and central Italy, the Alps region, parts of southern Germany, eastern Hungary, parts of the western Balkans, and northernmost European Russia. Positive anomalies between 4°C and 6°C were reached locally in the Pyrenees, southern France, and the Chosha Bay coast of European Russia. The number of hot days during the review period exceeded the LTA by over 30% and average daily temperatures ranked highest compared to the LTA in most of Europe.

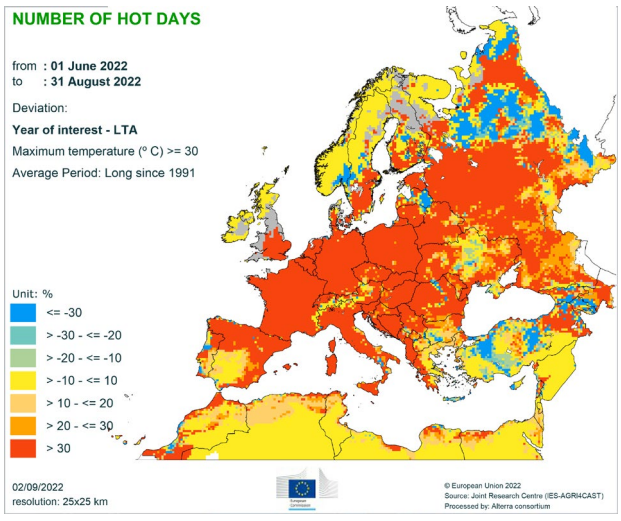
Severe heatwaves affected large areas of southern and western Europe with maximum daily temperatures exceeding the LTA by more than 8°C. A national record-high temperature of 42.9°C was recorded during a heatwave in France in June, while in July a record-high 47°C was recorded in Portugal, one of 40.3°C in the United Kingdom, likewise 40.3°C in Germany, and 37.2°C in Sweden.

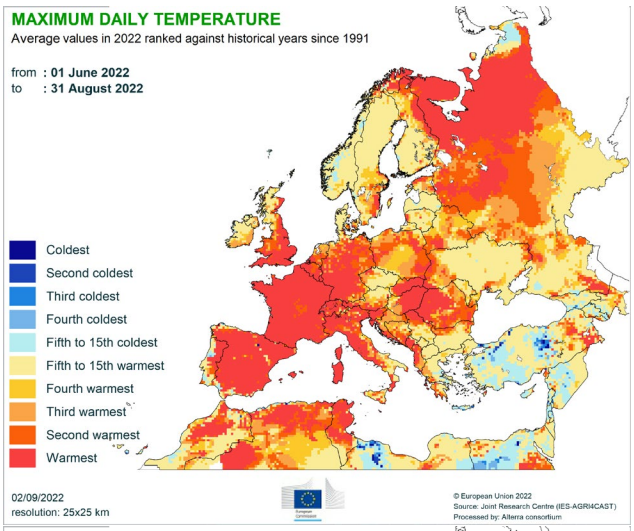
Slightly colder-than-usual conditions with temperature anomalies of -0.5°C to -2°C below the LTA were observed locally in Turkey, the Caspian Depression, and northernmost European Russia. The number of hot days observed was 30% below the LTA in parts of the Scandinavian Peninsula, northern European Russia, Latvia, and locally in Ukraine, Romania, south-western Bulgaria, and parts of Turkey.

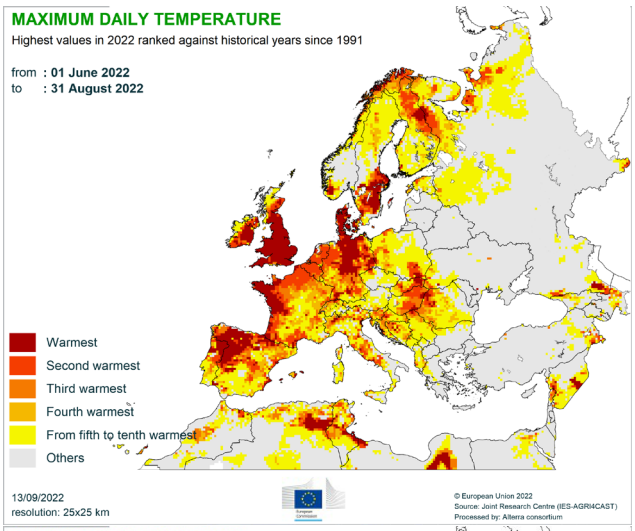
Drier-than-usual conditions with precipitation anomalies of -30% or less (compared with the LTA) were observed in most of the Iberian Peninsula, the United Kingdom, northern France, the Benelux countries, Germany, north-western Poland and southern Scandinavia, central Italy, Slovenia, Croatia, eastern Hungary, parts of Romania, Moldova, western Ukraine, Belarus, and parts of northern, central, and southern European Russia, the Ukraine coast along the Sea of Azov, and easternmost Turkey. The rain deficit in large parts of these regions was more than 50% below the LTA and only up to 2 days with rainfall (above 15 mm) were observed.

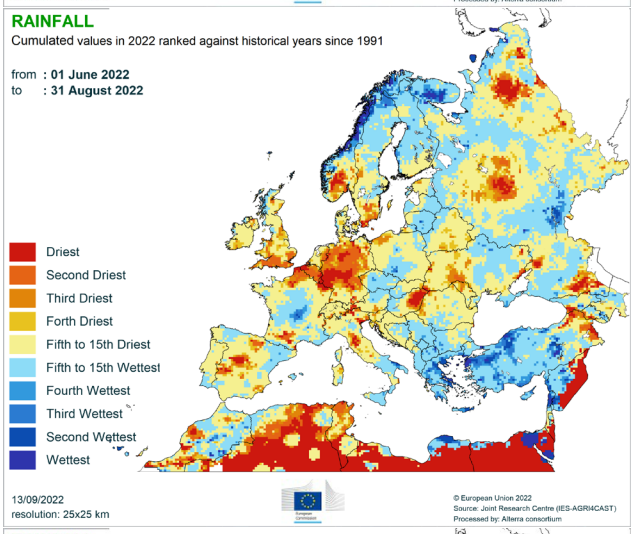
Wetter-than-usual conditions (30% or more compared with the LTA) were observed in parts of the northern Iberian Peninsula, central France, southern Italy, large parts of the Balkan region, most of Turkey, the Caspian Depression, parts of northern European Russia, and most of Scandinavia. In parts of Scandinavia, locally in European Russia, Belarus, Latvia, Lithuania, Turkey, and the Balkan region, more than 5 days with significant rainfall were observed while more than 9 days with significant rainfall were observed in the Alps region.

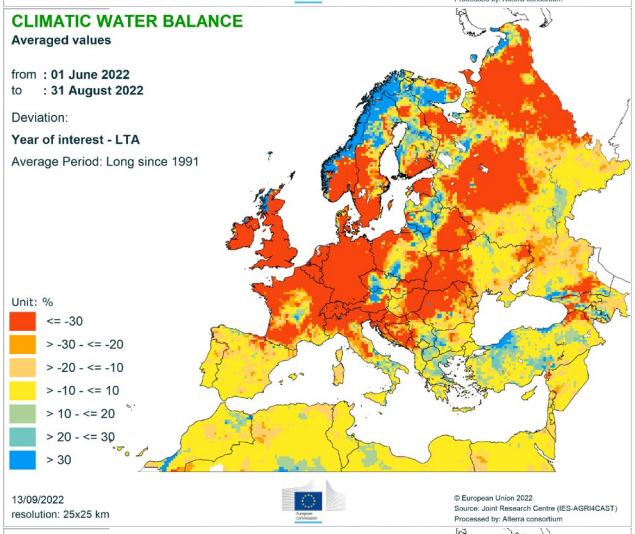


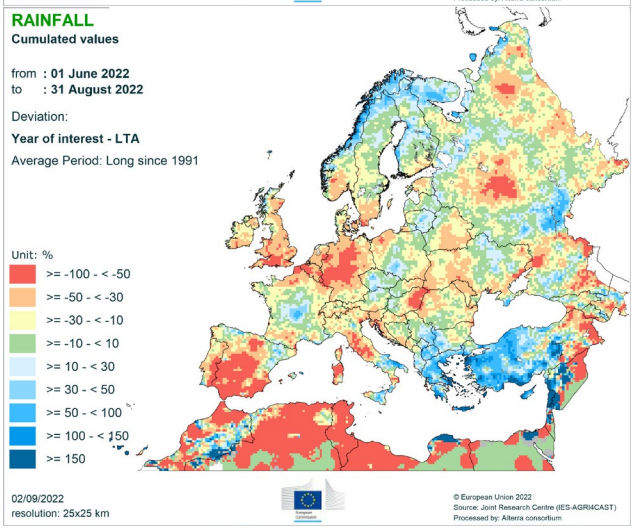


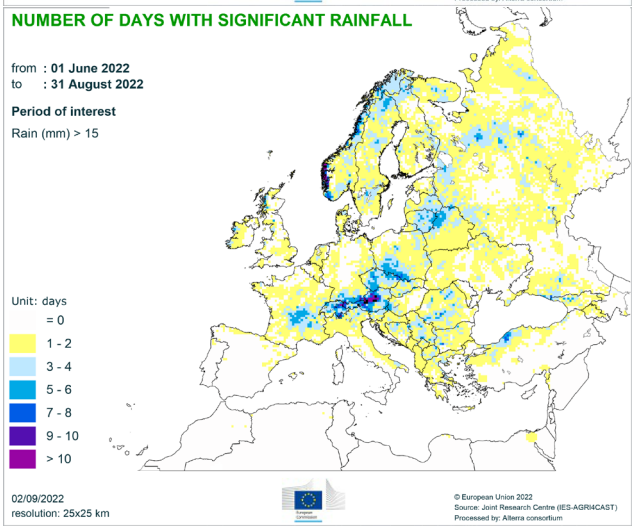

MAXIMUM DAILY TEMPERATURE
Average values in 2022 ranked against historical years since 1991
from : 01 June 2022
to : 31 August 2022
Coldest
Second coldest
Third coldest
Fourth coldest
Fifth to 15th coldest
Fifth to 15th warmest
Fourth warmest
Third warmest
Second warmest
Warmest
02/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


MAXIMUM DAILY TEMPERATURE
Highest values in 2022 ranked against historical years since 1991
from : 01 June 2022
to : 31 August 2022
Warmest
Second warmest
Third warmest
Fourth warmest
From fifth to tenth warmest
Others
13/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


RAINFALL
Cumulated values in 2022 ranked against historical years since 1991
from : 01 June 2022
to : 31 August 2022
Driest
Second Driest
Third Driest
Forth Driest
Fifth to 15th Driest
Fifth to 15th Wettest
Fourth Wettest
Third Wettest
Second Wettest
Wettest
13/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


CLIMATIC WATER BALANCE
Averaged values
from : 01 June 2022
to : 31 August 2022
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Unit: %
<= -30
> -30 - <= -20
> -20 - <= -10
> -10 - <= 10
> 10 - <= 20
> 20 - <= 30
> 30
13/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 June 2022
to : 31 August 2022
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Unit: %
>= -100 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 100
>= 100 - < 150
>= 150
02/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 June 2022
to : 31 August 2022
Period of interest
Rain (mm) > 15
Unit: days
= 0
1 - 2
3 - 4
5 - 6
7 - 8
9 - 10
> 10
02/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium

1.4. Weather forecast (15 - 24 September)

Weather conditions will mainly be determined by northerly winds moving from the North Sea southward over the continent, favouring cooler air temperatures and precipitation events that will mainly be intense in the Balkan region.

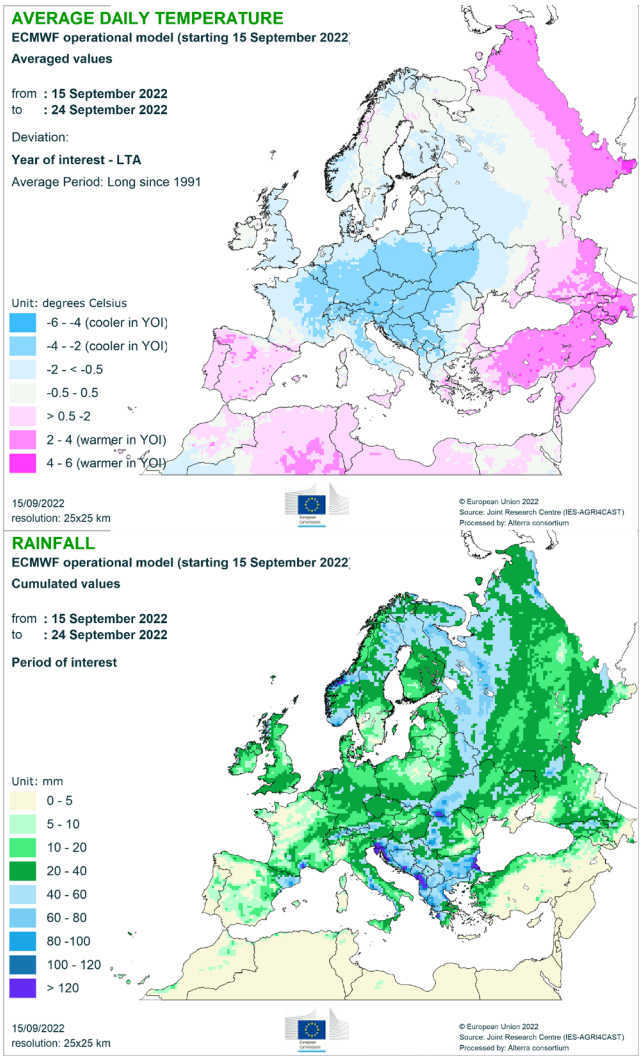
Warmer-than-usual conditions with respect to the 1991-2021 long-term average (LTA) are forecast in most of the Iberian Peninsula, Eastern Europe, southern Greece, southern Italy, Turkey, and along the Black Sea coast of Bulgaria and Romania with daily temperatures up to 8°C warmer than the LTA. Maximum daily temperatures in these regions are forecast to reach 28°C and to exceed 30°C in the southern Iberian Peninsula and parts of Turkey.

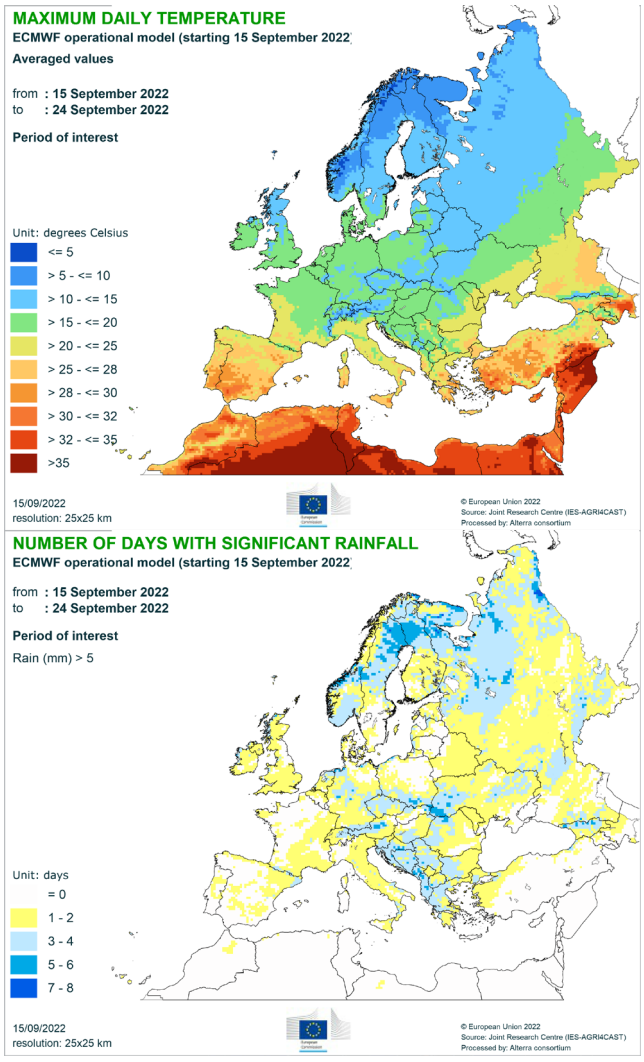
Colder-than-usual conditions, with temperature anomalies up to -6°C with respect to the LTA are forecast for central and western Europe. Maximum daily temperatures in these regions will be between 15°C and 20°C, while in Scotland, the Alps, the Carpathians regions, the East European Plain, and parts of Scandinavia daily maximum temperatures will be between 10°C and 15°C. Daily maximum temperatures up to 10°C in northern and coastal Scandinavia and northernmost European Russia.

Dry conditions are expected in parts of the Iberian Peninsula, western France, north-western Italy, eastern Romania, around the Sea of Azov in southern Ukraine, and southern European Russia. For these regions and most of Europe up to 2 days with rainfall above 5 mm are forecast in the review period.

Wet conditions (60 mm rainfall or more) are mainly forecast for the Balkan countries, western Romania, and western Ukraine, with precipitation between 40 and 60 mm across the belt of lower air temperatures in the East European Plain, Scandinavia, and northern European Russia. More than 5 days with rainfall above 5 mm are forecast in parts of Scandinavia, northern European Russia, the Carpathians, the Alps, and small regions of the western Balkans.

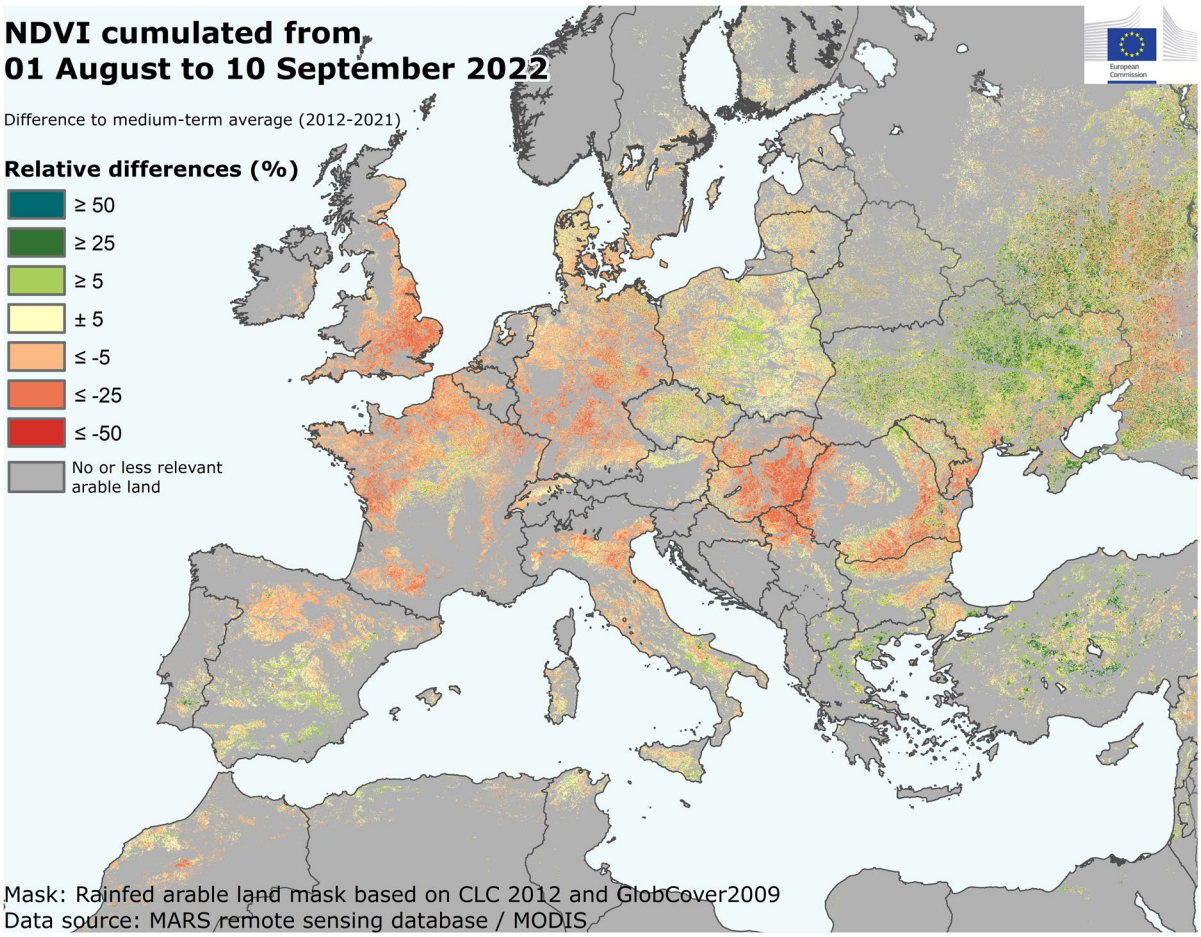
The **seasonal forecast** is that slightly above-average air temperatures are highly likely in most of Europe, and a low probability of a wet autumn.





2. Remote sensing – observed canopy conditions

Early end of season for summer crops



The map above displays the difference between the Normalised Difference Vegetation Index (NDVI) cumulated from 1 August to 10 September 2022 and the medium-term average (2012-2021) for the same period. Positive anomalies (in green) reflect above-average canopy density or early crop development while negative anomalies (in red) reflect below-average biomass accumulation or late crop development.

The map above displays predominately summer crop conditions as the winter crop season has finished except in the northernmost countries. Negative anomalies prevail in western and central Europe where summer crops have reached advanced senescence because of persistent dry and hot conditions during this summer. Precipitation fell in the second half of August, but too late to favour crop recovery.

In **northern Italy**, August was characterised by temperatures close to seasonal values and a few rainfall events, particularly intense during the second half of the month. Nevertheless, summer crops could not benefit from these positive conditions as they had already come to maturity with cumulated well below average biomass (e.g. in the *Veneto* region).

In **France**, a lack of rainfall and record-high temperatures were registered during the first dekad of August, with maximum temperatures exceeding 35°C in southern and western regions, contributing to further accelerating crop senescence (e.g. in the *Pays de la Loire* region).

In **southern Germany** and similarly in **Austria**, **Czechia,** and **Slovakia**, above-average temperatures and below-average precipitation continued in the first two dekads of August hampering the last stages of summer crop development (e.g. the *Jihozapad* area in Czechia).

Poland had mixed conditions as a consequence of the hot and dry conditions in July that affected the western half of the country. In August even eastern regions faced a rainfall deficit and above-average temperatures that reduced biomass accumulation to average levels (e.g. the province of *Lódzkie*).

After a wet and cold start to summer in the **Baltic countries**, August was drier and warmer-than-usual but overall crop biomass accumulation remained in line with or slightly above the average. The sharp temperature increase observed in the second half of August favoured the conclusion of the vegetative development of crops and the harvest campaign has started (e.g. *Latvia*).

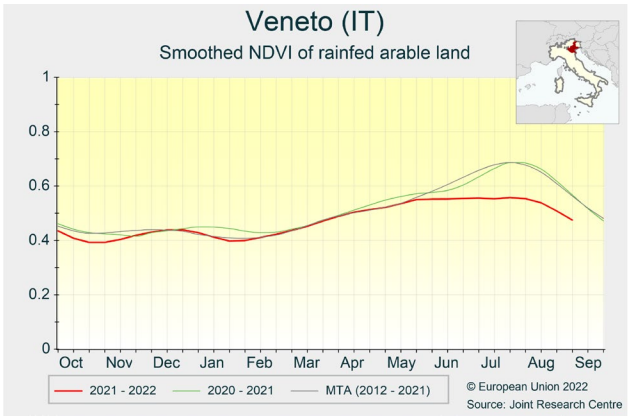
In **Hungary**, hot and dry conditions were interrupted by some precipitation in the second half of August, but summer crops had already reached maturity and negative anomalies still prevail in the NDVI anomaly map (e.g. the *Del-Alfold* region).

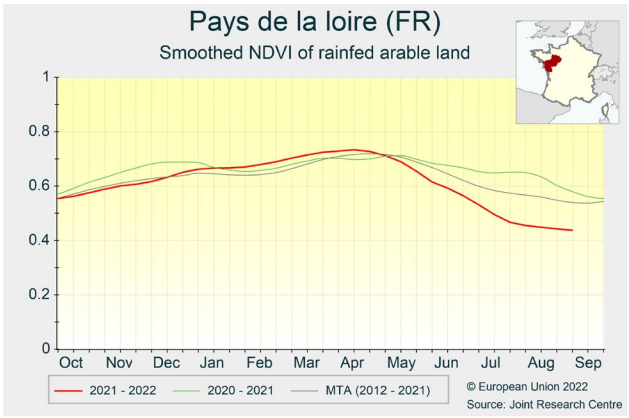
In **Romania** and **Bulgaria**, August brought much needed rain that helped slow down the fast ripening of summer crops despite the warmer-than-usual weather (e.g. *Sud-Est*).

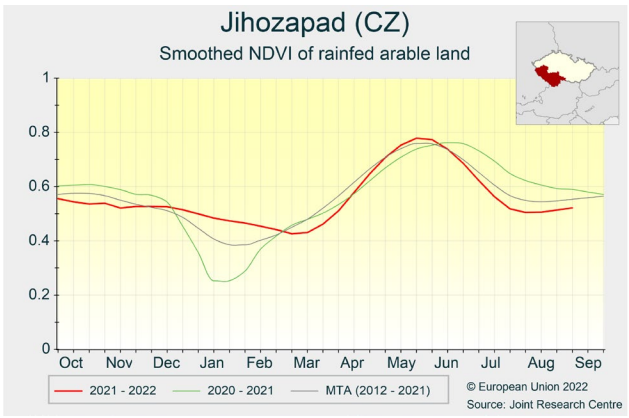
In **Ukraine**, positive anomalies (green colours) prevail in western and northern regions, mostly accounting for grain maize and soybean, where crops benefitted from favourable rainfall in July and early August during grain-filling (e.g. the Poltavs'ka province).

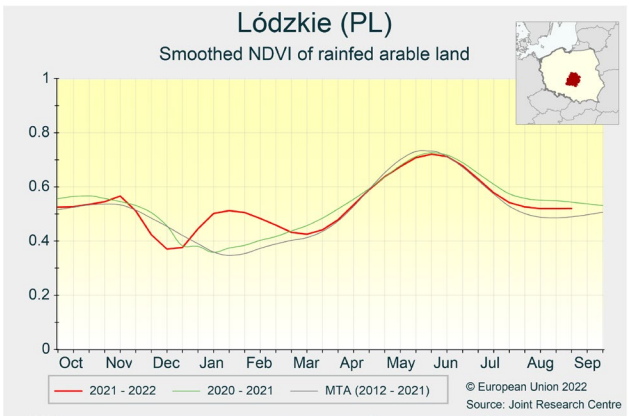
Above-average biomass accumulation in **European Russia** reflects a positive season for spring crops that is concluding under warmer-than-usual conditions in August.

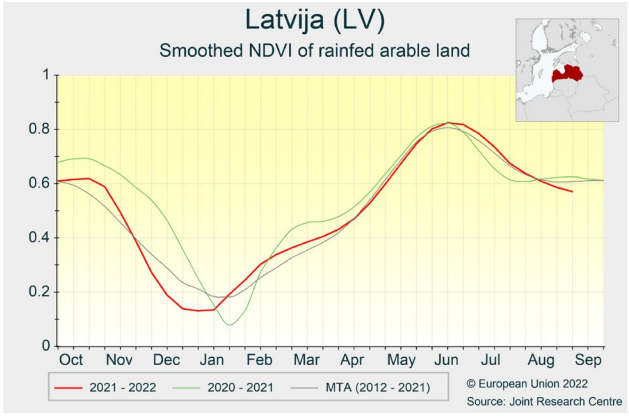
In the **United Kingdom**, a lack of precipitation and hot temperatures characterised August in southern regions, but harvest has already been completed. In northern regions, spring cereals could benefit from more rain and the harvest campaign has started earlier than it usually does.

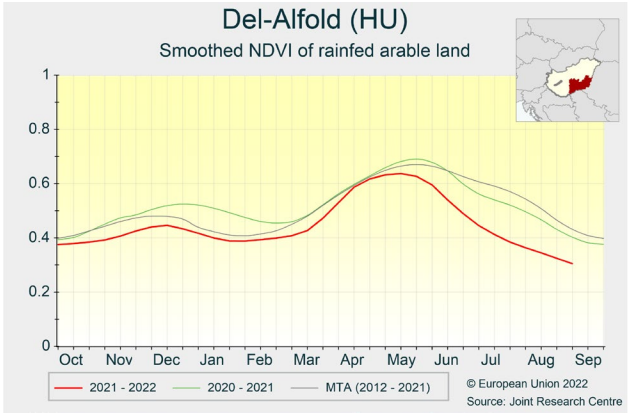


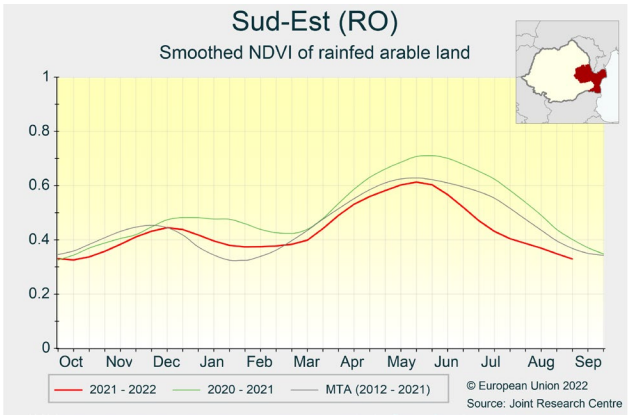


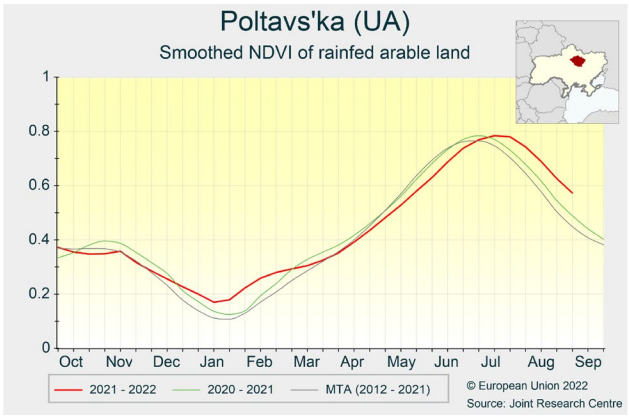





Latvija (LV)
Smoothed NDVI of rainfed arable land
1
0.8
0.6
0.4
0.2
0
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
2021 - 2022
2020 - 2021
MTA (2012 - 2021)
© European Union 2022
Source: Joint Research Centre


Del-Alfold (HU)
Smoothed NDVI of rainfed arable land
1
0.8
0.6
0.4
0.2
0
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
2021 - 2022
2020 - 2021
MTA (2012 - 2021)
© European Union 2022
Source: Joint Research Centre

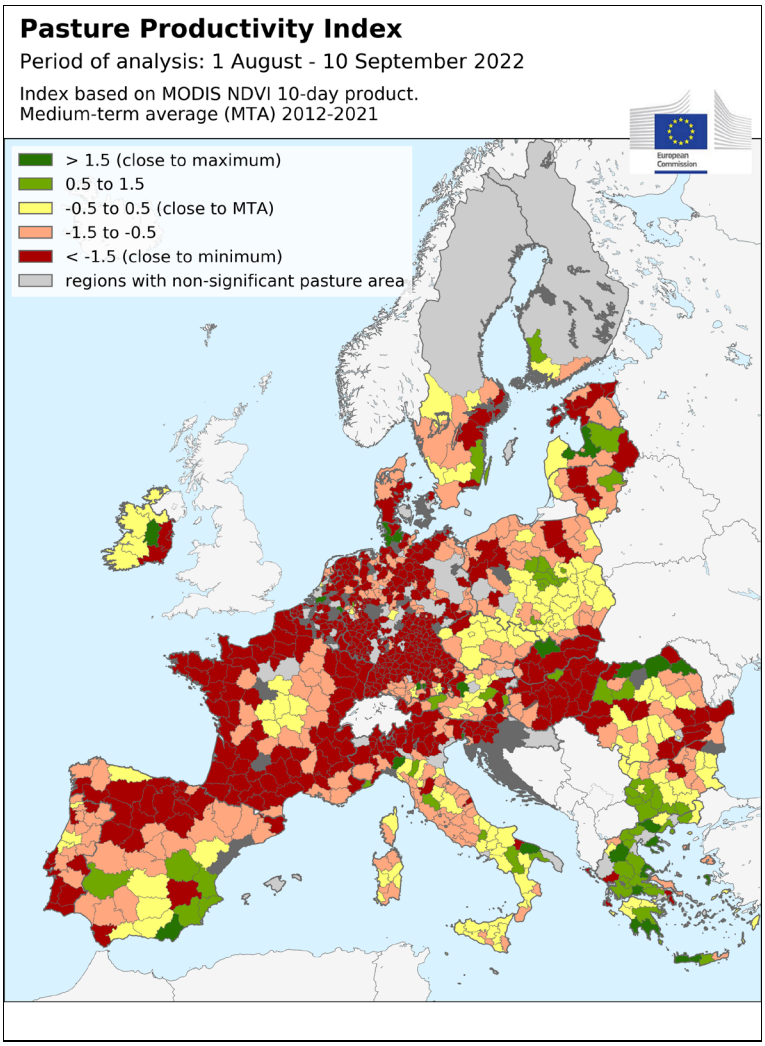

Sud-Est (RO)
Smoothed NDVI of rainfed arable land
1
0.8
0.6
0.4
0.2
0
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
2021 - 2022
2020 - 2021
MTA (2012 - 2021)
© European Union 2022
Source: Joint Research Centre


Poltavs'ka (UA)
Smoothed NDVI of rainfed arable land
1
0.8
0.6
0.4
0.2
0
Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sep
2021 - 2022
2020 - 2021
MTA (2012 - 2021)
© European Union 2022
Source: Joint Research Centre

3. Pastures in Europe – regional monitoring

Improved weather conditions not yet reflected in improved pasture productivity

For the period of review, negative anomalies of pasture productivity, due to hot and dry conditions; are generalised across the EU. Compared with the previous reporting period, the extent of stressed pastures increased. Pastures in fair to good condition in comparison with an average year prevail in the Baltic Sea region, Sweden, Ireland and Greece..



In **France**, despite significant rainfall since mid-August, high temperatures and radiation kept soil moisture low, leading to additional negative impacts on biomass accumulation.

In the **Benelux** countries, continued drier-than-usual weather caused further deterioration of the condition of pastures.

In **Germany**, significant rainfall in the second half of August brought some relief to pastures in eastern and southernmost parts of the country. However, in other parts dry and warmer-than-usual conditions continued until the beginning of September, which further deteriorated the condition of pastures.

In **Ireland**, dry conditions during the review period were ended by rainfall in early September. Additional rain, as forecast, will highly benefit grassland recovery.

In **Denmark** and **Sweden,** radiation and temperatures were high, but local rainfall deficits are expected to have had limited impact on pasture productivity. In **Finland** and the **Baltic countries**, dry condition prevailed during the observing period with surplus radiation and temperatures. Rainfall was scarce in the Baltic countries but extremely variable in **Finland**. Yet, overall, the growing season has been favourable for silage production in **Finland**.

In **Poland**, the impacts of water deficits on biomass accumulation are visible in the northern and south-western regions.

In **Italy**, northern and central areas are still under conditions of water stress compared with an average year. Southern areas are returning to more average conditions.

In **Spain**[1] and **Portugal**, rainfall of significance has not returned yet and grasslands remain under the long lasting drought that this season has offered.

In **Hungary** pasture productivity is exceptionally low as extremely dry conditions prevailed and rainfall since mid-August was insufficient to lift soil moisture levels above critical levels before the beginning of September. Also in **Austria**, **Czechia** and **Slovakia**, late-August rainfall has not yet led to visibly improved pasture conditions.

In **Slovenia** and **Croatia,** weather conditions are returning closer to normal, but the prolonged dry and hot conditions that prevailed during the whole season significantly affected the condition of pastures, which stabilized but not yet returned to average for this time of year.

In **Bulgaria,** abundant precipitation benefited pastures in the western regions, while in the eastern regions, rainfall deficit still prevails.

In **Romania**, August rainfall alleviated the soil moisture deficit and partially restored the condition of pastures, most notably in the west.

In **Greece**, biomass production has been above the MTA in the pasture areas of Greece mainland (*Western Macedonia*, *Thessaly* and *Central Macedonia*). Elsewhere, it is mostly in line with the MTA.

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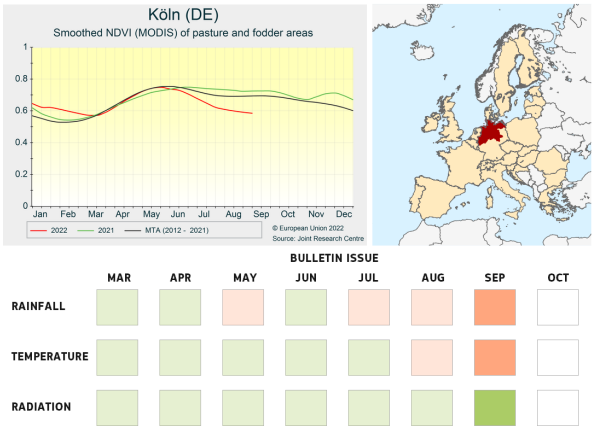
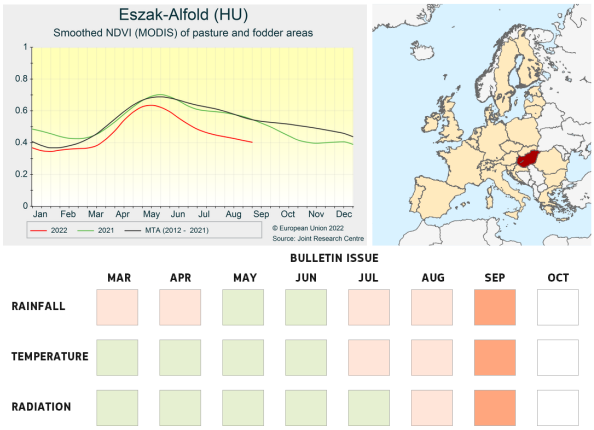
Germany - North

Reference period: 01 Aug to 10 Sep 2022



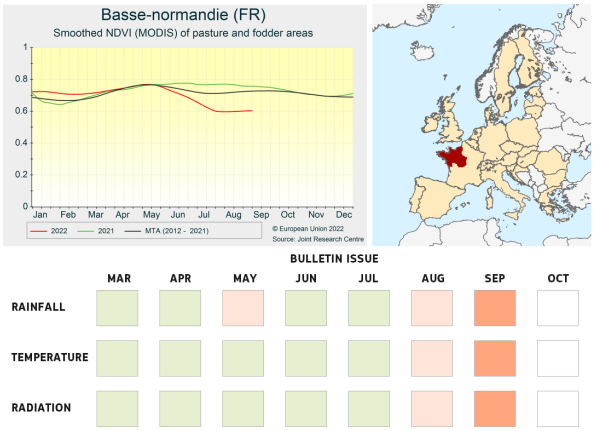
Hungary

Reference period: 01 Aug to 10 Sep 2022



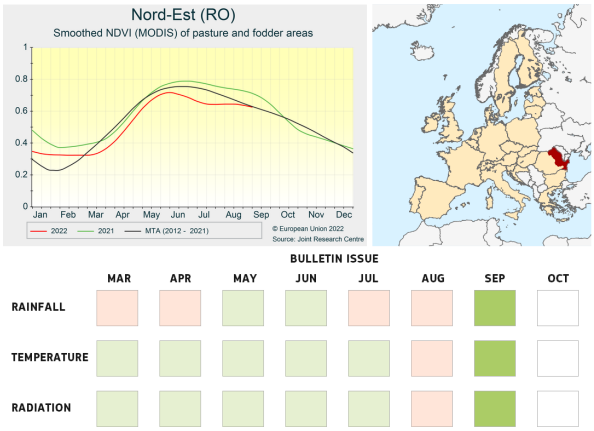
France - NorthWest

Reference period: 01 Aug to 10 Sep 2022



Romania - East

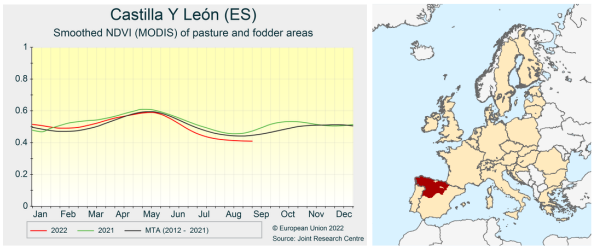
Reference period: 01 Aug to 10 Sep 2022



[1] Badajoz green colour is attributed to an artefact caused by inclusion of some irrigated land in the analysis

Spain and Portugal - North

Reference period: 01 Aug to 10 Sep 2022

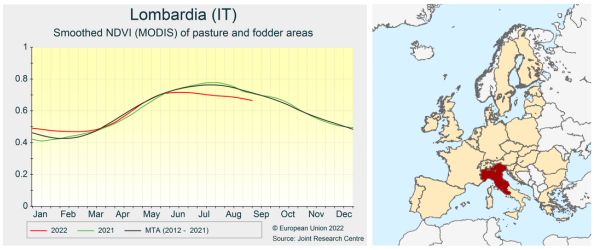


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Italy - North and central

Reference period: 01 Aug to 10 Sep 2022

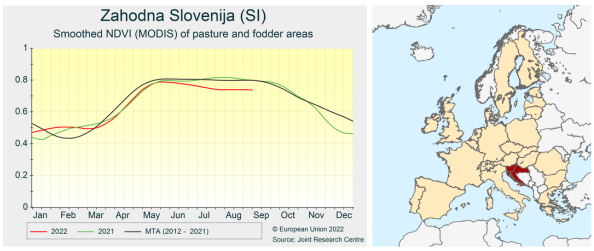


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Slovenia and Croatia

Reference period: 01 Aug to 10 Sep 2022

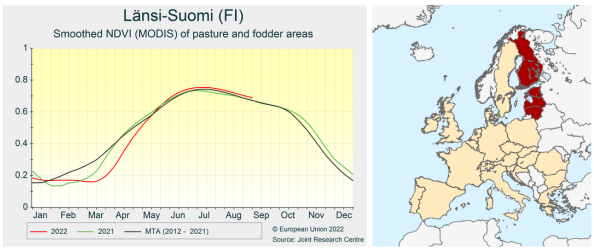


BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

Finland and Baltic countries

Reference period: 01 Aug to 10 Sep 2022



BULLETIN ISSUE

	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
RAINFALL								
TEMPERATURE								
RADIATION								

4. Rice in Europe

Extremely hot and dry in most of the EU rice-producing regions

The rice campaign in Europe was characterized by a long-lasting rainfall deficit and hot temperatures in most rice-growing regions. Yield expectations are below average in Italy, Spain, France, Portugal, Romania, and Hungary, and average to above-average in Bulgaria and Greece. The yield forecast for rice in the EU as a whole is 5.35 t/ha, which corresponds to 20.9% below the 5-year average.

Irrigated crops in Northern **Italy** experienced a lack of precipitation of historic proportions this season. The concurrent effect of low snowfall during winter, long-lasting drought conditions until mid-August, and unusually high temperatures from June to August strongly reduced streamflow discharge and groundwater levels. Irrigation consortia were progressively forced to lengthen farm irrigation shifts and to decrease water flows into irrigation channels (up to 90%). These conditions severely hampered rice cultivation, which is very dependent on water availability. Consequently, a well below-average biomass accumulation in large parts of rice-cultivating areas was observed by satellite image analysis. Our yield forecasts are -25% compared the 5-year average.

Weather in **Spain** was marked by extremely hot and dry conditions. Cumulated values of active temperatures (T_{base} 10°C) in all rice-growing areas were the highest in our archive (since 1979). Record-high maximum temperatures exceeded 40°C in *Extremadura* and *Andalucía* in mid-July. The rain deficit, already reported in the rice forecast for June, continued throughout summer. These weather conditions compromised the vegetative growth of rice. The levels of water in reservoirs used for irrigation reached an exceptionally low level in *Extremadura*, *Andalucía,* and *Comunidad Valenciana,* so restrictions in irrigation water supply were applied. Only the district of *Tarragona* received sufficient and constant water from the Ebro River to irrigate fields, resulting in above-average rice biomass accumulation. Despite this positive exception, our yield outlook for Spain as a whole is below the 5-year average.

In **Greece**, rice districts in *Central Macedonia* benefited from favourable meteorological conditions during the period under review. Warm, but not too hot temperatures (on average 1-2°C above the long-term average) and constant irrigation water availability sustained crop growth and development well. Our forecast is therefore above the 5-year average.

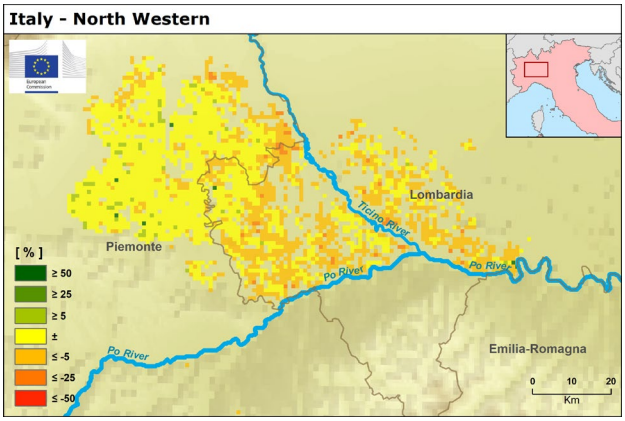
Growing conditions for rice in **Portugal** were negatively affected by hot and dry weather in the southern *Alentejo Litoral* area while they progressed with a near 15 days delay and above average biomass accumulation in the central rice-growing areas of *Area Metropolitana de Lisboa* and *Leziria Do Tejo*. Here, more favourable weather conditions took place during the key phenological stages for the crop (i.e. flowering and grain-filling). Our yield forecast is 6% below the 5-year average.

Extremely hot and dry conditions prevailed in southern **France** (*Bouches-du-Rhône*). Daily maximum temperatures were >32°C from the beginning of July to mid-August and cumulative rainfall was <5 mm. Such weather conditions were very unfavourable for rice growing, reducing the forecast for final production. More favourable conditions started from the second half of August, but came too late for the crops to recover. The overall yield outlook for rice in France is negative.

In **Bulgaria**, the combined effect of abundant rainfall in early June and a heatwave between end of June and early July with maximum daily temperatures reaching 35°C shortened the rice vegetative stages, particularly in the areas of *Pazardzhik* and *Plovdiv*. Analysis of satellite images confirms an advance in the season by nearly 20 days and biomass accumulation in line with an average season. Our forecast is close to the 5-year average.

A persistent rain deficit combined with well above-average temperatures hampered rice growth in most of the rice growing regions of **Romania**. Well above-average maximum daily temperatures at the beginning of July (T_{max} >34°C) and beginning of August (T_{max} >36°C), negatively impacted flowering and grain-filling stages. Our yield forecast is 20% below the 5-year average.

Hot and extremely dry conditions prevailed in **Hungary** during the period 1 June – 15 August, with total precipitation of only 35 mm against 135 mm for the LTA reference. Maximum daily temperatures of 36°C during the key phenological stages caused problems for flowering and grain-filling. Our yield forecast for rice has been revised downward.


Italy - North Western
Piemonte
Lombardia
Emilia-Romagna
Ticino River
Po River
Po River
Po River
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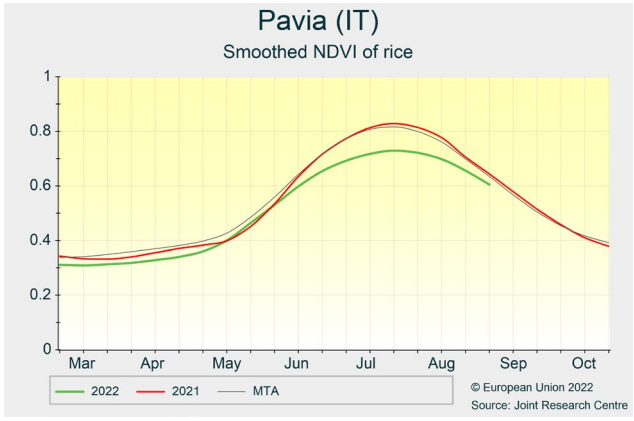
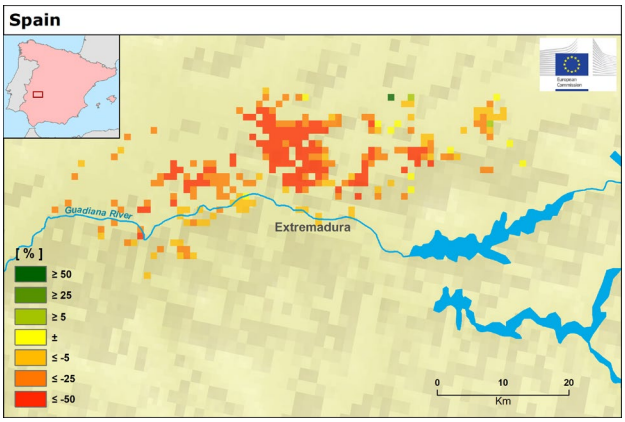

Pavia (IT)
Smoothed NDVI of rice
1
0.8
0.6
0.4
0.2
0
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre


Spain
Guadiana River
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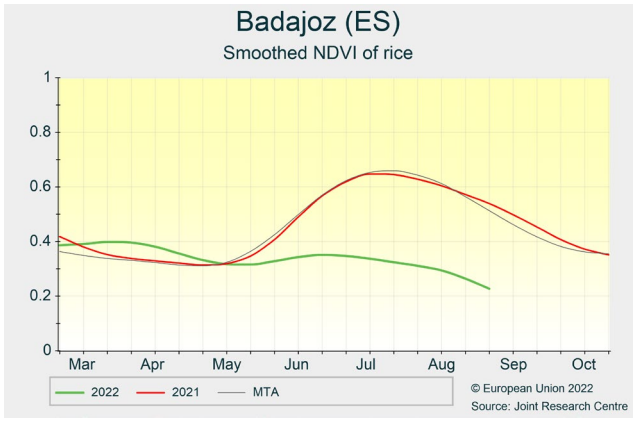
Badajoz (ES)
Smoothed NDVI of rice
1
0.8
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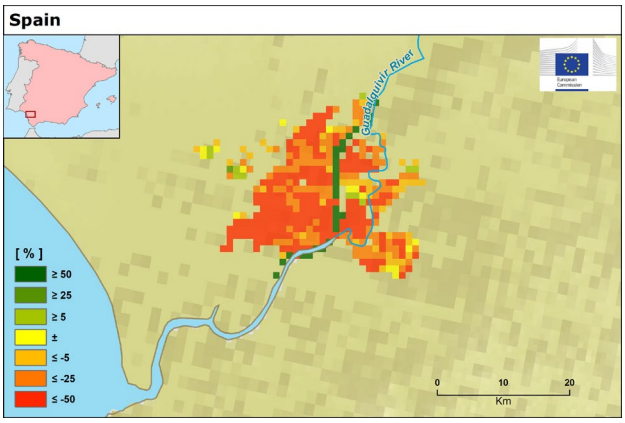
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre


Spain
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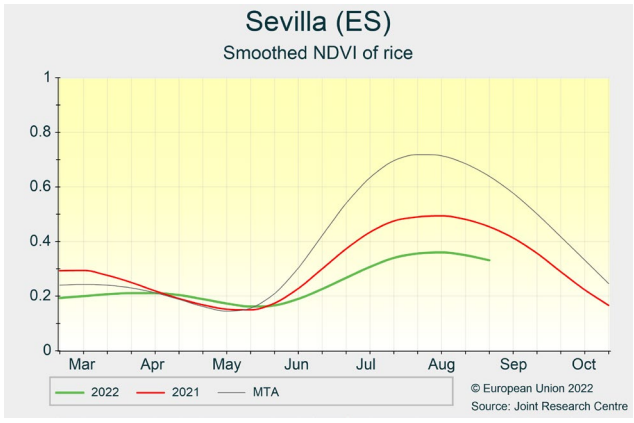
Sevilla (ES)
Smoothed NDVI of rice
1
0.8
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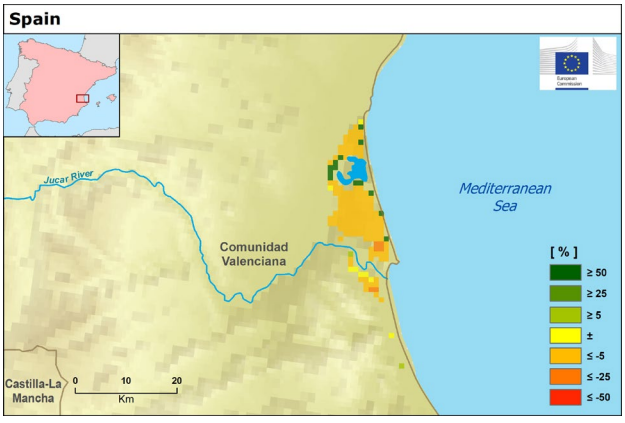
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre


Spain
Jucar River
Mediterranean Sea
Comunidad Valenciana
Castilla-La Mancha
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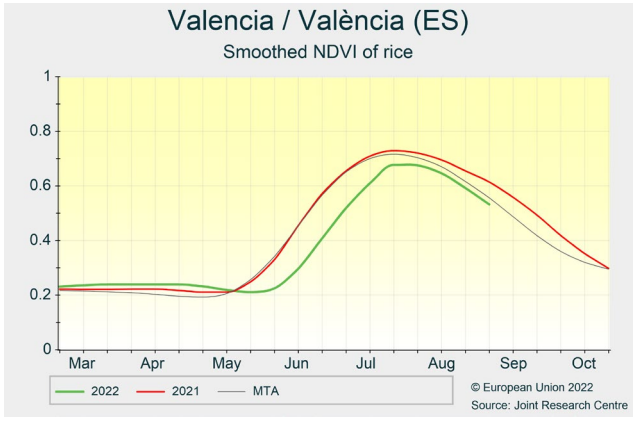
Valencia / València (ES)
Smoothed NDVI of rice
1
0.8
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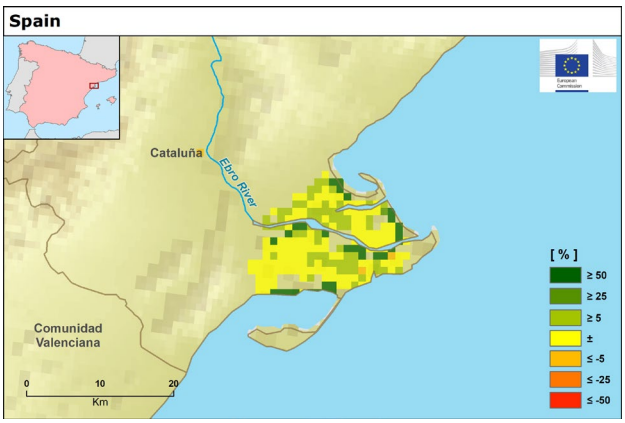
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre


Spain
Cataluña
Ebro River
Comunidad Valenciana
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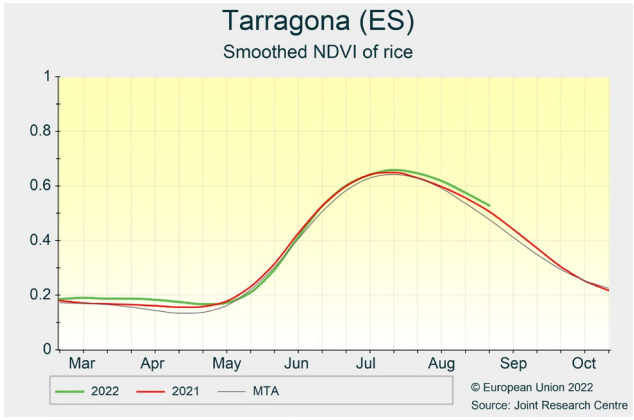
Tarragona (ES)
Smoothed NDVI of rice
1
0.8
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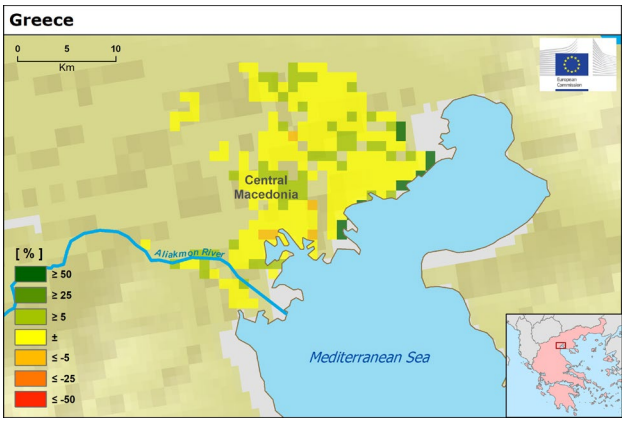
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre


Greece
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Central Macedonia
Aliakmon River
Mediterranean Sea
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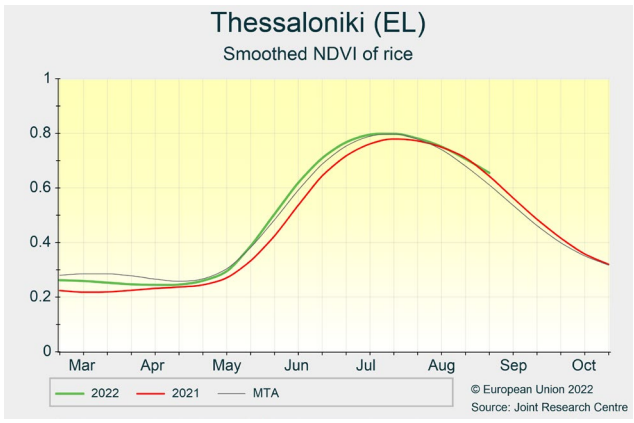
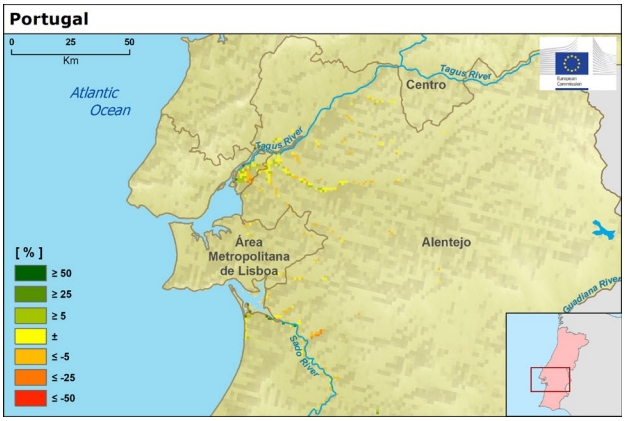

Thessaloniki (EL)
Smoothed NDVI of rice
1
0.8
0.6
0.4
0.2
0
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre


Portugal
0 25 50
Km
Atlantic Ocean
Tagus River
Centro
Área Metropolitana de Lisboa
Alentejo
Guadiana River
Sado River
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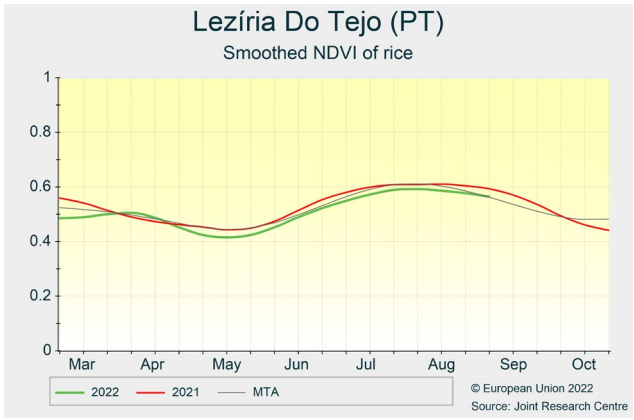
Lezíria Do Tejo (PT)
Smoothed NDVI of rice
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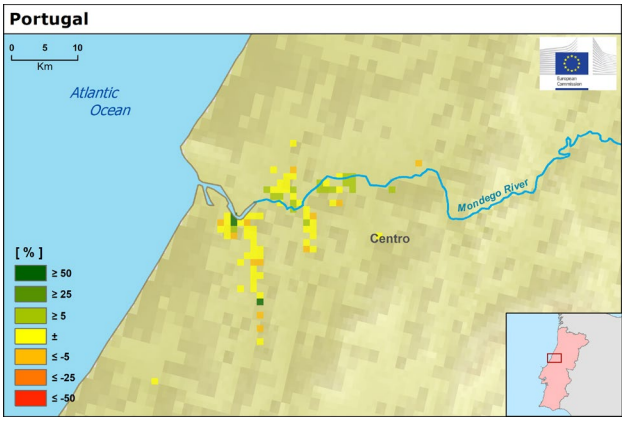
0.4
0.2
0
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre


Portugal
0 5 10
Km
Atlantic Ocean
Mondego River
Centro
[%]
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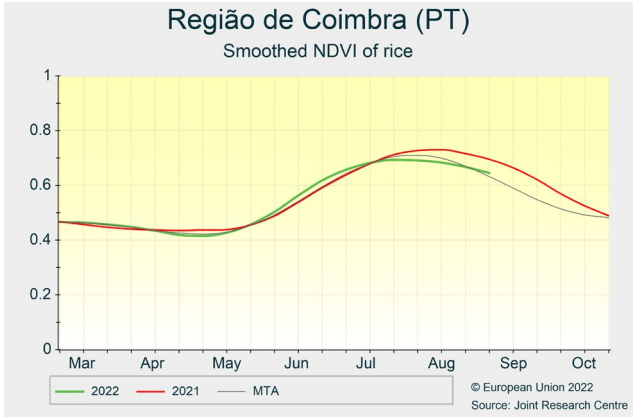
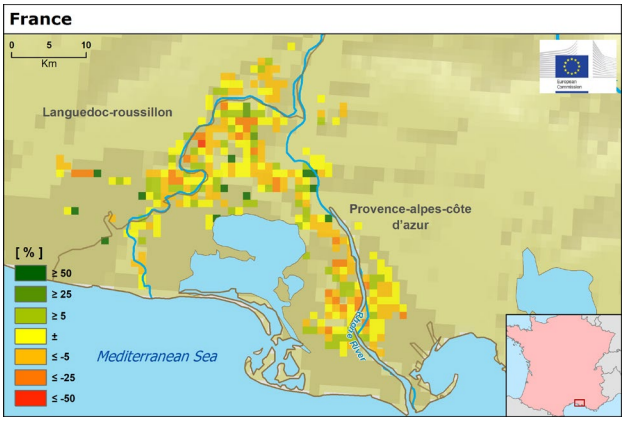
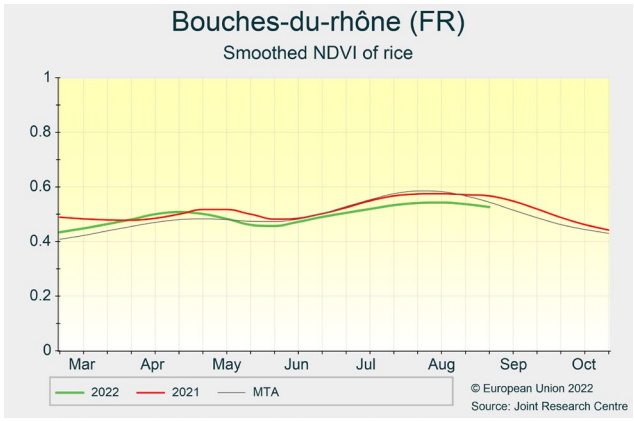
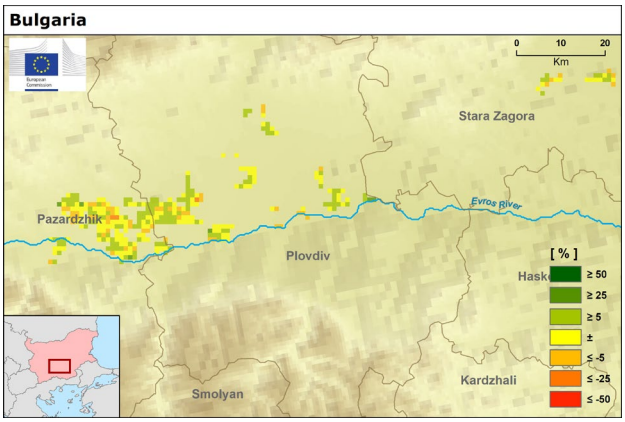
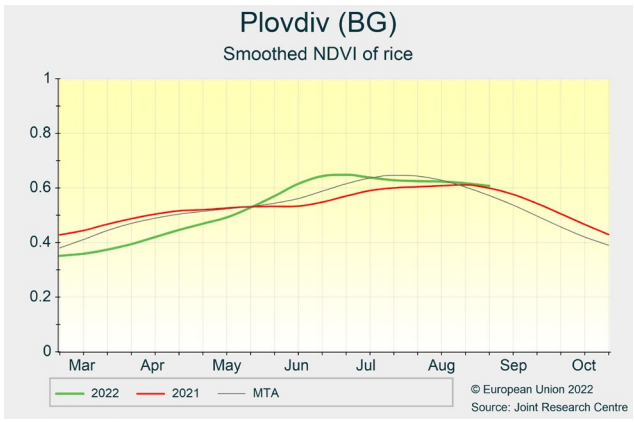
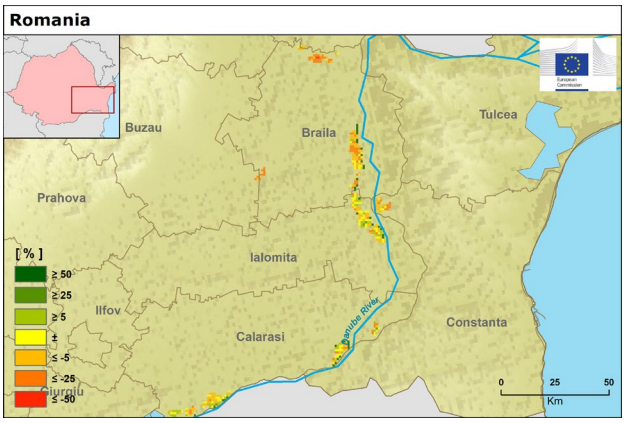

Região de Coimbra (PT)
Smoothed NDVI of rice
1
0.8
0.6
0.4
0.2
0
Mar Apr May Jun Jul Aug Sep Oct
2022 2021 MTA
© European Union 2022
Source: Joint Research Centre

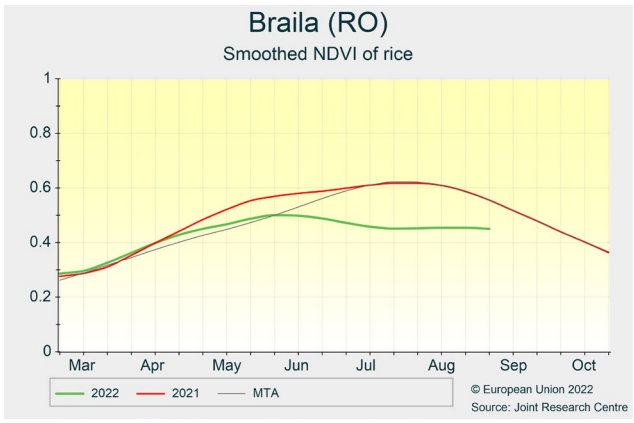


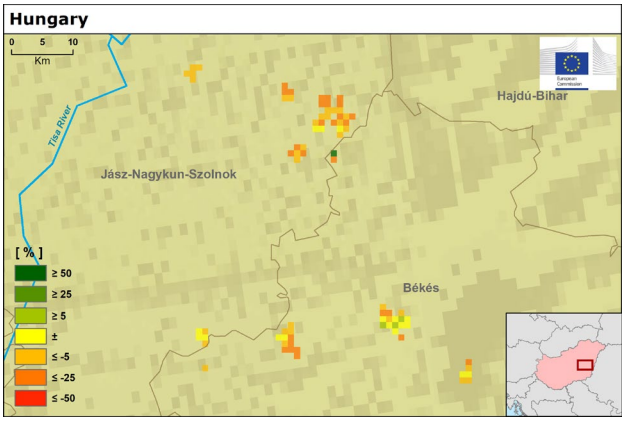


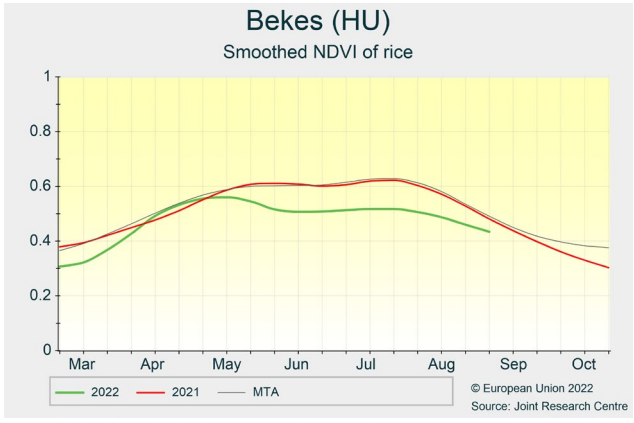












The maps display the difference between the Normalised Difference Vegetation Index (NDVI) cumulated from 1 June to 10 September 2022 and the medium-term average (2012-2021) for the same period. Mask: Rice areas based on CLC 2018. Data source: JRC MARS remote sensing database/MODIS

5. Country analysis

5.1. European Union

France

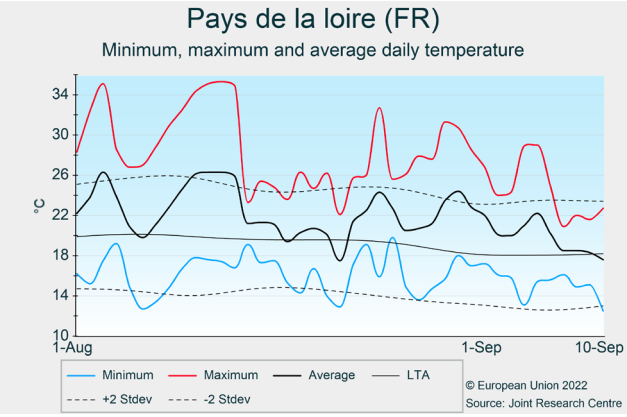
Rainfall arrived too late to benefit summer crops

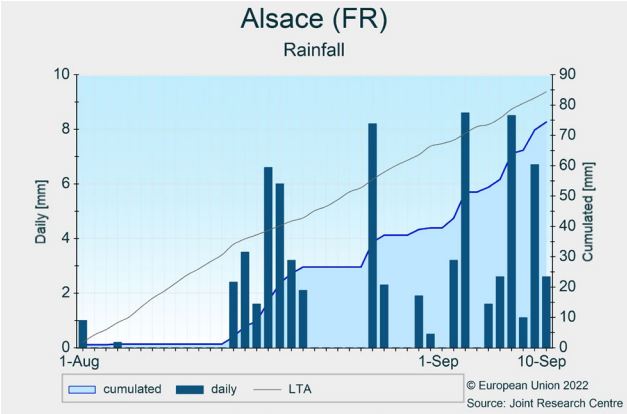
Abundant precipitation since mid-August arrived late in the season after summer crops had undergone severe irreversible damages due to hot temperatures and the drought occurring from the beginning of July.

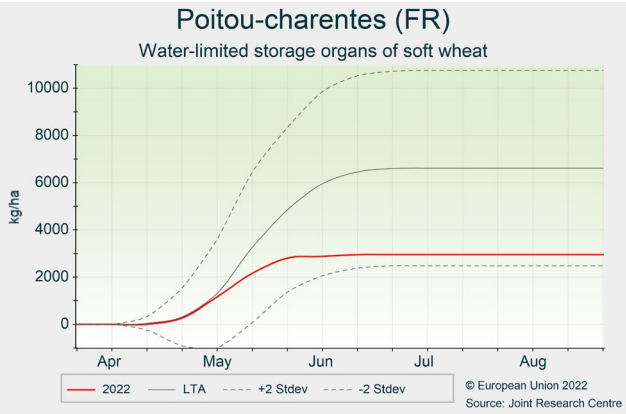
Warmer-than-average conditions prevailed during most of the review period in most of the country, with temperatures 2°C to 4°C above the LTA on average. Dry conditions prevailed until 12 August, worsening the drought situation. In the second half of the review period, rainfall was close to average, but the water received did not compensate for the deficit accumulated since early July.

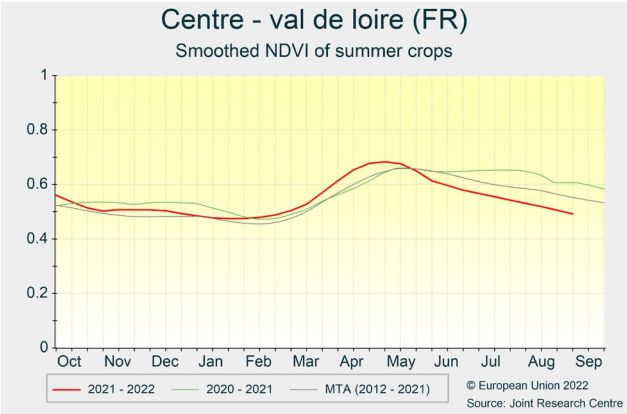
As already highlighted in the previous edition of the Bulletin, the drought from early July to mid-August negatively affected the growing conditions of all agricultural land, including crops, pastures, vineyards, and fruit trees. Precipitation after mid-August contributed to some degree of recovery of summer crops north of the *River Loire*. In the south, the rainfall came too late to allow for the recovery of summer crops, which had almost entirely dried up. At national level, the outlook for maize and sunflowers has been strongly impacted by the summer drought and repeated heatwaves. We slightly revised downward or maintained the yield forecasts for these crops, close to a record low for grain maize. Potatoes and sugar beet are not affected so much as they are cultivated in the north of the country, but their yield outlook remains negative. Maize and sunflower harvests have already started earlier than usual, especially in the *Nouvelle-Aquitaine* and *Occitanie* regions[2].

The wet conditions since mid-August benefitted rapeseed sowing, now emerged and in good shape









[2] https://cereobs.franceagrimer.fr/cereobs-sp/#

Germany

Yield outlook further deteriorated

Dry and warmer-than usual conditions continued in western and central regions until several days into September. Rain since then has arrived too late to improve the yield outlook. In southern and easternmost regions, rainfall since mid-August prevented further damage to summer crops. Yield forecasts for all summer crops were revised further downwards.

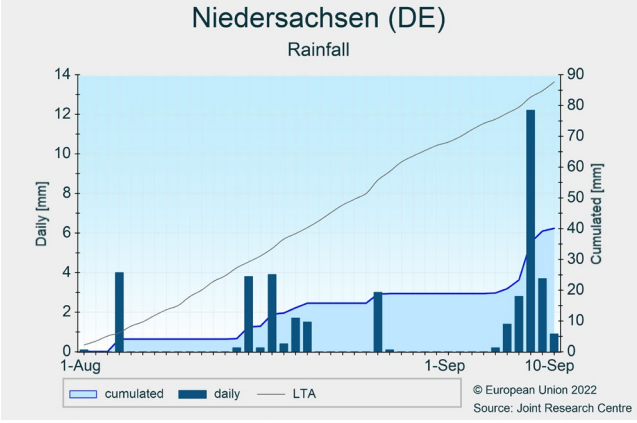
Temperatures remained above the LTA almost throughout the review period. The number of hot days (with maximum temperatures >30°C) was well above the LTA, but their incidence rapidly decreased after mid-August. Maximum temperatures exceeding 35°C only occurred on one day in most regions, on 4 August, when they reached between 37°C and 39°C in the south-west and north-east of the country.

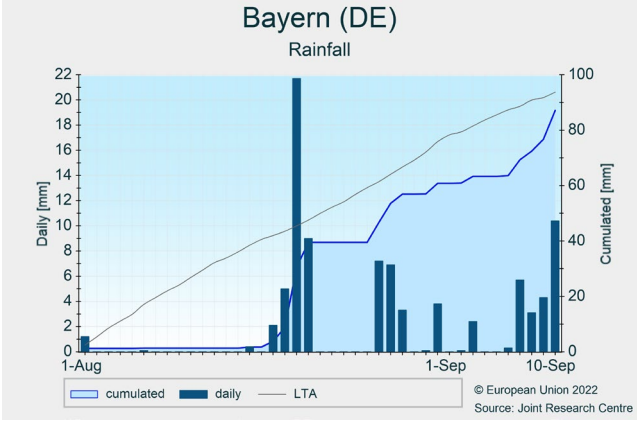
In central and western regions, rainfall remained scarce until several days into September after which several significant rain events raised the cumulative amounts for the period of review to 40 to 60% of the LTA. However, additional substantial rain events in southern and eastern regions (*Baden-Württemberg*, *Bayern*, *Sachsen*, *Brandenburg*, *Mecklenburg-Vorpommern*) in the second half of August led to cumulative amounts of around 80% of the LTA. Radiation was 10% to 20% above the LTA.

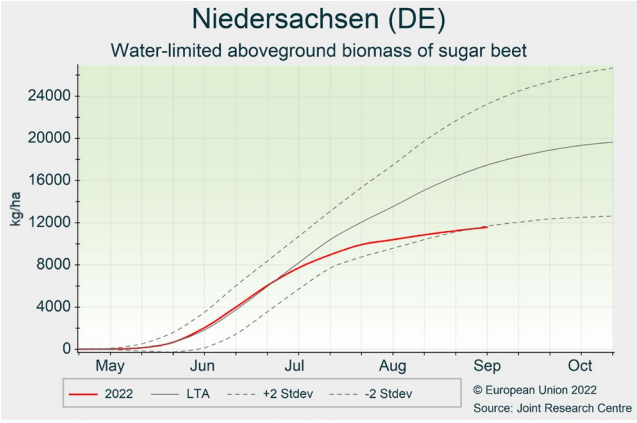
As a consequence, the condition of rain fed and partially irrigated crops further deteriorated in central and western regions whereas the rainfall in August in southern and eastern regions brought relief but without significantly improving the yield outlook.

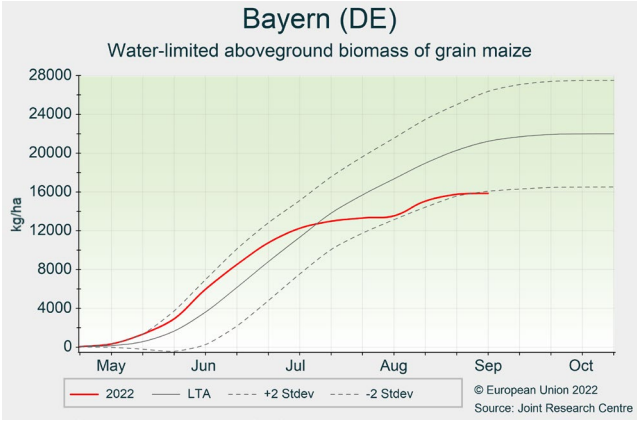
As the season is coming to an end, additional rainfall is unlikely to bring any benefits to summer crops. However, the recent rainfall was very welcome to allow seedbed preparation and sowing of winter crops for the coming season.

The forecasts for all summer crops were revised further downwards to well below the 5-year average.









Poland

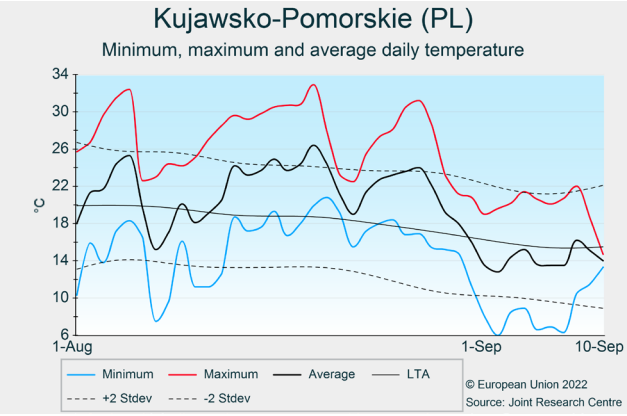
Mixed conditions for summer crops

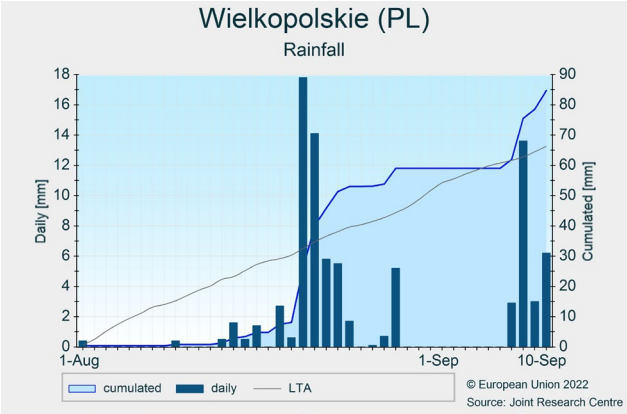
Rainfall during the third dekad of August considerably improved soil moisture conditions for summer crops as well as for early development of rapeseed in most of the country. Summer crop yield expectations are highly variable across the regions.

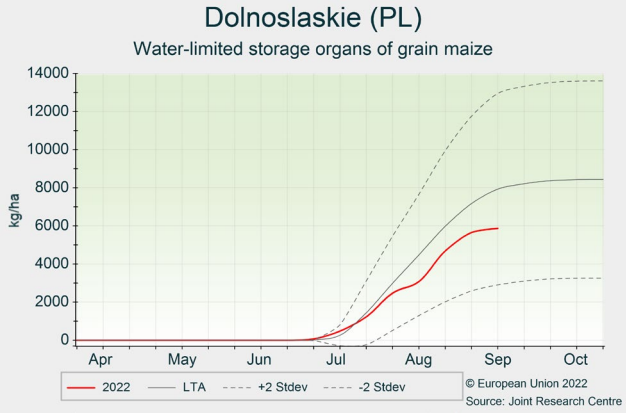
Hot and dry weather during the first two dekads of August resulted in increased soil moisture deficits most prominently visible in the west and north-east (*Warminsko-Mazurskie* region). During the third dekad of August, intense precipitation alleviated dry topsoil conditions in most of the country, except in the east where rainfall and soil moisture deficits persisted. The first dekad of September was colder than usual and rather dry. Significant rainfall was recorded again at the very end of the review period.

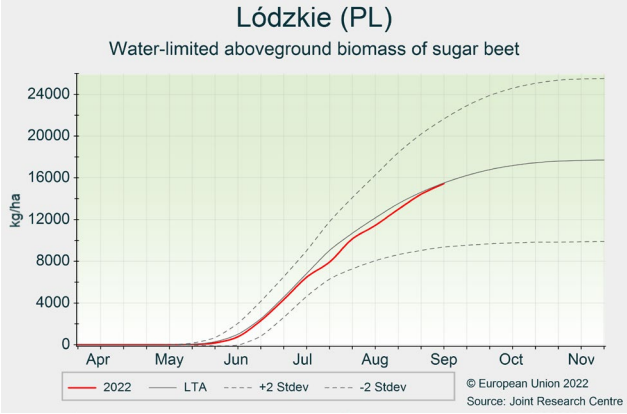
Conditions for summer crops vary a lot across the country. In the west, unfavourable conditions during maize flowering in mid-July reduced the yield potential so that grain maize was often harvested in August as feed crop, especially on lighter soils. In other regions, where adequate soil moisture supply was present during critical maize development stages, crops are in very good shape and the yield outlook is positive. In the case of sugar beet, improved soil moisture conditions resulted in increased root biomass accumulation, but at the expense of reduced sugar content and increased disease pressure. The hot and dry weather at the beginning of August was unfavourable for potato growth, especially on non-irrigated fields.

Despite an early harvest of winter crops, the sowing of rapeseed was regionally delayed by either overly dry or overly wet conditions. Although precipitation at the end of August generally had positive impacts on germination and early development of rapeseed, locally re-sowing was required after torrential rains. Our last month's yield expectations for potatoes and grain maize slightly below the 5-year average and for sugar beet around the average remain the same.









Romania

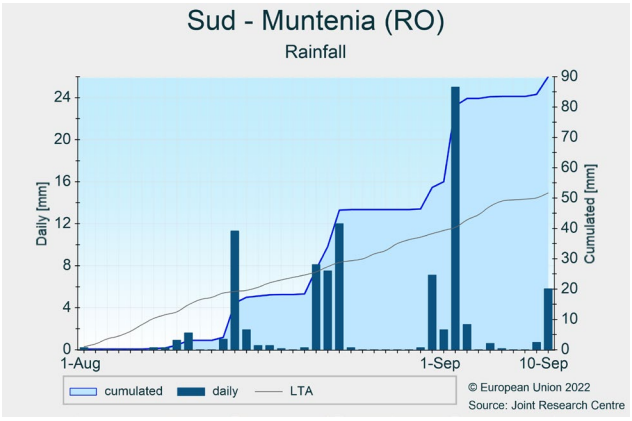
Poor summer crop yields expected

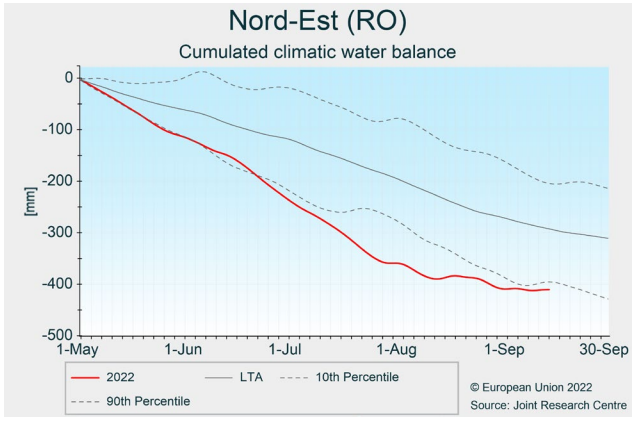
The harvest of summer crops started slowly during the last dekad of August. Abundant rainfall arrived late in the season without significantly improving soil moisture conditions and was combined with continued hot temperatures. A further deterioration of crop condition is forecast.

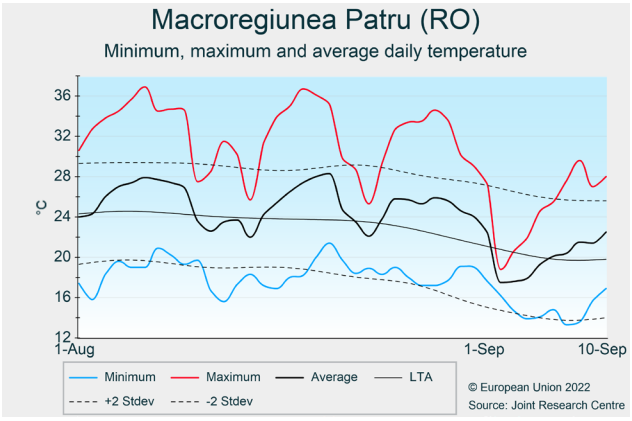
Dry summer conditions continued during the period under review until the first dekad of August. Since then, Romania has experienced abundant rainfall, exceeding twice the LTA in most regions. Nevertheless, the high evaporation levels have limited the improvement of soil moisture conditions, which remained critically low.

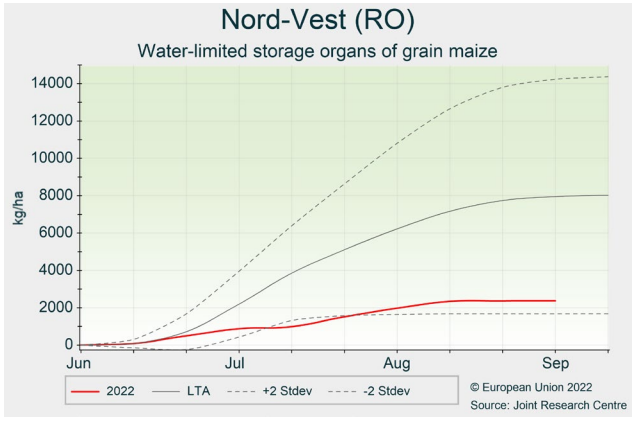
On average temperatures remained 1°C to 2°C higher than usual in most regions. The most distinct thermal anomalies were recorded along the borders with Hungary and in the south eastern parts of Romania, where temperatures were 2°C to 4°C above the LTA. August 2022 was the second warmest August in our database starting from 1979, with daily maxima regularly exceeding 30°C. Temperatures were back to near seasonal levels during the first dekad of September.

Rainfall arrived late in the season but did not improve summer crop condition. The hot temperatures in August led to an additional thermal stress which led to a shorter grain filling stage for grain maize and sunflowers and negatively affected their yield potential. Consequently, our yield forecast was revised downward. Harvesting of summer crops started slowly in the last dekad of August and initial feedback shows well below-average yields. Sowings of winter rapeseed also started during the second half of August. The recent rainfall resulted in fair conditions for sowing and germination.









Spain and Portugal

Dry and hot weather; crops under stress

Continued warm and dry weather does not relieve stressed summer crops. The yield outlook for summer crops remains below the 5-year average.

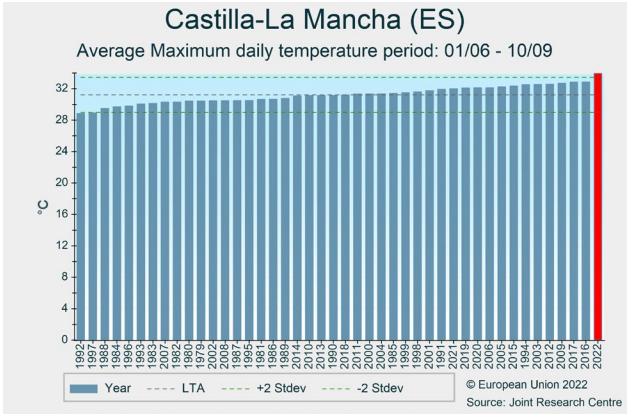
The negative weather impacts of spring and early summer on yields in Spain could not be overcome by the summer weather during the period of analysis. The review period has seen rainfall of less than 5 mm for most of the cropped areas in the Peninsula and *Castilla y Leon* also received less than 15 mm. Daily temperature maxima still reached above 35°C for days to weeks in all cropped areas. It was the hottest in our records for the whole of summer in *Andalucia*, *Aragon*, *Castilla La Mancha*, *Castilla y Leon*, and *Extremadura*.

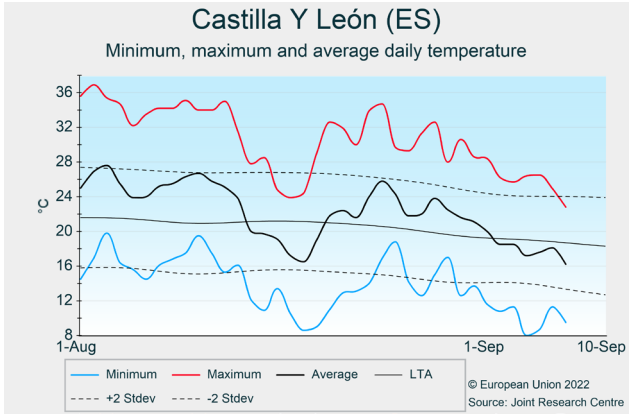
The total water volume stored in Spanish reservoirs is currently around 35% compared to 41% last year and 53% for the previous 10-year average (www.embalses.net). The storage level in southern Spain is only at 30%, and the irrigation water supply is restricted.

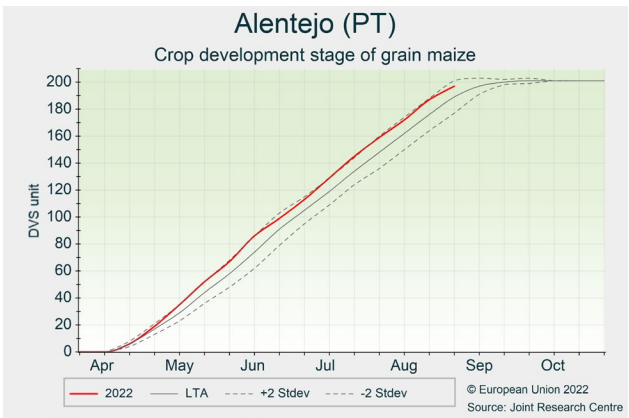
However, the season will complete with sufficient water supply in the north. In Portugal, water levels in the most southern reservoirs are low, affecting irrigated orchards in western Alentejo (*Mira* basin) while the current irrigation campaign in the *Guadiana* basin still seems to be ensured (sir.dgadr.gov.pt/reservas).

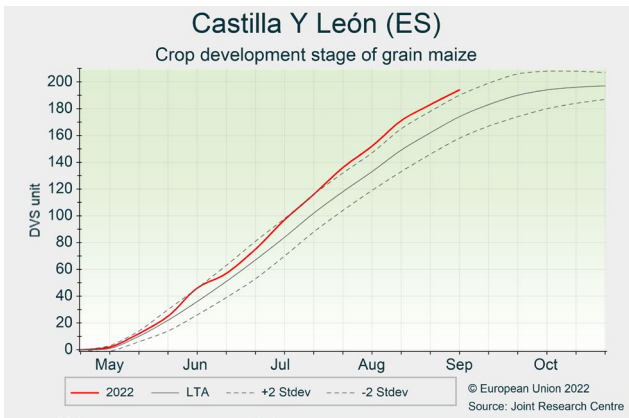
As mentioned in the August issue of the Bulletin, maize was exposed to temperatures above 42°C during flowering and this will most likely have reduced fertility and kernel numbers considerably. Grain maize, still advanced in its development by 1-2 weeks, is now in maturation in the south and will soon mature in the northern regions. Sunflowers have also been adversely affected; however, in terms of production at national level, the substantially increased area is expected to compensate for the below-average yields.

Our yield forecasts for summer crops remain well below the 5-year average.









Hungary

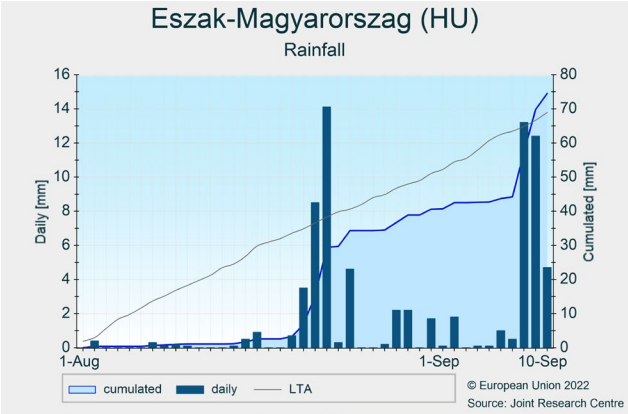
Continuing impact of the drought

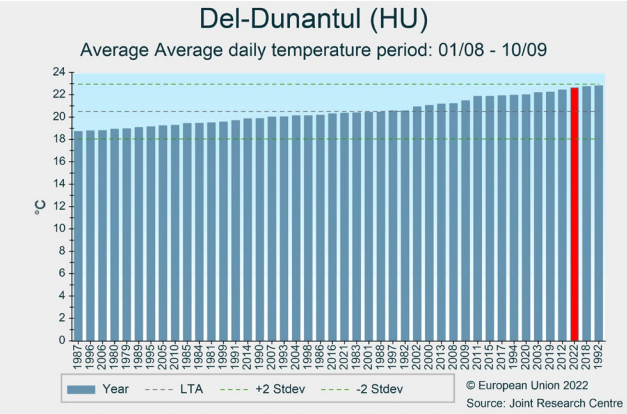
The rainfall deficit affecting the country since early July ended in mid-August, too late to recover the yield potential of summer crops. Our yield forecasts are close to a record low.

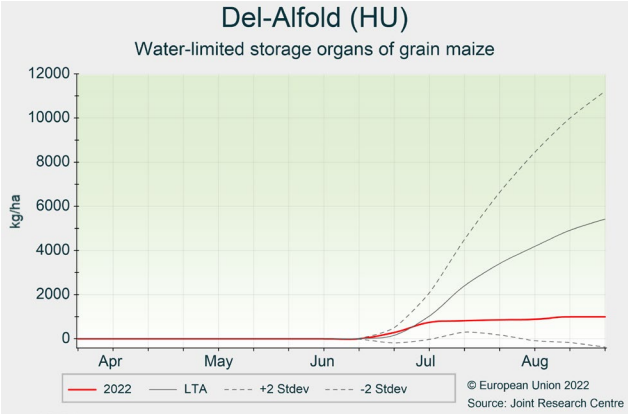
Drought conditions since July affecting most of the country, except for *Nyugat-Dunántúl* in the west, continued until 19 August. Significant rainfall followed over the entire country until the end of August, bringing rainfall totals close to the LTA of the review period. However, the increase in soil moisture was hampered by an even higher evaporation demand as temperatures during the review period were above the LTA, from +1.5°C in the west to +2.5°C in the east. August 2022 has been the third warmest on record in our 30+ years database.

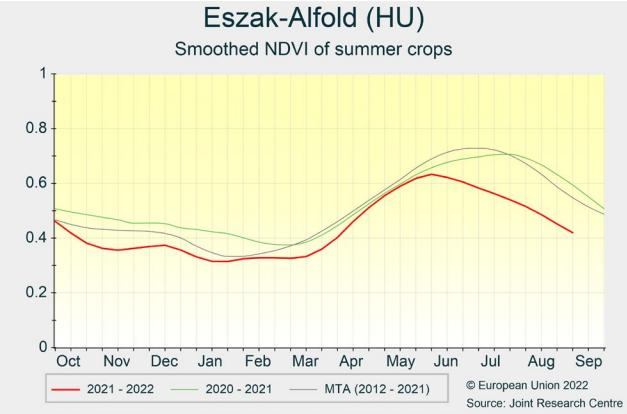
The conditions of summer crops remain alarming for the whole country, except in *Nyugat-Dunántúl*. The deficit of water and the high temperatures have seriously impacted summer crops on non-irrigated fields. The rain in late August arrived too late to prevent yield loss in most areas, and the grain-filling period occurred under severe water and temperature stress. As a consequence, a significant number of fields in the eastern part of the country reached full maturity earlier than normal. The yield forecast of summer crops was therefore revised further downward, close to a record low. In addition, we can expect a significant decrease in harvested grain maize and sunflower areas due to the drought.

August rainfall and very warm weather were beneficial for rapeseed sowing and germination. The sowing campaign started at the end of August.









Italy

No recovery for summer crops

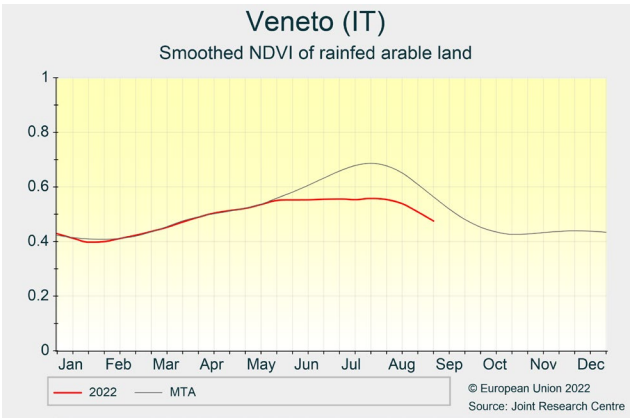
Late summer rains did not benefit crop yields. Crop yield forecasts remain poor for maize, sunflower, and soybean but have only been revised downward for grain maize.

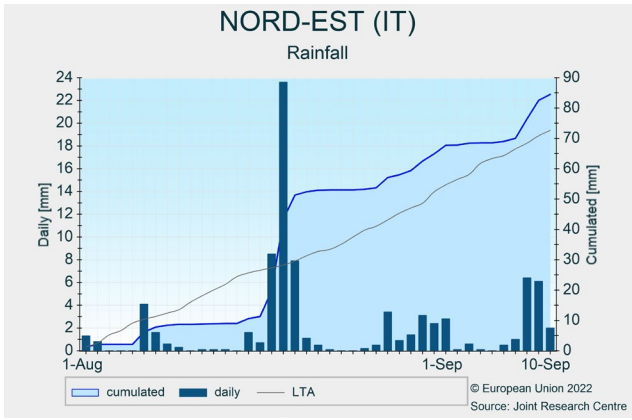
Drought conditions in northern and central Italy were partially mitigated during August and September but no real benefit was brought to crops.

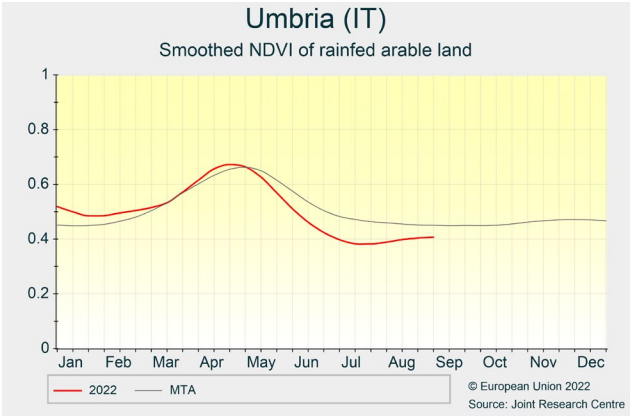
After the first 15 days of August, and a sequence of two to three short heat waves, temperatures moved to seasonal values with only very few hot days (T max >35°C) occurring in the central regions. Some rainfall has fallen in most of the regions and notably in the *Veneto* since 15 August. Total August and September precipitation is in line with or slightly above the average. However, storms with strong winds, hail, and intense rain occurred locally (up to 150mm/day).

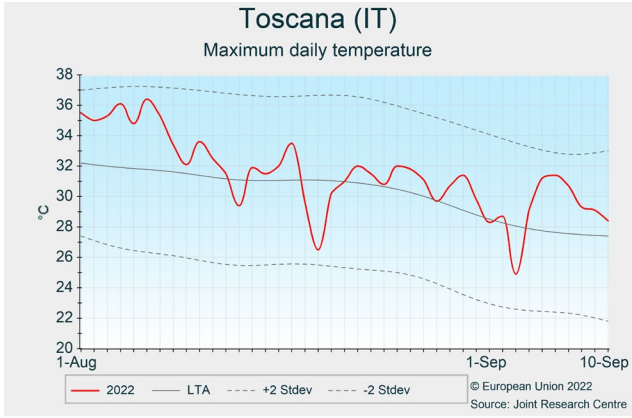
Most summer crops did not benefit at all from the break in the drought conditions. The grain maize cycle was strongly advanced and in several areas the harvest was finished before 15 August. The maize left in the field after this date was almost at the end of the cycle when green and grain biomass accumulation had already finished. Moreover, maize, soybean, and sunflower still in the field may have been lodged by local storms, making it more difficult to harvest them. Only maize planted very late, usually used as green maize, may have benefited from the mild weather.

Considering the grain maize crop was failing due to drought conditions and lodged by storms, its yield forecast has been revised down below the 2003 value. Sugar beet, soybean, and sunflower yield forecasts remain poor but stable since the August bulletin.









Czechia, Austria and Slovakia

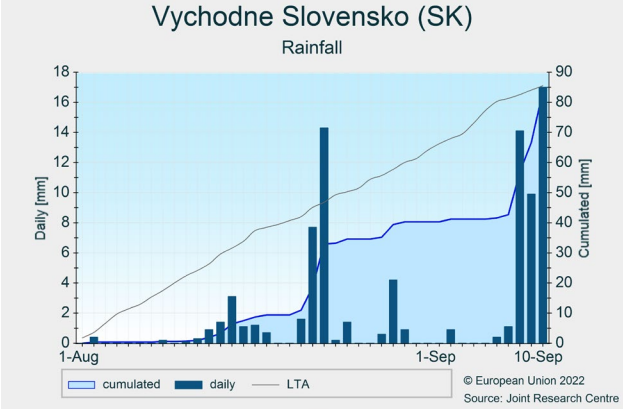
Suboptimal soil moisture conditions for maize grain-filling

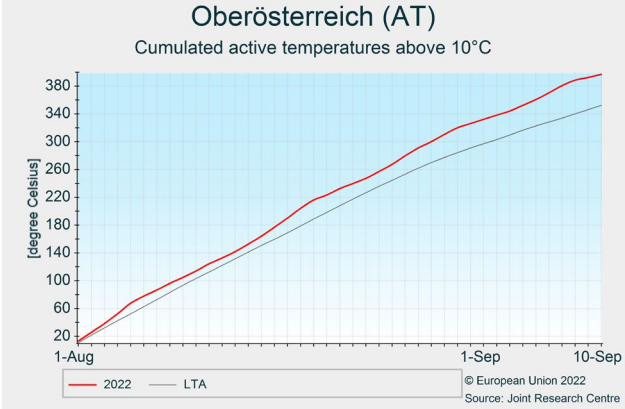
Intensive rainfall during the last dekad of August improved soil moisture conditions for summer crops after the first two dekads of the month were very dry. Nevertheless, soil moisture deficits hampered grain-filling of maize and resulted in reduced grain maize yield expectations.

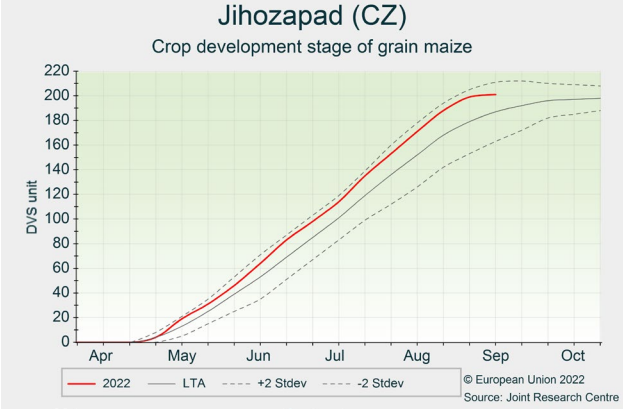
Lack of rainfall since mid-July resulted in deteriorating soil moisture levels, and hampered the development of summer crops. The situation improved considerably during the third dekad of August with the onset of very intense precipitation that replenished topsoil moisture.

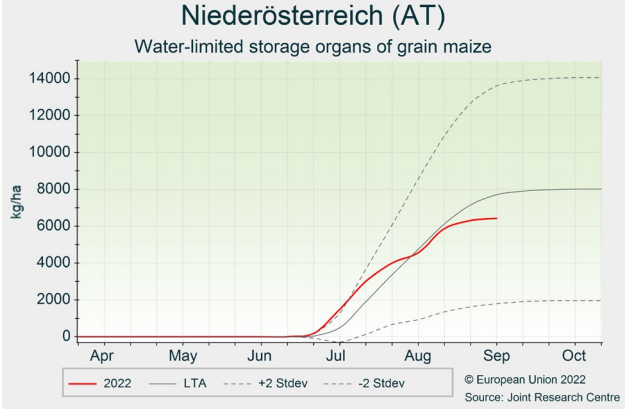
As a consequence of warmer-than-average temperatures in August, the development stage of summer crops is advanced. Grain maize has already reached (or is very close to) physiological maturity. Our model indicates that biomass accumulation of maize is very variable across regions as a function of the rainfall received, and ranges from slightly above average in central and northern Czechia to significantly below average in Slovakia. Yield formation in grain maize has slowed down during the period of review due to the moisture deficit and is now below the seasonal average in many producing regions. Consequently, the grain maize yield expectations for the three countries have been further reduced compared to the last bulletin and now range from below (Austria, Czechia) to well-below (Slovakia) the 5-year average. For potatoes, the hot and dry summer did not favour storage organ accumulation so that the outlook also remains below the 5-year average while the improved soil moisture conditions for sugar beet after mid-August resulted in increased root biomass accumulation, and satisfactory yields are expected.

Late August rainfall was beneficial for sowing and germination of rapeseed in Czechia and Western Slovakia, while dry conditions in Eastern Slovakia could delay sowing operations.







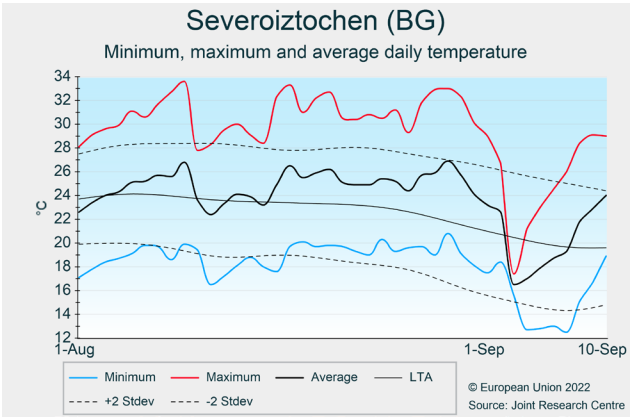


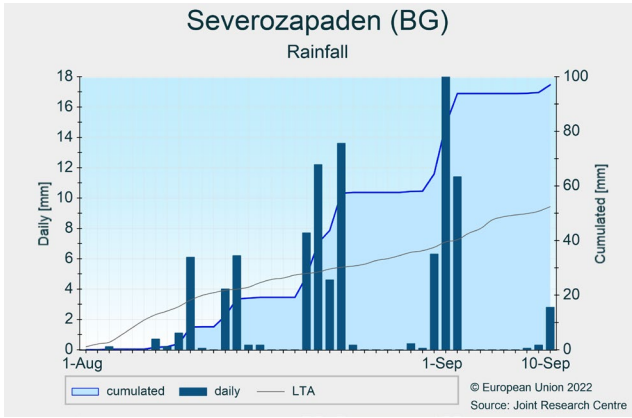
Bulgaria

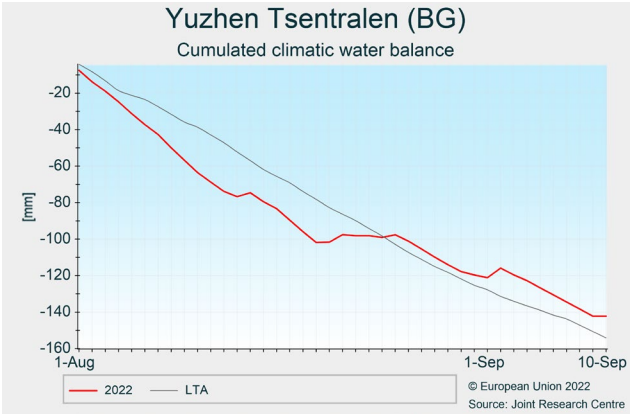
Yield outlook for summer crops further reduced

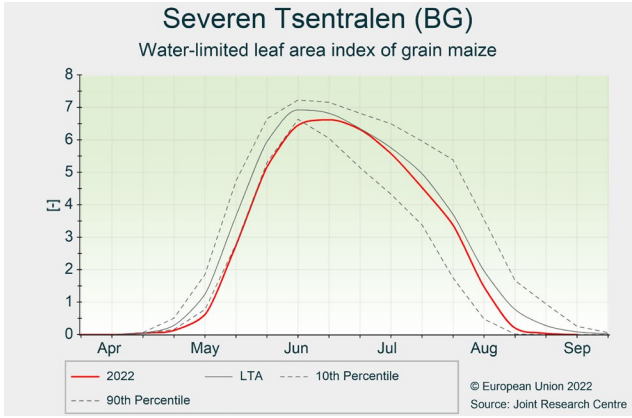
Abundant rainfall arrived too late to fully compensate yield losses caused by the dry summer. The harvest campaign for summer crops has started with expectations of a below average yield.

During the review period, Bulgaria continued to experience warmer-than-usual conditions with average daily temperatures 2°C to 4°C above the LTA, but maximum values were close to 35°C for a few days only. After the dry July, the first half of August remained extremely dry, particularly in north-eastern regions where no rain was recorded while less than 20 mm fell in western and central regions. Since the second half of August abundant rainfall has been recorded in the whole country and overall cumulated values are now close to the average for the period in the eastern side of the country and even above average in the western part. This precipitation occurred too late for the growth of summer crops to recover because most crops had already reached senescence as a consequence of the hot and dry conditions in the previous months. Only late varieties benefitted from the rain. Our yield forecasts for maize and sunflower were further revised downward but only to a limited extent as large yield reductions were avoided because of the rainfall. Our outlook below the 5-year average is confirmed. The harvest campaign for sunflowers started in early August, but was hampered by the wet conditions, whereas maize harvesting began at the end of August. The rainfall was favourable to increase soil moisture levels and allowed winter rapeseed to be sown in the optimal window.









Denmark and Sweden

Good performances for cereals

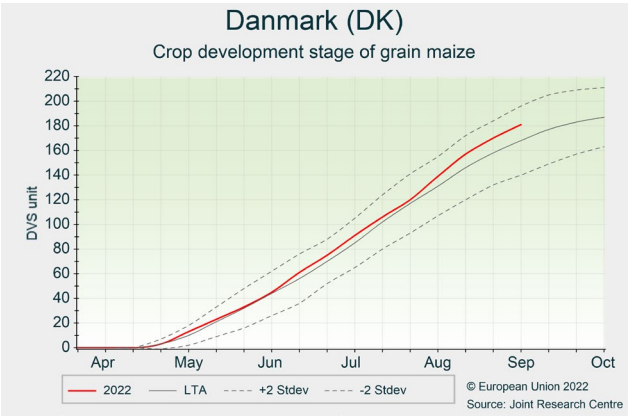
Cereal harvest has been completed in good conditions of warm and dry weather, and yields are expected to be above the 5-year average. Development of summer crops is advanced, and the sowing of rapeseed has been completed.

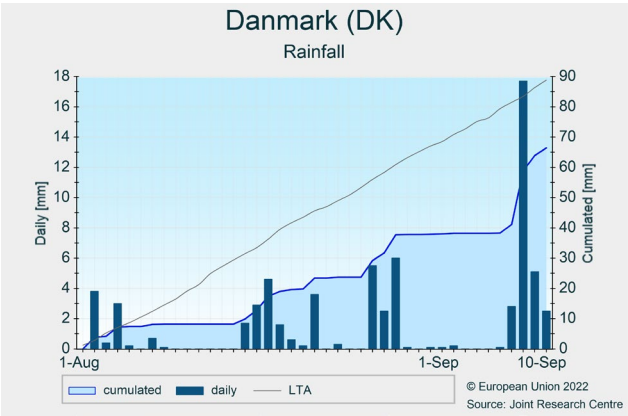
Temperatures were above the LTA during most of August in both countries. An overall rainfall deficit was observed in Denmark and southern Sweden, although rain was well distributed through time. Solar radiation was above the LTA.

Winter and spring cereal harvests have been completed in both countries. Yields are expected to be largely above average in Denmark. Preliminary spring barley yield estimates in West Jutland were locally reported to be 10 to 20% higher than usual[3]. In Sweden, cereal production is also expected to be above average, yet closer to normal compared to Denmark.

Regarding summer crops, the harvest of green maize should start earlier than usual due to high temperatures, possibly around mid-September in some parts of Denmark. Similarly, potatoes have been reported to be at an advanced stage of development in Sweden, with potential high quality, but a lower yield because of dry conditions. Due to the sustained soil moisture deficit in southern Sweden, sugar beet development is below average, and yield expectations have been lowered accordingly.

Rapeseed sowing has mostly been completed, but more rain is needed to ensure the crop gets established. Emergence has been locally delayed for more than three weeks in Sweden. The yield forecasts remain unchanged for cereals. Lastly, sugar beet and potato yield have been revised slightly downward, but remain close to the 5-year average.





[3] https://effektivtlandbrug.landbrugnet.dk/artikler/hoest-tour-2022/81049/meget-stoerre-udbytte-for-samme-indsats.aspx

Estonia, Latvia, Lithuania, Finland

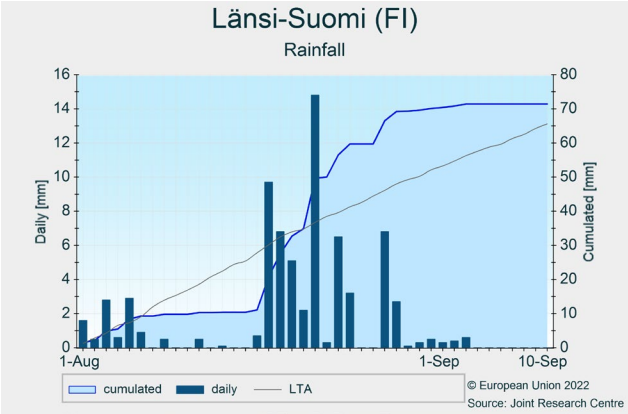
Harvest continues in Finland with varying yields

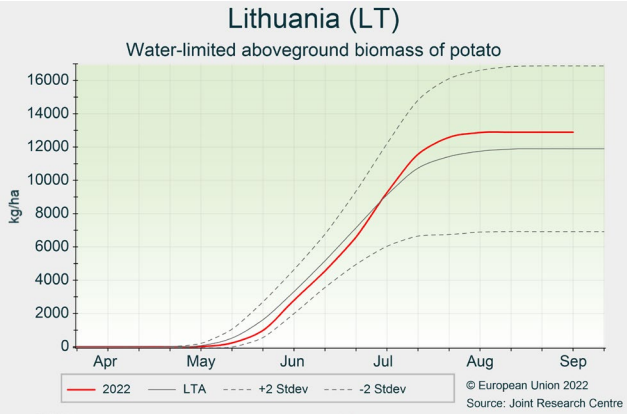
Harvest progressed well in the Baltic countries under warm weather and is in full swing in Finland. Winter sowing started in all countries but warmer weather and adequate rain are needed to ensure adequate germination.

Temperatures were above average in August, with maximum values reaching 30°C in the Baltic countries for a few days in the second half of August. Colder than usual weather characterised the first dekad of September. Rainfall was lower than average in the Baltic countries and regionally variable in Finland where the south was mainly dry but the west was wet. Precipitation in Finland was more abundant in the second half of August.

Harvest started slightly later than usual in the Baltic countries due to the delayed crop development, but progressed well in August. Reported yields are good but the quality is variable. Overall harvest expectations for potatoes are also good but variable due to the impact of the heavy rainfall on growth during the summer period. In Finland the harvest is progressing well with some interruptions due to rain depending on the regions but particularly on the west coast. Cereal yields are estimated to be good but variable, particularly in terms of quality, because of the regional differences in rain distribution. Harvest forecasts are moderate for potatoes and good for sugar beet.

Winter sowing has started in all countries but more rain is needed to ensure successful crop establishment. The cold weather at the end of the period slowed germination of the recently sewn crops. The forecasts remain practically unchanged except for rye in Finland which has decreased to 3.78 after taking into account the spread of diseases reported for this crop.





Greece and Cyprus

Outlook maintained for summer crops

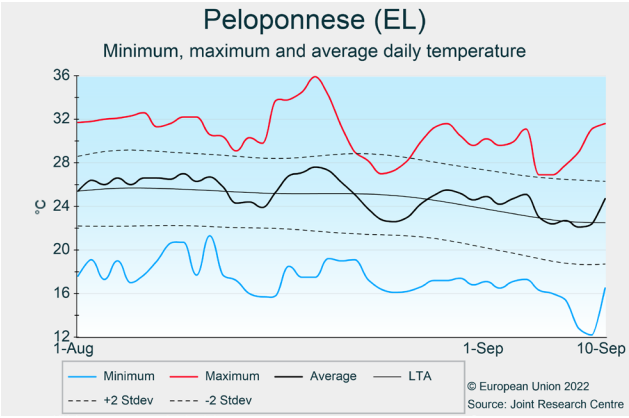
Overall favourable temperatures supported good yield expectations for most of the irrigated summer crops in Greece.

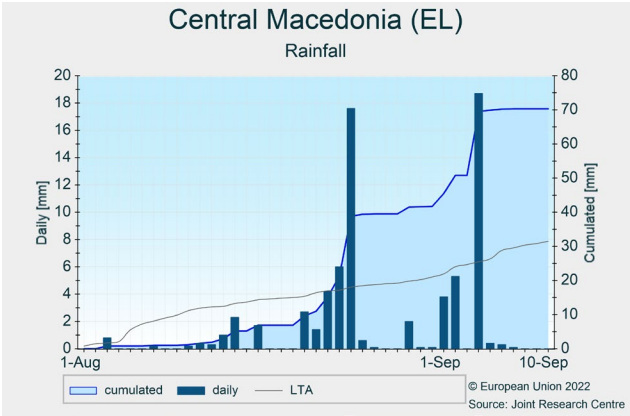
Rains at the end of August and beginning of September have interrupted or delayed harvesting operations of summer crops in most agricultural areas in Greece. The sunflower harvest started at the end of August, and high yields are expected in irrigated areas. In contrast, yield expectations in non-irrigated areas are lower as there has hardly been any rain in July with only non-significant rainfall episodes in *Eastern Macedonia* and *Thrace*, and in *Central Macedonia* in August. These two regions account for almost 90%[1] of the area cultivated with sunflowers in Greece.

Harvest of summer-spring potatoes started in Greece at the end of August and beginning of September. Although temperatures have been favourable, lack of rain for most of summer and sudden rains at the end of August and beginning of September may have affected the quality of potatoes that were ready for harvest as they resumed their vegetative phase. Average yields are expected in the irrigated areas of southern and western Greece (i.e. *Peloponnese, Western Greece, Crete,* and *Western Macedonia*), accounting for almost 50%[4] of the potato cultivated area. Some concern is reported for potato losses due to *Phytophthora infestans* [5] in *Eastern Macedonia* and *Thrace*, accounting for 20%[1] of the spring-summer potato cultivated area in Greece.

Good yields are expected for maize as it is the most heliophilic plant among the summer crops, and will have suffered the least from the scarce rainfall this summer, especially were irrigated.

Our overall expectations for the summer crops campaign are positive. The August outlook has been confirmed, and yield forecasts are set above the 5-year average.





[4] Percentages of cultivated areas derived from ELSTAT at https://www.statistics.gr/en/statistics/-/publication/SPG06/-

[5] https://www.agrotypos.gr/kalliergeies/patata/apo-50-lepta-timi-paragogou-xekinise-i-patata-nevrokopiou

Ireland

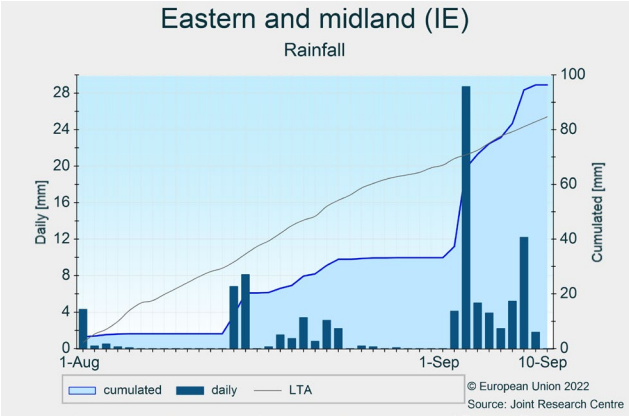
Harvest almost completed in warm and dry conditions

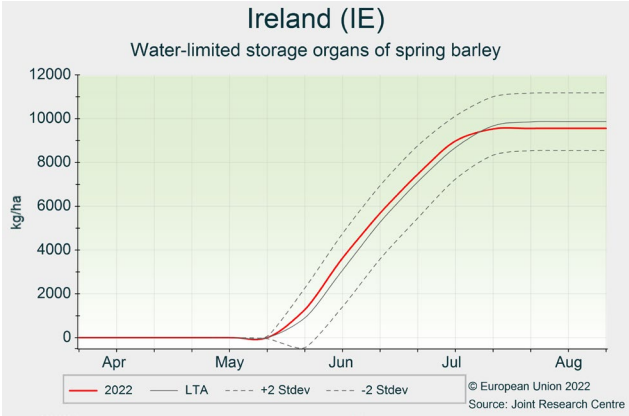
Harvest continued under favourable conditions in the northern areas at the beginning of September. After the rainfall of mid August, conditions were also adequate for the sowing of winter rapeseed, which progressed well across the country. Yield forecasts were maintained above the 5-year average.

The review period was characterised by above-average temperatures except for a few colder-than-usual days at the beginning of August. Rainfall was below the seasonal values in August but markedly increased at the beginning of September, reaching above average values in the South and East, whereas the North remained relatively dry. Sunshine levels were higher than usual across the country.

The prevailing dry conditions resulted in most of the crops being harvested by the end of August, with the last fields being completed at the beginning of September in the northern areas where crops were delayed. Reported yields are generally positive, but with mixed results for winter barley.

Winter rapeseed drilling proceeded under optimal conditions at the end of August and beginning of September, and an increased area is expected due to the favourable sowing opportunities and attractive price levels. The positive yield forecasts of last month's Bulletin were maintained.





Belgium, Luxembourg and the Netherlands

Yield outlook for summer crops further deteriorated

Dry and warmer-than-usual conditions continued until several days into September. Rain since then arrived too late to improve the yield outlook. Yield forecasts for all summer crops were revised further downwards.

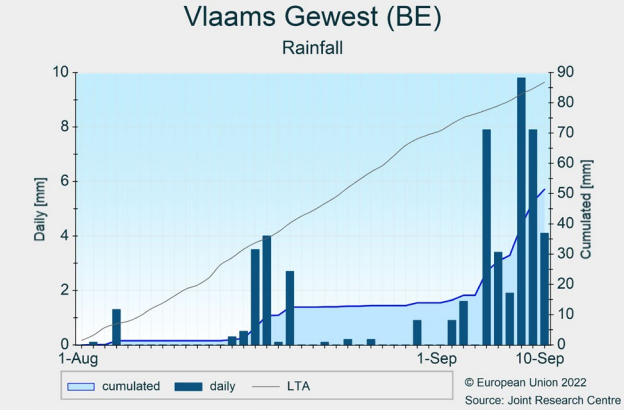
Temperatures remained above the LTA almost throughout the review period. The number of days with maximum temperature > 30 °C was above the LTA, but maximum temperatures remained below 35 °C, except for one day (4 August) in Luxembourg.

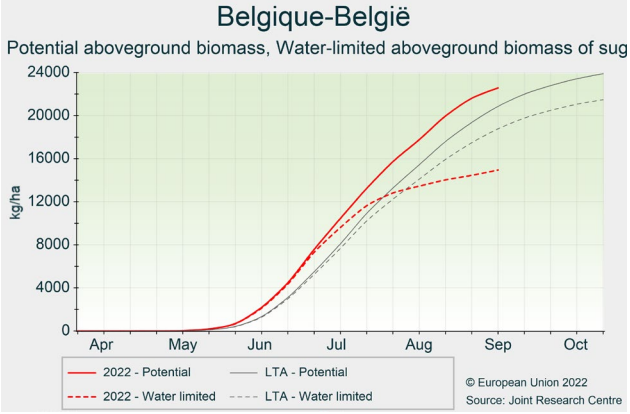
Rainfall was well below the LTA. A few events occurred mid-August, but then it remained scarce again until several days into September; after which several more significant rain events raised the cumulative amounts for the period of review to 40 to 60% of the LTA. Radiation was 15% to 20% above the LTA.

Fully irrigated crops benefited from the high radiation levels, but the condition of rain fed and partially irrigated crops further deteriorated. The rainfall in mid-August was too little, and the rain at the end of the review period came too late to improve the yield outlook. Sugar beet crops may still benefit from more rain; however, the crops would first respond by recovering from the stressed condition (partially at the expense of beet sugar content) before new root biomass is formed and sugar stored, while the harvesting campaign is about to take off.

The recent rainfall did improve the condition of top soils for seedbed preparation and sowing of winter crops for the coming season.

The forecasts for all summer crops were revised further downwards, to well below the 5-year average.





Slovenia and Croatia

Crop performance significantly affected by drought

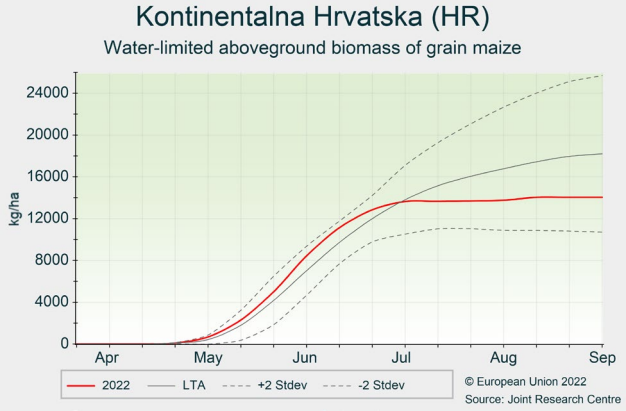
Winter and spring crops harvests have been completed. Lower than usual yields are expected for summer crops because of the drought. Autumn sowing is about to start although more rain is needed locally.

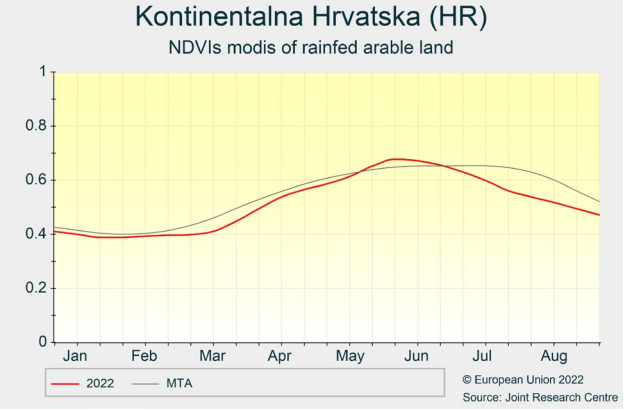
Temperatures were above normal during most of the review period. A rainfall deficit was observed in Slovenia and western Croatia while rainfall was closer to seasonal values in continental Croatia. Solar radiation was close to the LTA in eastern Slovenia but below the LTA in continental Croatia. Satellite NDVI values were still below the MTA for both countries, with the negative anomaly more pronounced in Croatia.

Winter and spring cereal harvests have now been completed, and the sunflower harvest is ongoing in Croatia. Summer crop yields are expected to be lower than the 5-year average due to the continued dry and warm weather during summer. According to our models, yields for maize and sugar beet should be heavily impacted. This has been confirmed by field observations for maize[6]. Sunflower yields are also expected to be negatively impacted although to a lesser extent than maize.

Autumn sowing is about to start, but increased soil moisture will be necessary to ensure correct germination and establishment so some local delays can be expected.

The yield forecasts remain unchanged for cereals, but were further decreased slightly for sugar beet and green maize.





[6] https://www.agroklub.com/ratarstvo/susa-obrala-kukuruz-klipovi-s-tek-po-nekoliko-zrna/79468/

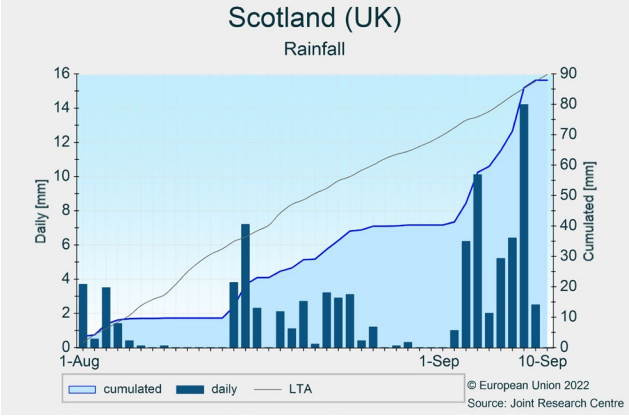
5.2. United Kingdom

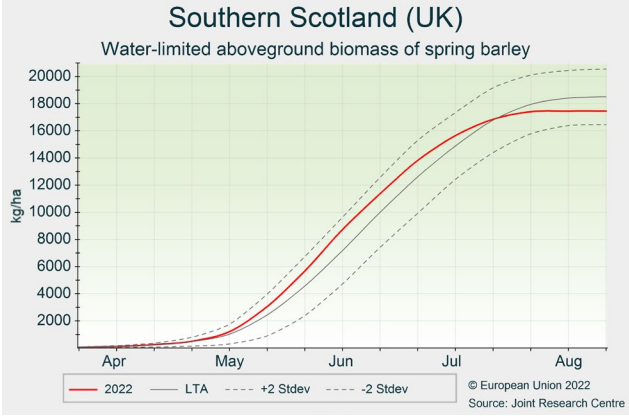
Early harvest ends with good yields in the north

Warm temperatures and prevailing dry conditions allowed the harvest in northern areas to be completed quickly, with good yields reported. Winter sowings started earlier than usual under favourable conditions.

Temperatures were mainly above average throughout the country. Rainfall was distinctly below the LTA throughout the country in August, but markedly increased in September, reaching close to average values by the end of the period in the south, east, and north. Sunshine levels were well above the LTA.

The warm and relatively dry weather favoured the conclusion of the harvesting campaign of winter and spring cereals, which started early due to the earlier than usual conclusion of the crop cycle. Despite some rainfall in the second half of August, harvest was also around two weeks early in northern areas and has been nearly concluded with good yields and quality. Only some spring barley remains to be collected in Scotland, where rain has interrupted it, depending on the location. The positive yield forecasts of last month's Bulletin were maintained or slightly revised upwards due to the adequate harvesting conditions. The early harvest of winter crops and the rainfall of mid-August enabled an early start to sowing winter crops - particularly rapeseed - for the coming season.





5.3. Black Sea Area

Ukraine

Fair yield outlook for summer crops

The September edition of the JRC MARS Bulletin in the Global outlook series on Ukraine [7] *provides a regional analysis, showing a fair yield outlook for summer crops at country level. Increased yield forecasts in the northern oblasts are offset by poor yield expectations in the oblasts affected by dry conditions. However, a reduction in the total harvested area of summer crops due to the Russia's war against Ukraine is expected to lead to below-average production levels.*

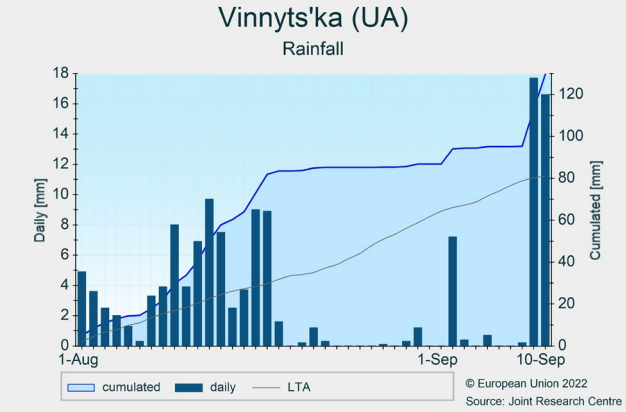
Wetter-than-usual conditions prevailed during the period under review, with the most distinct rain surplus being in the central oblasts (e.g., Kirovohrads'ka, Cherkas'ka). In August, rainfall was particularly frequent and abundant (locally twice the LTA) in the eastern half of Ukraine whereas the first dekad of September was distinctly wetter than usual in the western half of the country.

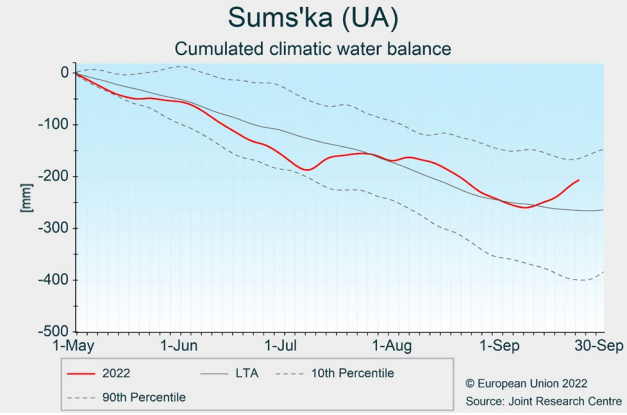
Above-average temperatures prevailed in August, with the most distinct thermal anomalies (+2°C to +4°C) being in the eastern oblasts. Temperatures dropped sharply during the first dekad of September, with a thermal anomalies ranging from -2°C to -4°C in most oblasts (-4°C to -6°C in the northernmost ones, e.g., *Chernihivs'ka, Sums'ka*).

Rainfall in some central and northern oblasts arrived on time to improve crop conditions. However, rainfall arrived late in the season for summer crops in the southern and western oblasts and poor yields are expected. In the eastern oblasts, which benefited from adequate rainfall throughout the season, the higher-than-average temperatures did not cause any severe yield deterioration.

The harvest of summer crops started in the south during the last week of August.

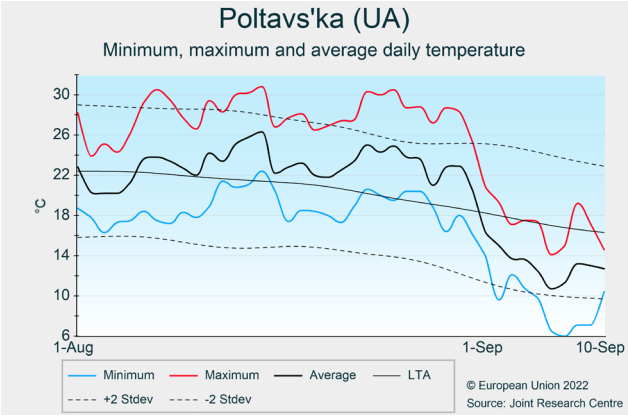
According to the Ukrainian Ministry of agriculture, 87% of the projected rapeseed area had been sown by 12 September [8]. Sowings of winter cereals started early September.

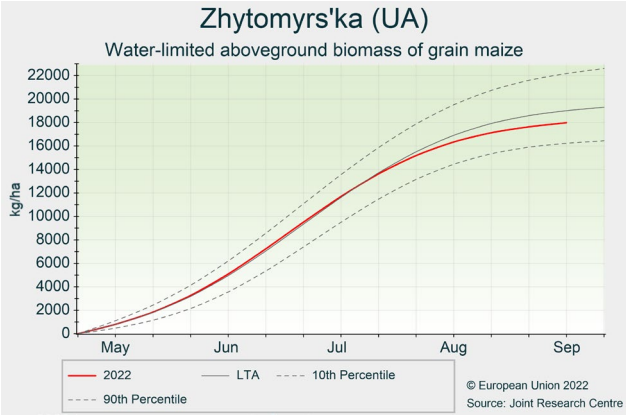




[7] https://publications.jrc.ec.europa.eu/repository/handle/JRC127974

[8] https://minagro.gov.ua/news/7-oblastej-ukrayini-zavershili-sivbu-ozimogo-ripaku


Poltavs'ka (UA)
Minimum, maximum and average daily temperature
°C
30
26
22
18
14
10
6
1-Aug
1-Sep
10-Sep
Minimum
Maximum
Average
LTA
+2 Stdev
-2 Stdev
© European Union 2022
Source: Joint Research Centre


Zhytomyrs'ka (UA)
Water-limited aboveground biomass of grain maize
kg/ha
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
May
Jun
Jul
Aug
Sep
2022
LTA
10th Percentile
90th Percentile
© European Union 2022
Source: Joint Research Centre

Turkey

Fair yield forecast for summer crops

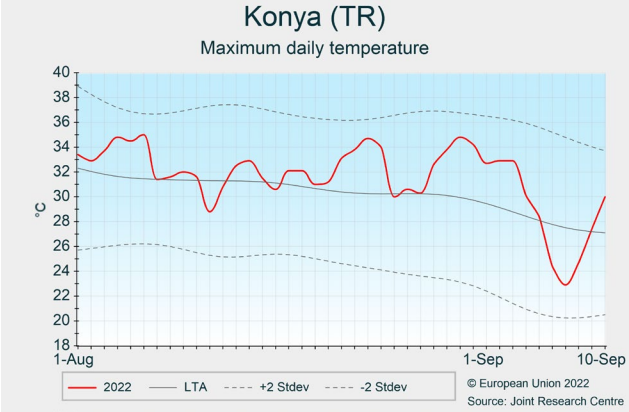
Summer season with sufficient water for irrigation means average to above-average yield expectations for grain maize and soybeans.

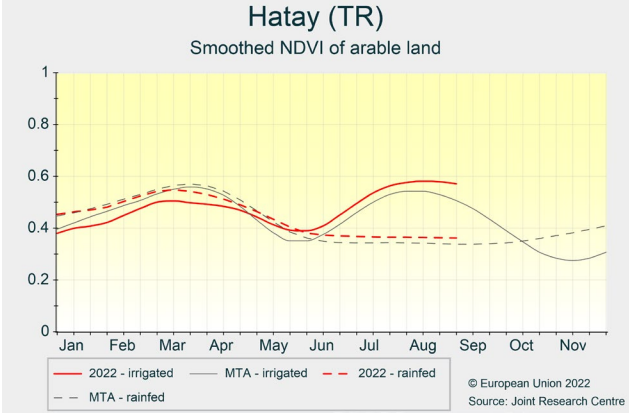
In the Anatolian region of *Konya*, where most of the country's soybean is produced, August was marked by temperatures that fluctuated between average to hot temperatures. Three heatwaves of a few days each and with maximum temperatures around 35°C occurred at the beginning and in the second half of the month. The hot temperatures had marginal effect on summer crops as irrigation practices mitigated the heat stress. The heatwave in early August may have caused some shortening of the grain filling stage. The heatwaves at the end of the month occurred when crops had almost completed their cycle so no effect on yields is expected.

In southern regions, where most of the country's grain maize is produced (i.e. *Adana* and *Hatay* regions), temperatures were predominantly average, with the exception of a heatwave of 5 days at the end of August and beginning of September. Maize development and biomass accumulation are average (*Adana*) to above-average (*Hatay*). The heatwave stress seems to have been mitigated by irrigation practices as no effect is visible from the remote sensing profiles.

The yield forecasts at country level are close to average for grain maize and above-average for soybeans.

A more detailed analysis is provided in the September edition of the JRC MARS Bulletin in the Global outlook series on Turkey[9].





[9] https://publications.jrc.ec.europa.eu/repository/handle/JRC127972

5.4. European Russia and Belarus

European Russia

Unfavourable conditions for yield formation in the south

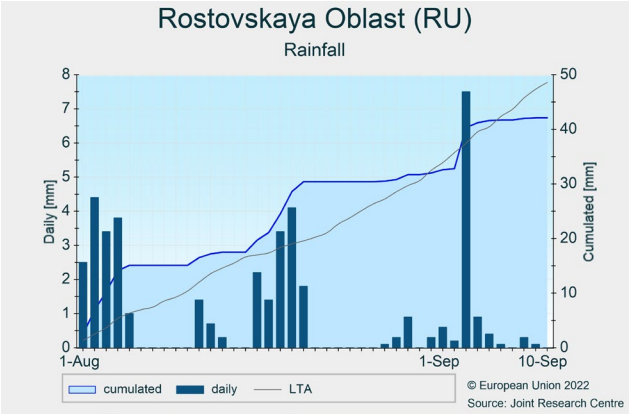
Summer 2022 ended with significantly warmer and drier-than-usual weather conditions in most parts of European Russia. Consequently, a deterioration of the yield potential of summer crops is expected in the south western parts.

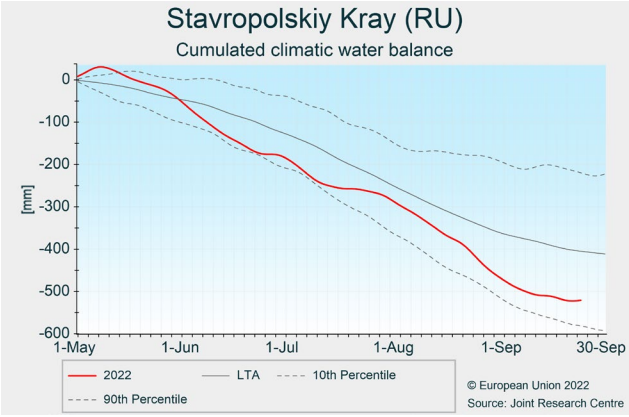
Most of European Russia experienced below-average rainfall during the period under review. Precipitation was 50% to 80% below the LTA in the Volga okrug, northern parts of the Central okrug, and easternmost parts of the Southern Okrug. Less distinct precipitation anomalies (-30% to -50%) prevailed in other parts of the Central and Southern okrugs, and the North-Caucasian okrug. Slightly above-average (up to 30% above the LTA) precipitation was observed in some south-western oblasts (e.g., *Krasnodar*, *Rostov*).

August was significantly (2°C to 4°C) warmer than usual in most crop producing regions. The most distinct anomalies were observed in the northern parts of the Southern okrug (e.g., *Volgograd*) where daily maxima fluctuated around 32°C throughout the month. Temperatures have dropped sharply since early September to 2°C to 6°C below the LTA in the Central okrug, the Volga okrug, and in most parts of the Southern okrug (near seasonal temperatures only in the south westernmost oblasts, e.g., *Krasnodar*, *Stavropol*).

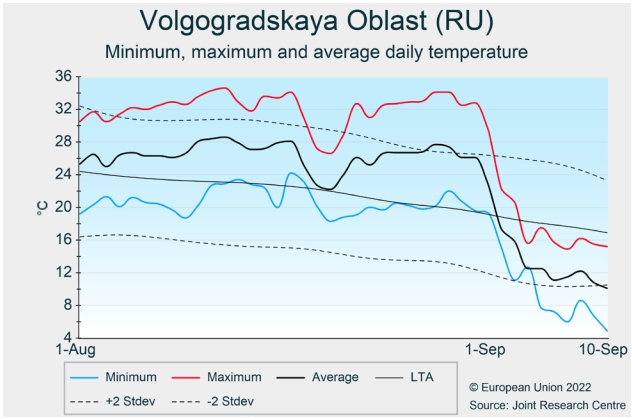
Our crop model shows that the warm and dry August conditions negatively affected the condition of grain maize. Yields are forecast below the historical trend. A more detailed analysis will be provided in the September edition of the JRC MARS Bulletin in the Global outlook series on Russia[10].

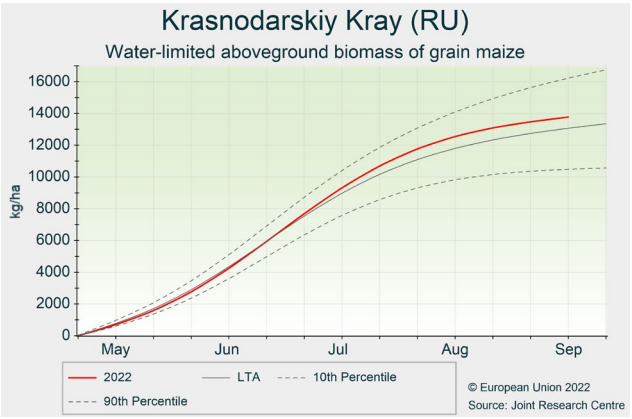
According to the Russian Ministry of Agriculture[11], the harvest of soft wheat is still ongoing and production is expected to achieve a new record. The harvest of grain maize just started in the south. Sowing of winter cereals started at the end of August and, according to the same source, 2.5 Mha have already been sown.





[10] https://publications.jrc.ec.europa.eu/repository/handle/JRC127976 (as of 26 September 2022)
[11] https://www.apk-inform.com/en/news/1529174


Volgogradskaya Oblast (RU)
Minimum, maximum and average daily temperature
°C
36
32
28
24
20
16
12
8
4
1-Aug
1-Sep
10-Sep
Minimum
Maximum
Average
LTA
+2 Stdev
-2 Stdev
© European Union 2022
Source: Joint Research Centre


Krasnodarskiy Kray (RU)
Water-limited aboveground biomass of grain maize
kg/ha
16000
14000
12000
10000
8000
6000
4000
2000
0
May
Jun
Jul
Aug
Sep
2022
LTA
10th Percentile
90th Percentile
© European Union 2022
Source: Joint Research Centre

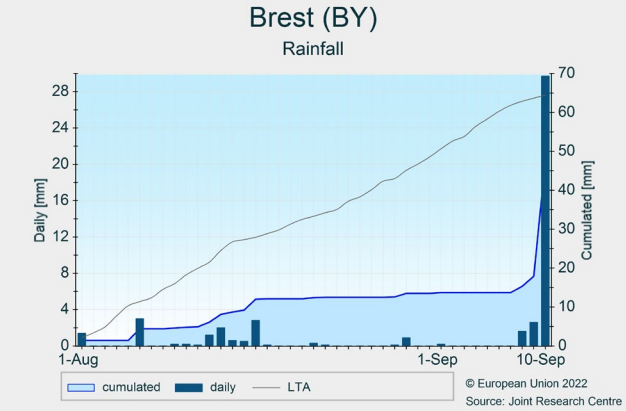
Belarus

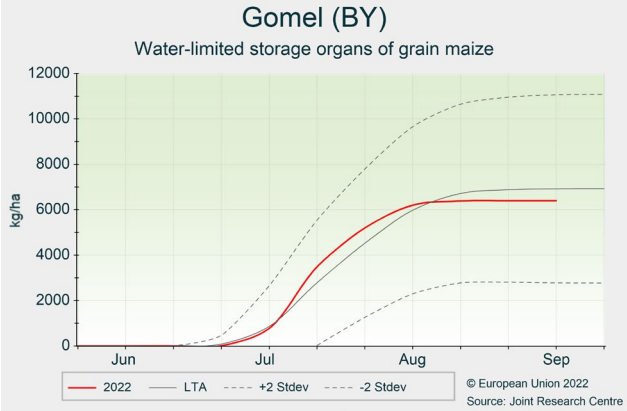
Dry conditions impact grain maize

A hot and dry August and beginning of September resulted in a significant decrease of soil moisture reserves during the period of review, which was unfavourable for maize grain filling and the winter crop sowing campaign.

Temperatures were significantly above average during August while the first dekad of September was considerably colder than usual. Cumulative precipitation for the period of analysis (01 Aug – 10 Sep) was significantly below average, with the only significant (very intense) rainfall recorded on the 10th of September. A prolonged rain deficit and hot temperatures resulted in deteriorating soil moisture reserves for summer crops and rendered conditions unfavourable for winter crop sowing and emergence.

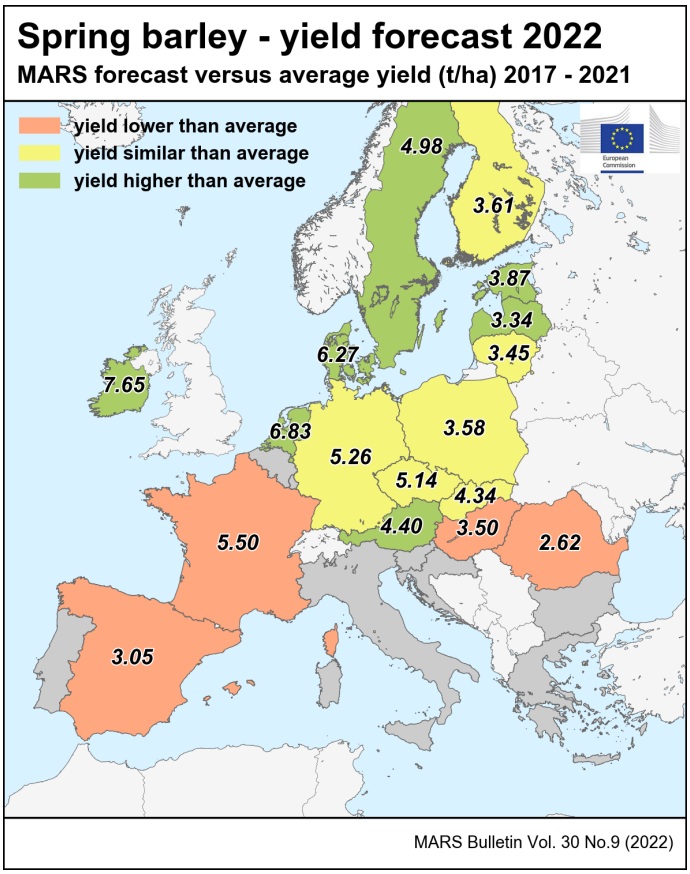
Higher-than-average August temperatures advanced crop development and maize is now approaching maturity. As indicated by our model, accumulation of biomass and storage organs of grain maize is around the seasonal averages. As low soil moisture during grain filling could have compromised yield potentials, we have slightly reduced yield forecasts for grain maize compared with the August issue of the Bulletin.



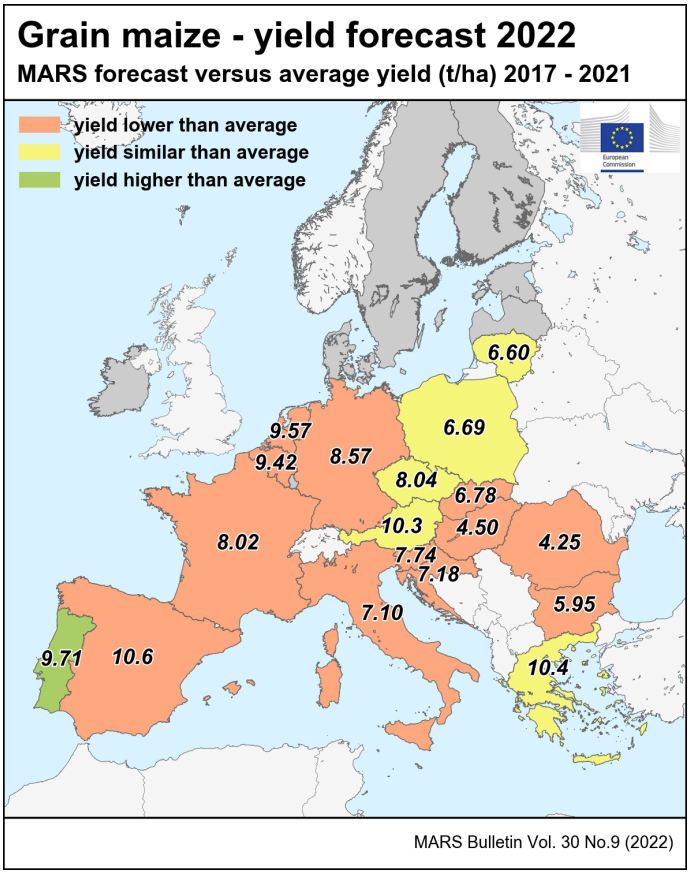


6. Crop yield forecast

Country	Spring barley (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	4.13	4.22	**4.16**	+ 1	– 1
AT	4.12	4.36	**4.40**	+ 7	+ 1
BE	—	—	**—**	—	—
BG	—	—	**—**	—	—
CY	—	—	**—**	—	—
CZ	5.04	5.09	**5.14**	+ 2	+ 1
DE	5.20	5.09	**5.26**	+ 1	+ 3
DK	5.53	5.51	**6.27**	+ 13	+ 14
EE	3.46	2.79	**3.87**	+ 12	+ 38
EL	—	—	**—**	—	—
ES	3.29	3.61	**3.05**	– 7	– 16
FI	3.55	2.66	**3.61**	+ 2	+ 36
FR	5.97	6.10	**5.50**	– 8	– 10
HR	—	—	**—**	—	—
HU	4.16	4.72	**3.50**	– 16	– 26
IE	7.25	7.89	**7.65**	+ 6	– 3
IT	—	—	**—**	—	—
LT	3.36	3.30	**3.45**	+ 2	+ 4
LU	—	—	**—**	—	—
LV	3.01	2.46	**3.34**	+ 11	+ 36
MT	—	—	**—**	—	—
NL	6.29	6.17	**6.83**	+ 9	+ 11
PL	3.47	3.78	**3.58**	+ 3	– 5
PT	—	—	**—**	—	—
RO	2.78	3.42	**2.62**	– 6	– 23
SE	4.39	3.77	**4.98**	+ 13	+ 32
SI	—	—	**—**	—	—
SK	4.40	4.72	**4.34**	– 1	– 8



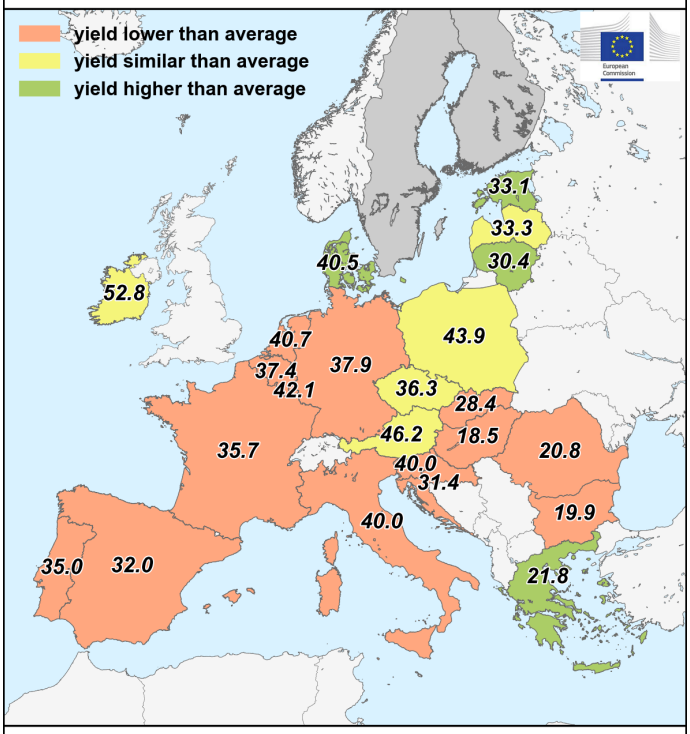
Country	Grain maize (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	7.87	7.91	**6.39**	– 19	– 19
AT	10.6	11.2	**10.3**	– 3	– 8
BE	10.6	11.9	**9.42**	– 11	– 21
BG	6.40	5.89	**5.95**	– 7	+ 1
CY	—	—	**—**	—	—
CZ	8.12	9.65	**8.04**	– 1	– 17
DE	9.50	10.4	**8.57**	– 10	– 17
DK	—	—	**—**	—	—
EE	—	—	**—**	—	—
EL	10.2	9.91	**10.4**	+ 2	+ 5
ES	11.9	12.3	**10.6**	– 11	– 14
FI	—	—	**—**	—	—
FR	9.09	10.0	**8.02**	– 12	– 20
HR	8.12	7.77	**7.18**	– 12	– 8
HU	7.57	6.04	**4.50**	– 41	– 26
IE	—	—	**—**	—	—
IT	10.3	10.3	**7.10**	– 31	– 31
LT	6.59	5.86	**6.60**	+ 0	+ 13
LU	—	—	**—**	—	—
LV	—	—	**—**	—	—
MT	—	—	**—**	—	—
NL	10.8	12.9	**9.57**	– 11	– 26
PL	6.79	7.47	**6.69**	– 2	– 11
PT	9.18	9.75	**9.71**	+ 6	– 1
RO	5.99	5.90	**4.25**	– 29	– 28
SE	—	—	**—**	—	—
SI	9.22	9.39	**7.74**	– 16	– 18
SK	7.54	7.86	**6.78**	– 10	– 14



Country	Green maize (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU*	41.6	45.5	**37.5**	– 10	– 18
AT	46.6	47.1	**46.2**	– 1	– 2
BE	40.6	43.6	**37.4**	– 8	– 14
BG	21.6	19.1	**19.9**	– 8	+ 4
CY	—	—	**—**	—	—
CZ	35.6	38.9	**36.3**	+ 2	– 7
DE	42.2	47.2	**37.9**	– 10	– 20
DK	38.3	40.7	**40.5**	+ 6	– 0
EE	31.4	27.4	**33.1**	+ 6	+ 21
EL	20.2	20.5	**21.8**	+ 8	+ 6
ES	36.5	37.0	**32.0**	– 12	– 13
FI	—	—	**—**	—	—
FR	41.7	47.3	**35.7**	– 15	– 25
HR	37.7	34.9	**31.4**	– 17	– 10
HU	29.8	27.8	**18.5**	– 38	– 33
IE	52.5	59.7	**52.8**	+ 1	– 12
IT	51.7	53.6	**40.0**	– 23	– 25
LT	28.4	27.7	**30.4**	+ 7	+ 10
LU	47.3	53.0	**42.1**	– 11	– 21
LV	32.3	28.9	**33.3**	+ 3	+ 15
MT	—	—	**—**	—	—
NL	43.8	45.2	**40.7**	– 7	– 10
PL	45.3	48.4	**43.9**	– 3	– 9
PT	40.2	43.9	**35.0**	– 13	– 20
RO	27.2	26.1	**20.8**	– 23	– 20
SE	—	—	**—**	—	—
SI	45.4	42.9	**40.0**	– 12	– 7
SK	29.9	27.9	**28.4**	– 5	+ 2

Green maize - yield forecast 2022

MARS forecast versus average yield (t/ha) 2017 - 2021

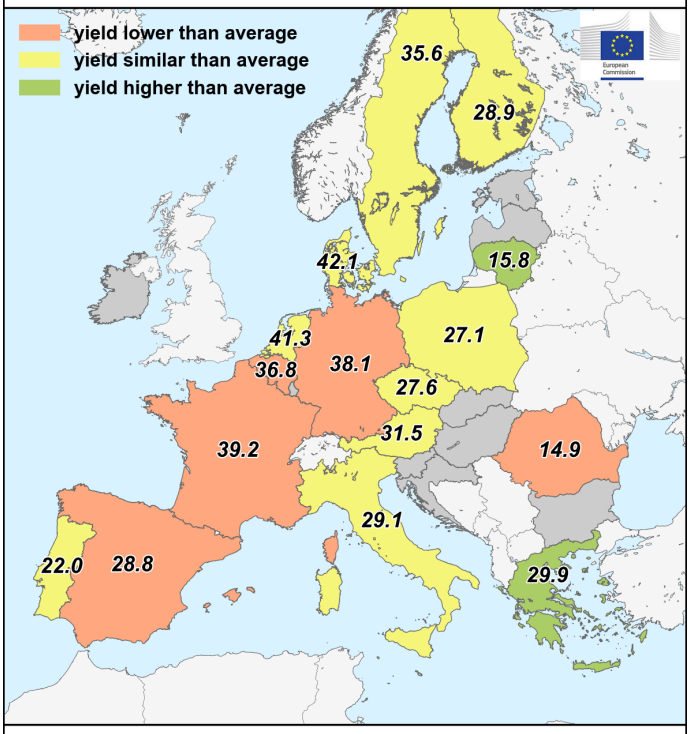


MARS Bulletin Vol. 30 No.9 (2022)

Country	Potato (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	34.2	N/A	**33.4**	– 2	N/A
AT	32.0	34.1	**31.5**	– 2	– 8
BE	40.9	42.9	**36.8**	– 10	– 14
BG	—	—	**—**	—	—
CY	—	—	**—**	—	—
CZ	28.2	29.4	**27.6**	– 2	– 6
DE	41.6	43.8	**38.1**	– 8	– 13
DK	41.6	42.3	**42.1**	+ 1	– 0
EE	—	—	**—**	—	—
EL	28.0	25.5	**29.9**	+ 7	+ 17
ES	31.8	32.5	**28.8**	– 10	– 11
FI	28.7	27.5	**28.9**	+ 1	+ 5
FR	41.4	41.5	**39.2**	– 5	– 6
HR	—	—	**—**	—	—
HU	—	—	**—**	—	—
IE	—	—	**—**	—	—
IT	29.2	29.2	**29.1**	– 0	– 0
LT	15.0	13.1	**15.8**	+ 6	+ 21
LU	—	—	**—**	—	—
LV	—	—	**—**	—	—
MT	—	—	**—**	—	—
NL	41.8	N/A	**41.3**	– 1	N/A
PL	27.4	30.0	**27.1**	– 1	– 10
PT	22.6	24.0	**22.0**	– 2	– 8
RO	16.7	16.5	**14.9**	– 11	– 10
SE	34.4	34.8	**35.6**	+ 4	+ 2
SI	—	—	**—**	—	—
SK	—	—	**—**	—	—

Potato - yield forecast 2022

MARS forecast versus average yield (t/ha) 2017 - 2021

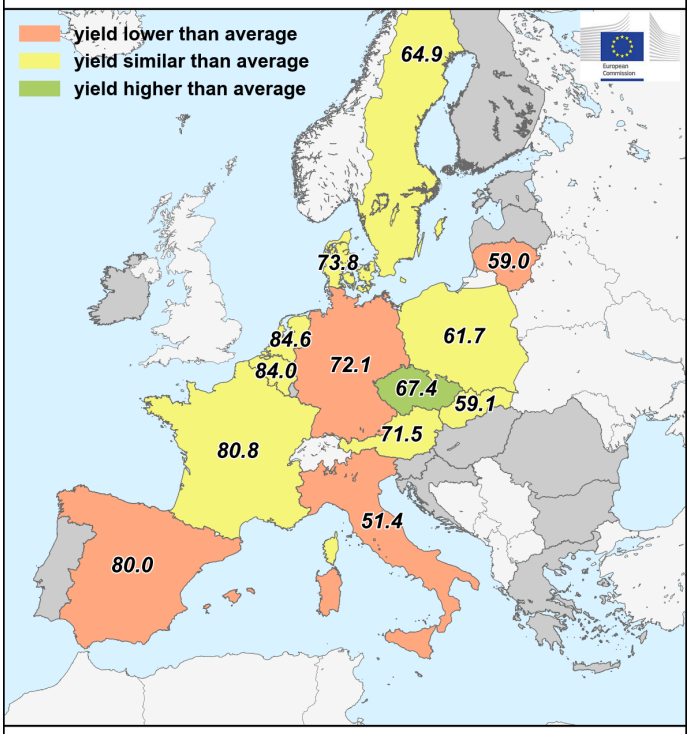


MARS Bulletin Vol. 30 No.9 (2022)

Country	Sugar beets (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	75.0	N/A	**73.2**	– 2	N/A
AT	73.6	79.7	**71.5**	– 3	– 10
BE	86.7	82.5	**84.0**	– 3	+ 2
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	63.0	67.7	**67.4**	+ 7	– 0
DE	75.1	81.8	**72.1**	– 4	– 12
DK	73.3	77.5	**73.8**	+ 1	– 5
EE	—	—	—	—	—
EL	—	—	—	—	—
ES	87.5	87.5	**80.0**	– 9	– 9
FI	—	—	—	—	—
FR	82.3	85.7	**80.8**	– 2	– 6
HR	—	—	—	—	—
HU	—	—	—	—	—
IE	—	—	—	—	—
IT	67.6	N/A	**51.4**	– 24	N/A
LT	61.6	58.3	**59.0**	– 4	+ 1
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	84.0	N/A	**84.6**	+ 1	N/A
PL	61.4	61.0	**61.7**	+ 1	+ 1
PT	—	—	—	—	—
RO	—	—	—	—	—
SE	66.2	71.9	**64.9**	– 2	– 10
SI	—	—	—	—	—
SK	59.1	62.6	**59.1**	+ 0	– 6

Sugar beet - yield forecast 2022

MARS forecast versus average yield (t/ha) 2017 - 2021

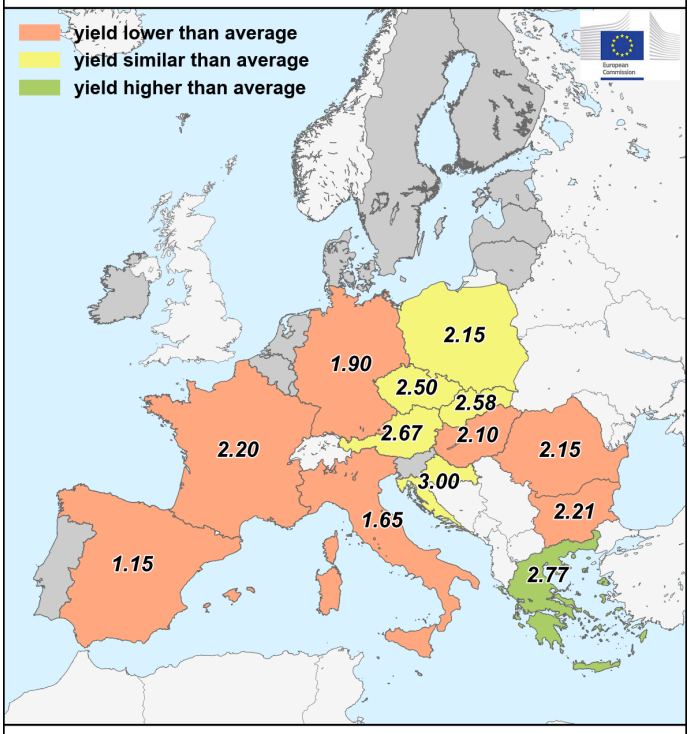


MARS Bulletin Vol. 30 No.9 (2022)

Country	Sunflower (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	2.34	2.38	**2.05**	– 13	– 14
AT	2.71	3.01	**2.67**	– 1	– 11
BE	—	—	—	—	—
BG	2.31	2.38	**2.21**	– 4	– 7
CY	—	—	—	—	—
CZ	2.54	2.90	**2.50**	– 2	– 14
DE	2.20	2.60	**1.90**	– 14	– 27
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	2.65	2.53	**2.77**	+ 5	+ 10
ES	1.24	1.22	**1.15**	– 7	– 6
FI	—	—	—	—	—
FR	2.39	2.74	**2.20**	– 8	– 20
HR	3.05	3.04	**3.00**	– 2	– 1
HU	2.87	2.70	**2.10**	– 27	– 22
IE	—	—	—	—	—
IT	2.40	2.40	**1.65**	– 32	– 31
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	2.13	2.38	**2.15**	+ 1	– 10
PT	—	—	—	—	—
RO	2.61	2.54	**2.15**	– 18	– 15
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	2.65	2.66	**2.58**	– 3	– 3

Sunflower - yield forecast 2022

MARS forecast versus average yield (t/ha) 2017 - 2021

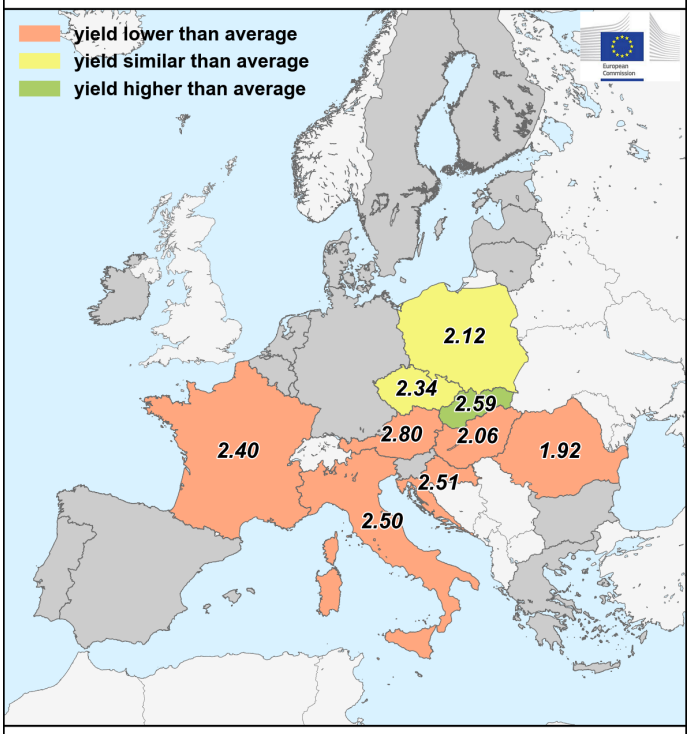


MARS Bulletin Vol. 30 No.9 (2022)

Country	Soybean (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	2.88	2.82	**2.40**	– 17	– 15
AT	2.98	3.06	**2.80**	– 6	– 9
BE	—	—	—	—	—
BG	—	—	—	—	—
CY	—	—	—	—	—
CZ	2.28	2.61	**2.34**	+ 3	– 10
DE	—	—	—	—	—
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	—	—	—	—	—
ES	—	—	—	—	—
FI	—	—	—	—	—
FR	2.61	2.85	**2.40**	– 8	– 16
HR	2.88	2.63	**2.51**	– 13	– 5
HU	2.71	2.61	**2.06**	– 24	– 21
IE	—	—	—	—	—
IT	3.42	3.11	**2.50**	– 27	– 20
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	2.08	2.25	**2.12**	+ 2	– 6
PT	—	—	—	—	—
RO	2.43	2.49	**1.92**	– 21	– 23
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	2.44	2.52	**2.59**	+ 6	+ 3

Soybean - yield forecast 2022

MARS forecast versus average yield (t/ha) 2017 - 2021

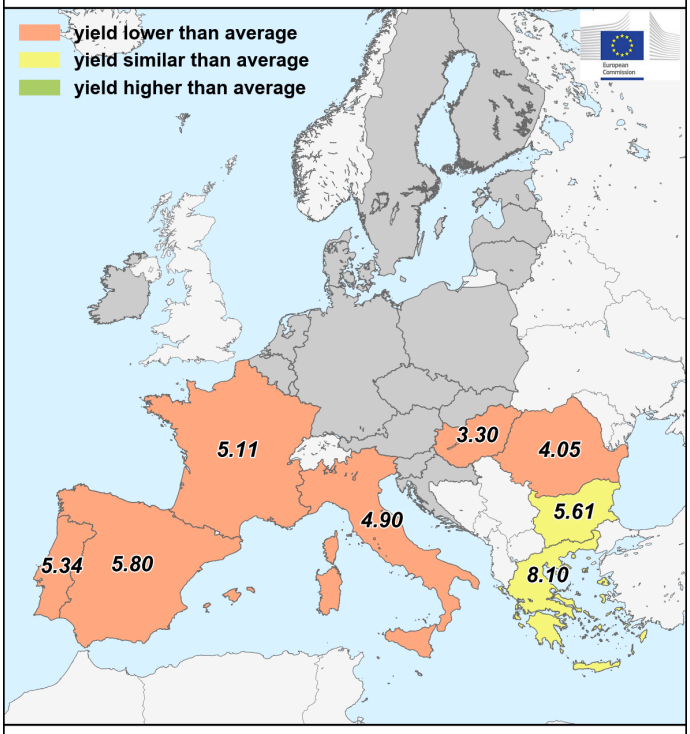


MARS Bulletin Vol. 30 No.9 (2022)

Country	Rice (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
EU	6.77	6.51	**5.34**	– 21	– 18
AT	—	—	—	—	—
BE	—	—	—	—	—
BG	5.60	4.90	**5.61**	+ 0	+ 14
CY	—	—	—	—	—
CZ	—	—	—	—	—
DE	—	—	—	—	—
DK	—	—	—	—	—
EE	—	—	—	—	—
EL	7.89	6.80	**8.10**	+ 3	+ 19
ES	7.56	7.36	**5.80**	– 23	– 21
FI	—	—	—	—	—
FR	5.52	5.31	**5.11**	– 7	– 4
HR	—	—	—	—	—
HU	4.12	3.47	**3.30**	– 20	– 5
IE	—	—	—	—	—
IT	6.62	6.45	**4.90**	– 26	– 24
LT	—	—	—	—	—
LU	—	—	—	—	—
LV	—	—	—	—	—
MT	—	—	—	—	—
NL	—	—	—	—	—
PL	—	—	—	—	—
PT	5.69	5.97	**5.34**	– 6	– 11
RO	4.88	4.65	**4.05**	– 17	– 13
SE	—	—	—	—	—
SI	—	—	—	—	—
SK	—	—	—	—	—

Rice - yield forecast 2022

MARS forecast versus average yield (t/ha) 2017 - 2021



MARS Bulletin Vol. 30 No.9 (2022)

Country	Wheat (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
BY	3.45	3.54	**3.62**	+ 5	+ 2
TR	2.79	2.66	**2.90**	+ 4	+ 9
UA	4.07	4.53	**4.01**	– 2	– 12
UK	8.03	7.80	**8.18**	+ 2	+ 5

Country	Barley (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
BY	2.85	2.86	**3.32**	+ 17	+ 16
TR	2.53	1.87	**2.56**	+ 1	+ 37
UA	3.35	3.82	**3.40**	+ 2	– 11
UK	6.15	6.09	**6.32**	+ 3	+ 4

Country	Grain maize (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
BY	5.58	5.31	**5.72**	+ 3	+ 8
TR	9.30	8.90	**9.40**	+ 1	+ 6
UA	6.76	7.68	**7.07**	+ 5	– 8
UK	—	—	**—**	—	—

Country	Soybean (t/ha)				
	Avg 5yrs	2021	MARS 2022 forecasts	%22/5yrs	%22/21
BY	—	—	**—**	—	—
TR	4.29	4.15	**4.66**	+ 9	+ 12
UA	2.29	2.64	**2.35**	+ 3	– 11
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: 2017-2022 data come from DG Agriculture and Rural Development short-term-outlook data (dated August 2022, received on 01.09.2022), Eurostat Eurobase (last update: 05.09.2022) and EES (last update: 15.11.2017).

Non-EU 2017-2021 data come from USDA, Turkish Statistical Institute (TurkStat), Eurostat Eurobase (last update: 05.09.2022), Ministry for Development of Economy, Trade and Agriculture of Ukraine, Department for Environment, Food & Rural Affairs of UK (DEFRA), FAO and PSD-online.

2022 yields come from MARS Crop Yield Forecasting System (output up to 10.09.2022).

EU aggregate after 01.02.2020 is reported.

N/A = Data not available.

The column header '%22/5yrs' stands for the 2022 change with respect to the 5-year average(%). Similarly, '%22/21' stands for the 2022 change with respect to 2021(%).

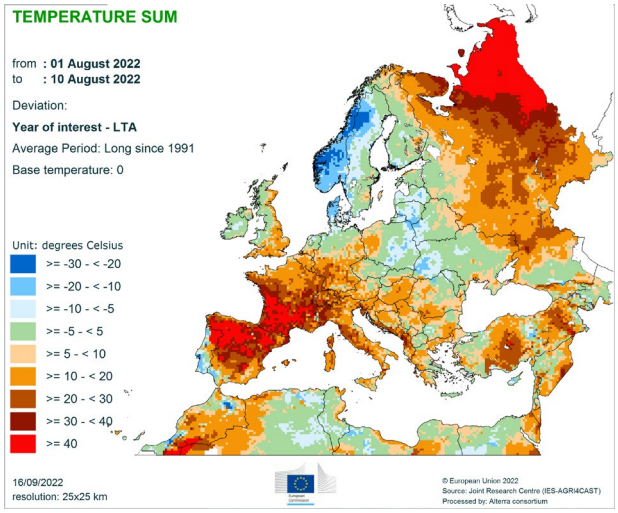
* The EU figures do not include green maize forecasts for Sweden since recent data on yields were not consistent.

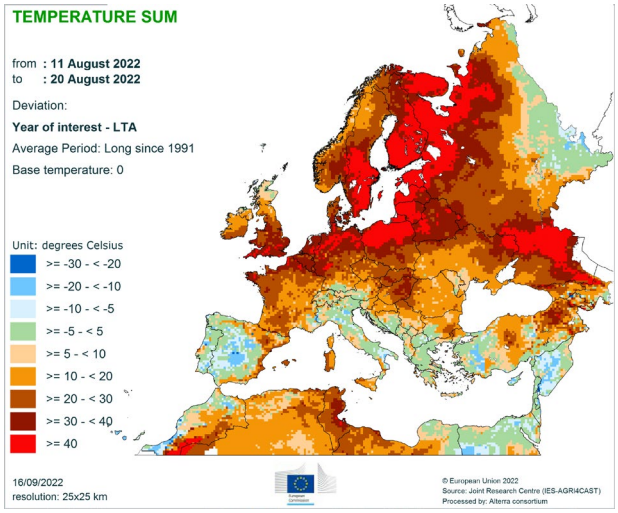
Cop name	Eurostat Crop name	Eurostat Crop Code	Official Eurostat Crop definition*
Total wheat	Wheat and spelt	C1100	Common wheat (*Triticum aestivum* L. emend. Fiori et Paol.), spelt (*Triticum spelta* L.), einkorn wheat (*Triticum monococcum* L.) and durum wheat (*Triticum durum* Desf.).
Total barley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

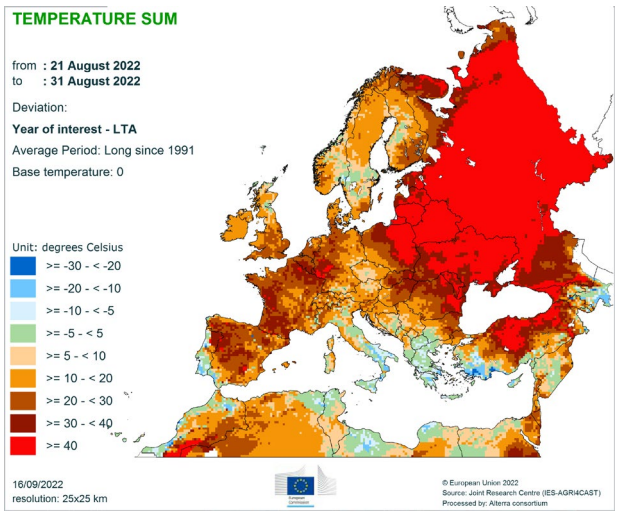
** Source:* Eurostat - Annual crop statistics (Handbook 2020 Edition)

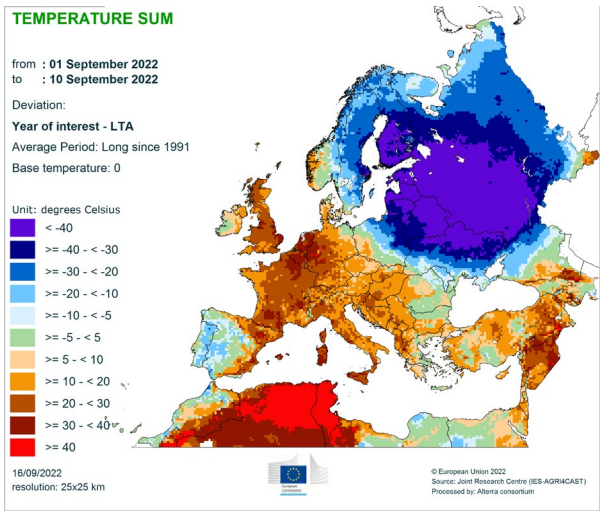
7. Atlas

Temperature regime

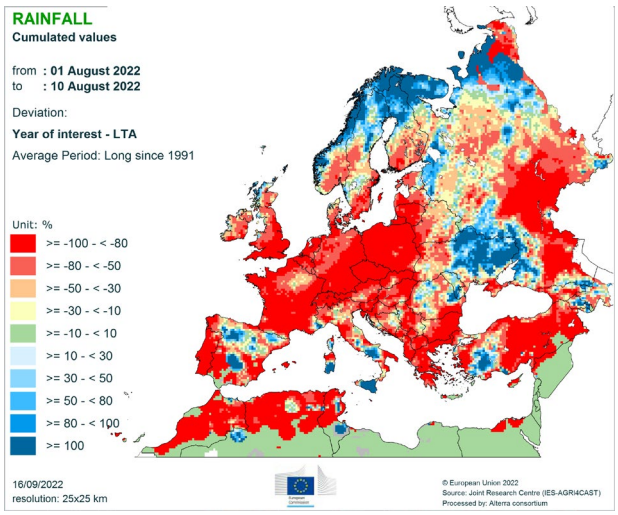


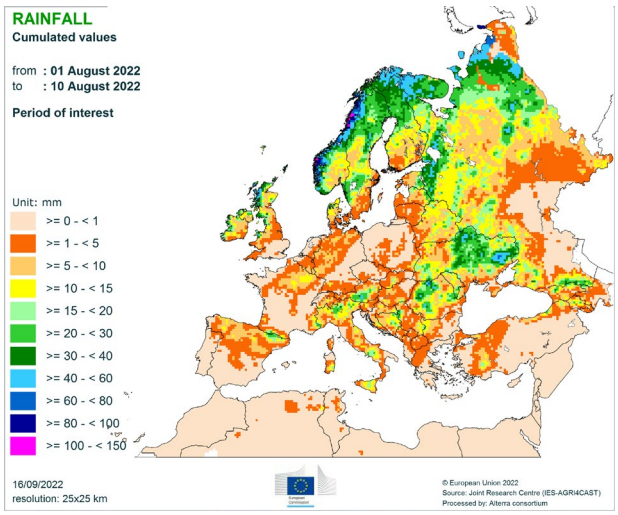


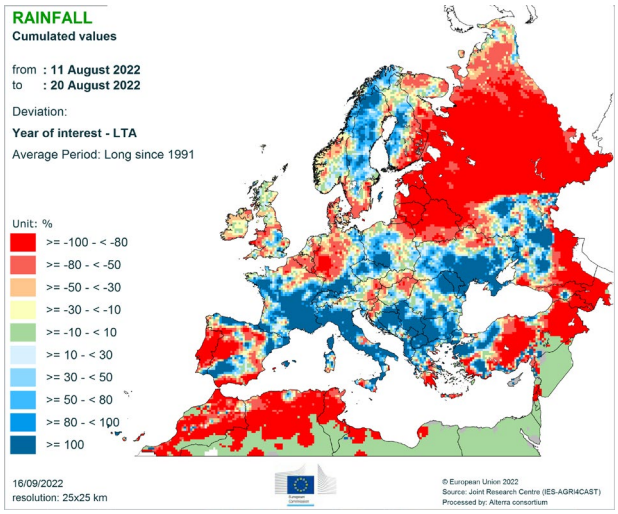


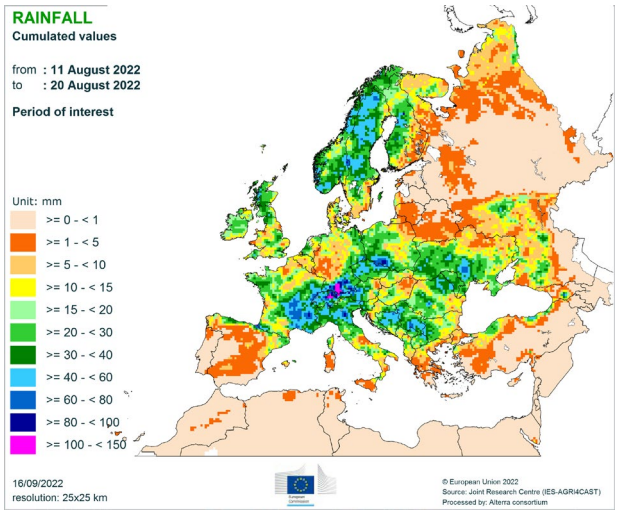


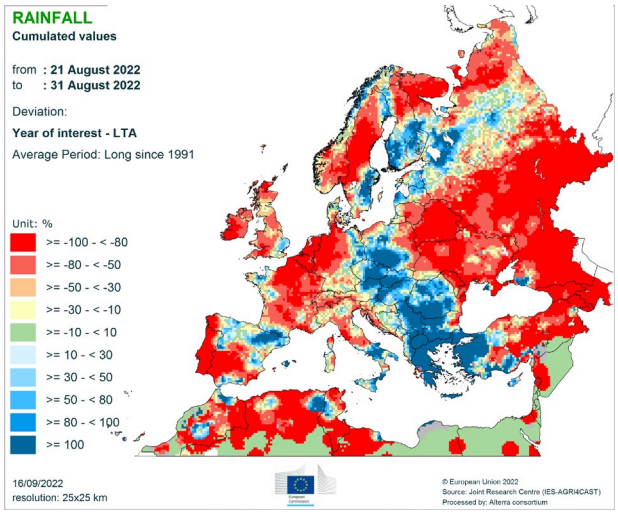
Precipitation

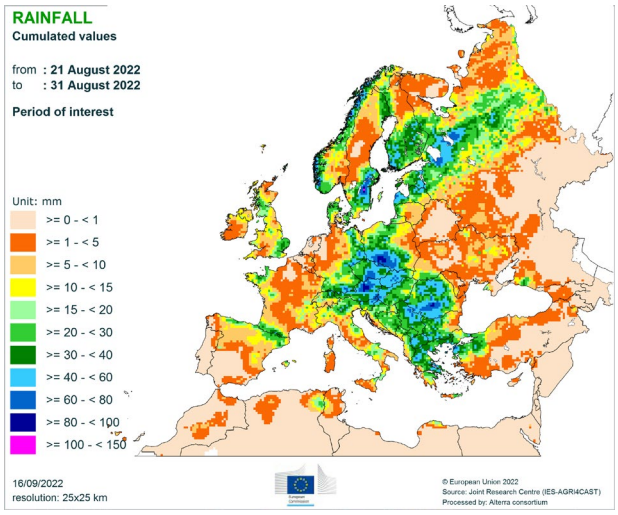


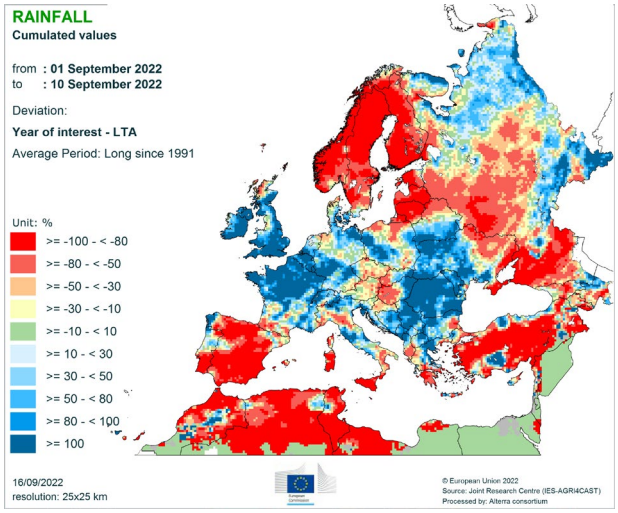


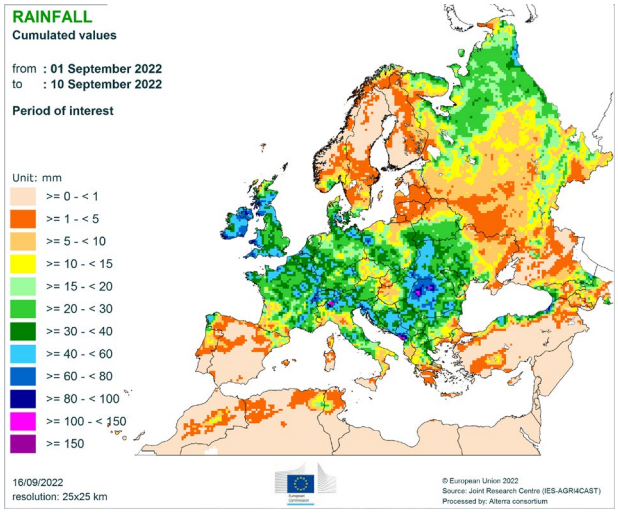




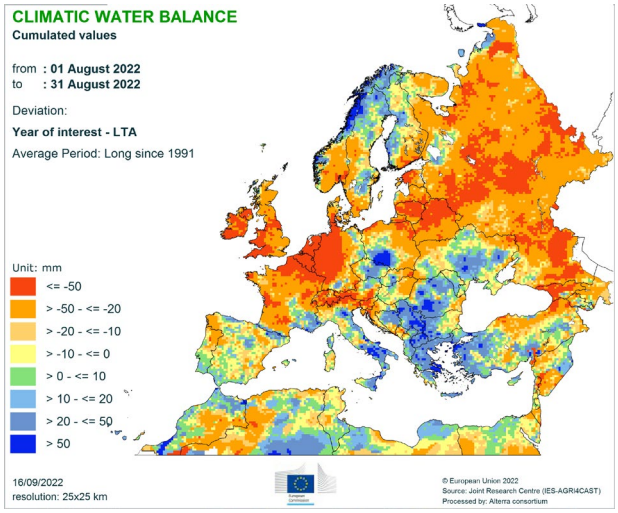


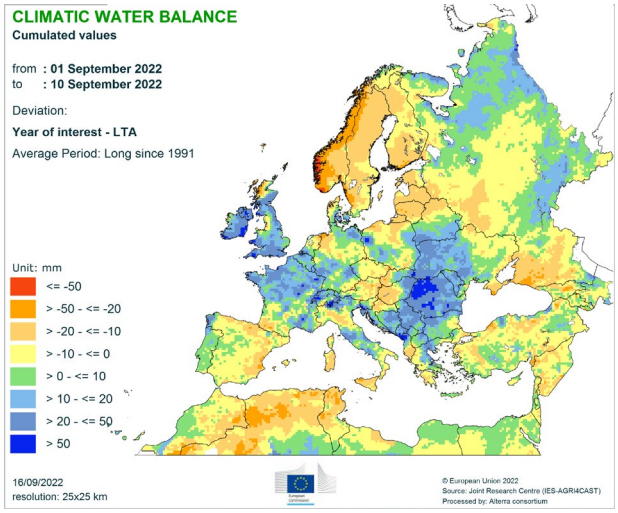




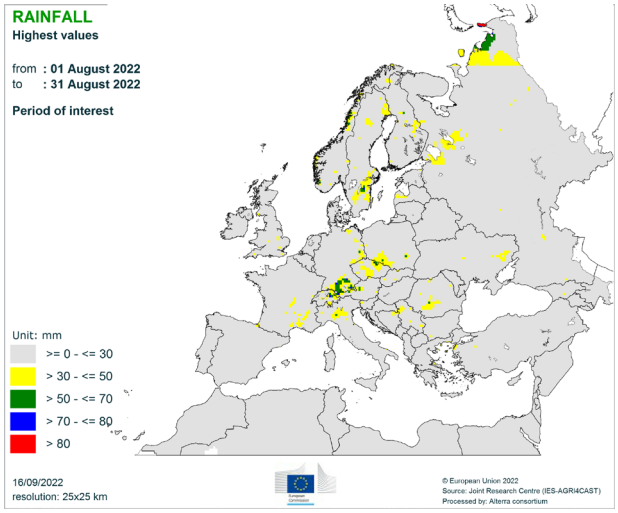


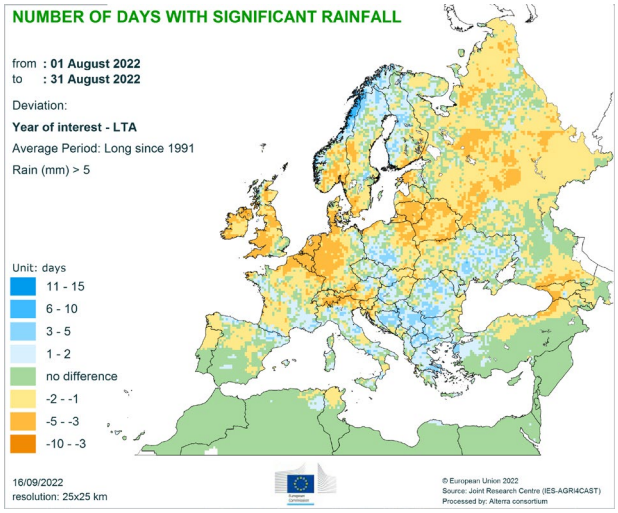
Climatic water balance

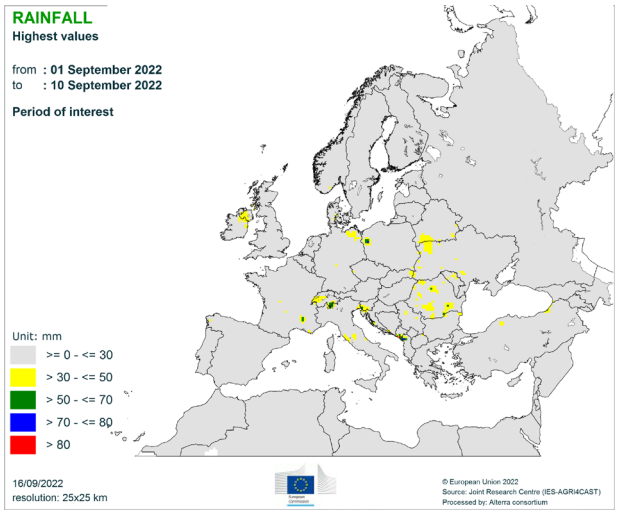


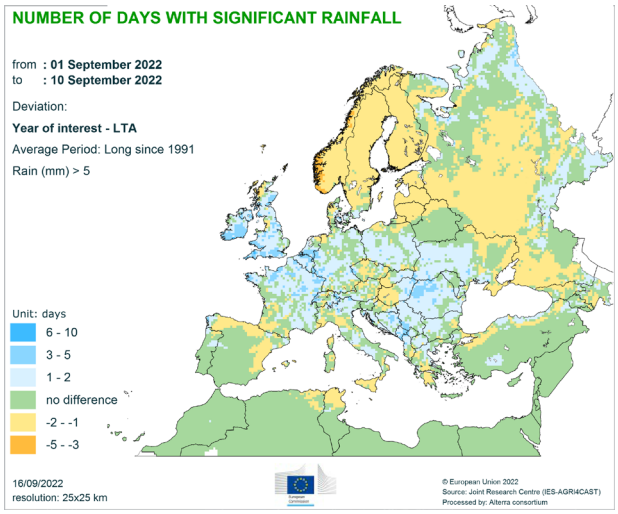


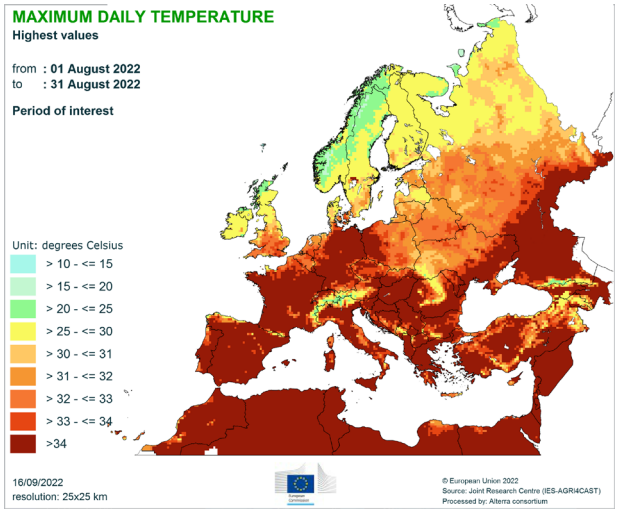
Weather events

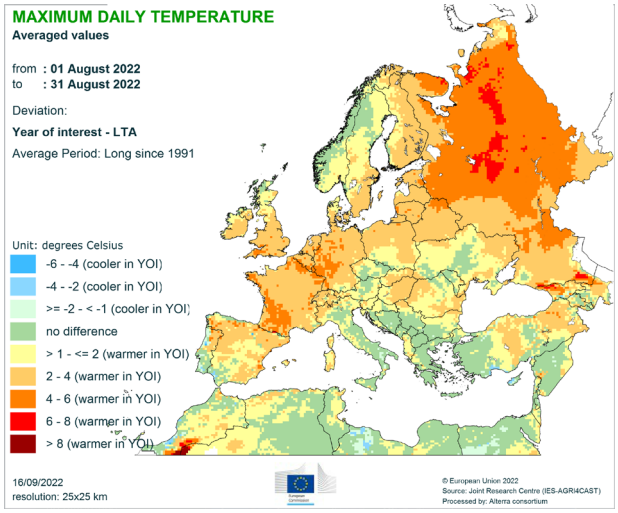





RAINFALL
Highest values
from : 01 September 2022
to : 10 September 2022
Period of interest
Unit: mm
>= 0 - <= 30
> 30 - <= 50
> 50 - <= 70
> 70 - <= 80
> 80
16/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 September 2022
to : 10 September 2022
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Rain (mm) > 5
Unit: days
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
16/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


MAXIMUM DAILY TEMPERATURE
Highest values
from : 01 August 2022
to : 31 August 2022
Period of interest
Unit: degrees Celsius
> 10 - <= 15
> 15 - <= 20
> 20 - <= 25
> 25 - <= 30
> 30 - <= 31
> 31 - <= 32
> 32 - <= 33
> 33 - <= 34
>34
16/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


MAXIMUM DAILY TEMPERATURE
Averaged values
from : 01 August 2022
to : 31 August 2022
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Unit: degrees Celsius
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
> 8 (warmer in YOI)
16/09/2022
resolution: 25x25 km
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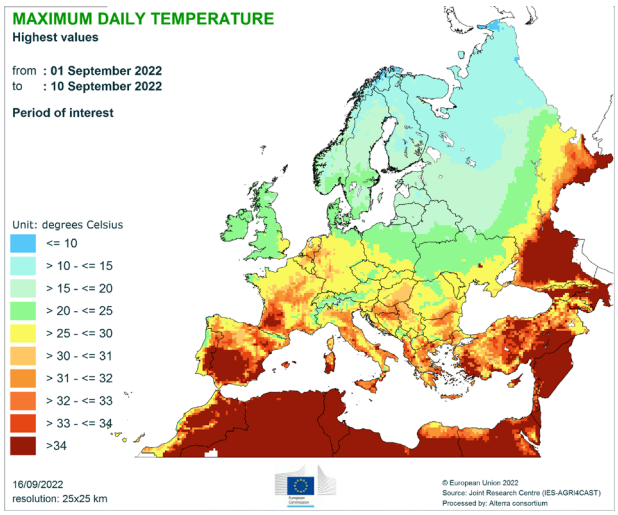
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


MAXIMUM DAILY TEMPERATURE
Highest values
from : 01 September 2022
to : 10 September 2022
Period of interest
Unit: degrees Celsius
<= 10
> 10 - <= 15
> 15 - <= 20
> 20 - <= 25
> 25 - <= 30
> 30 - <= 31
> 31 - <= 32
> 32 - <= 33
> 33 - <= 34
>34
16/09/2022
resolution: 25x25 km
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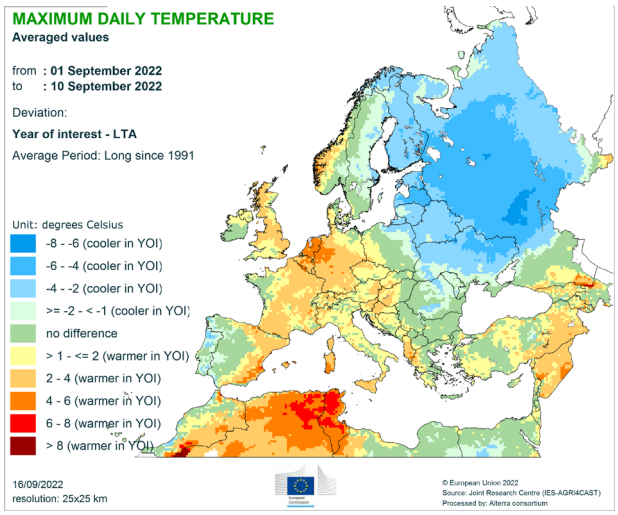
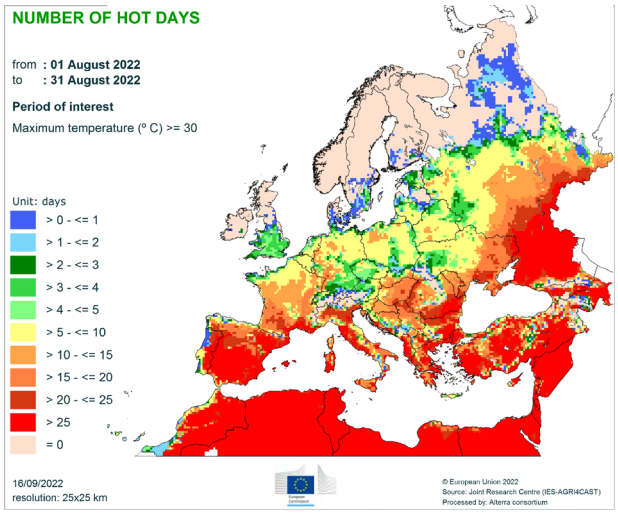
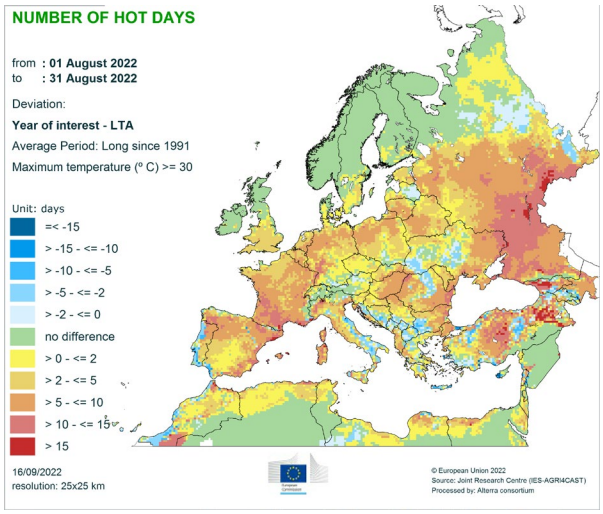
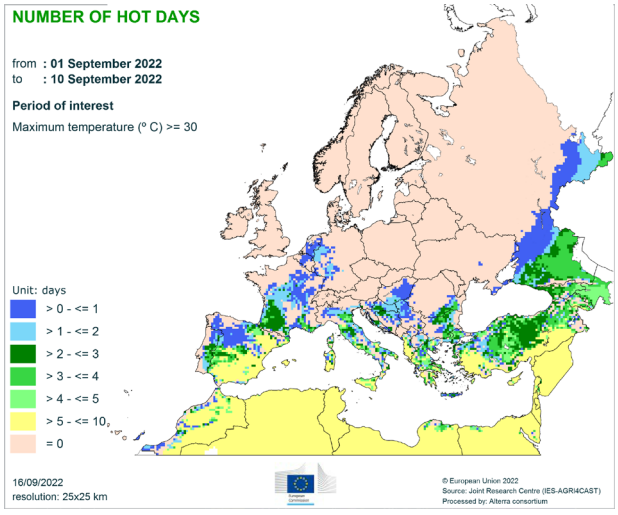
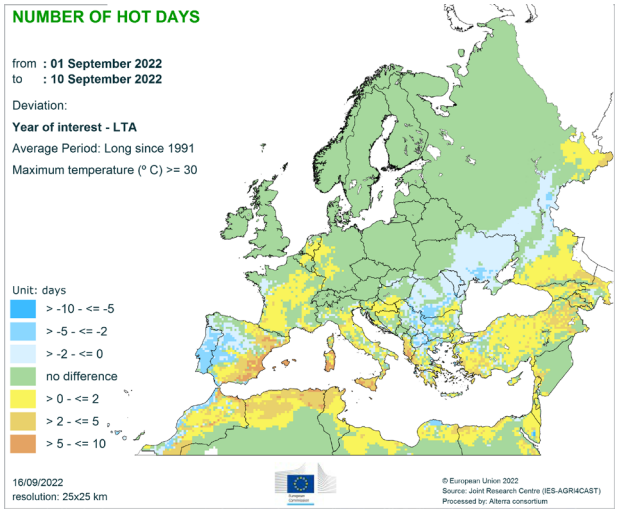
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium


MAXIMUM DAILY TEMPERATURE
Averaged values
from : 01 September 2022
to : 10 September 2022
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Unit: degrees Celsius
-8 - -6 (cooler in YOI)
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
>= -2 - < -1 (cooler in YOI)
no difference
> 1 - <= 2 (warmer in YOI)
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
> 8 (warmer in YOI)
16/09/2022
resolution: 25x25 km
© European Union 2022
Source: Joint Research Centre (IES-AGRI4CAST)
Processed by: Alterra consortium

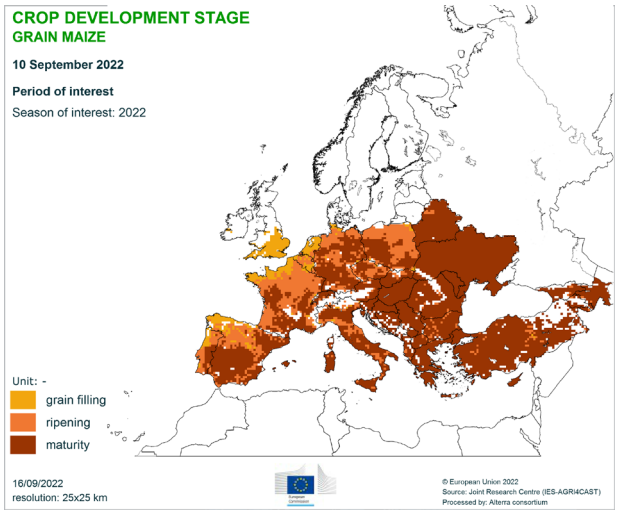


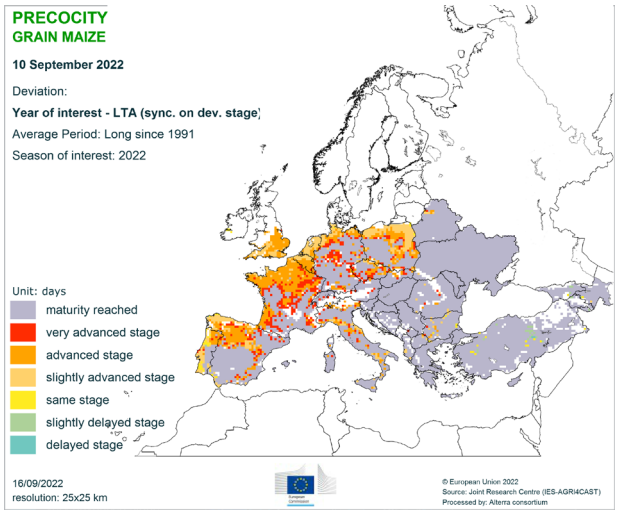


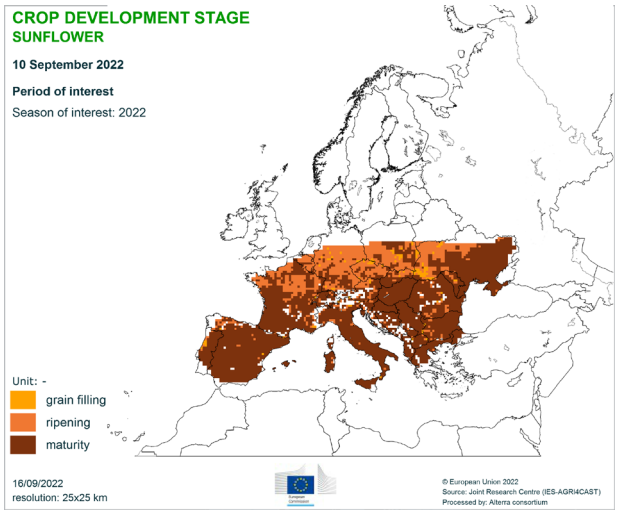


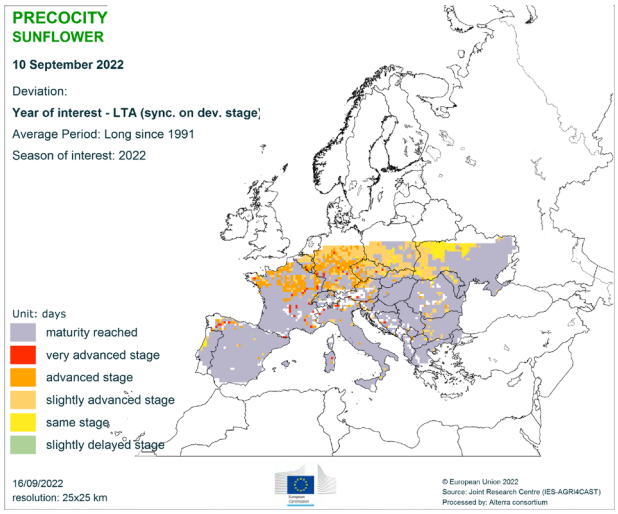


Crop development stages and precocity

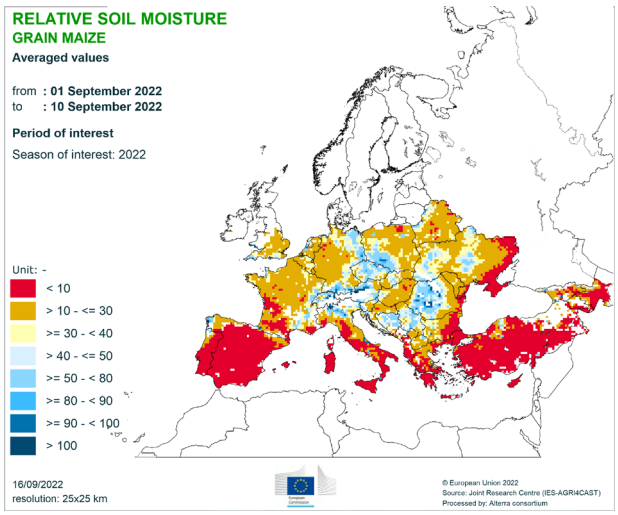


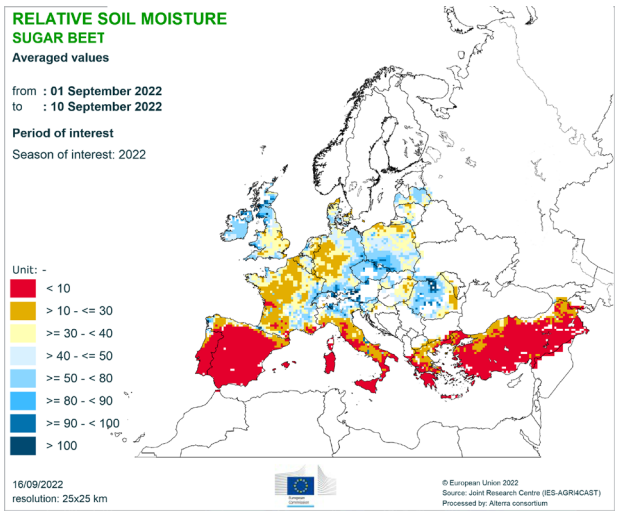




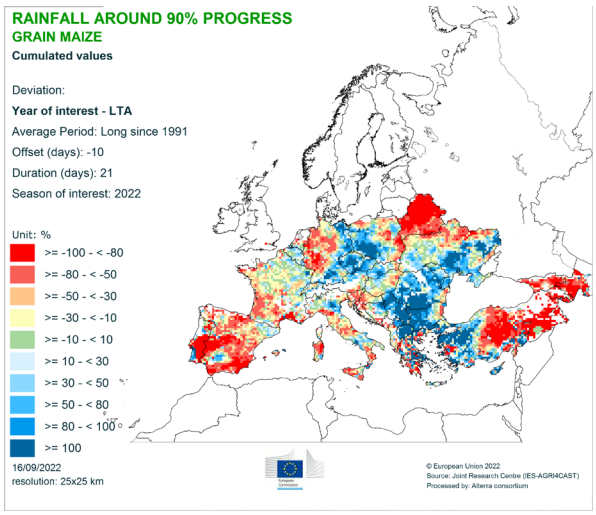


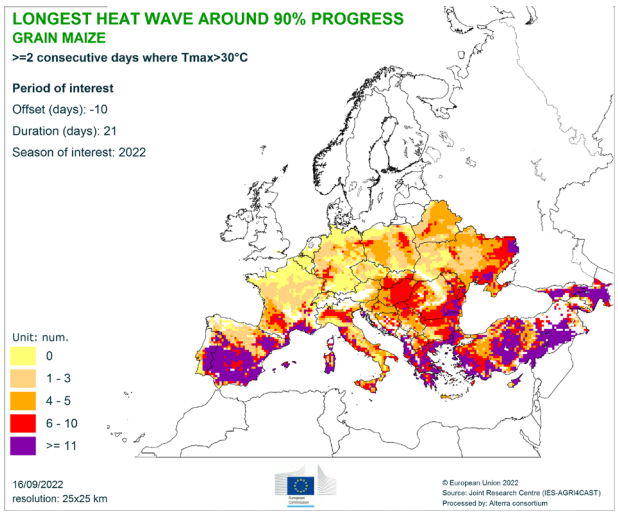
Relative soil moisture



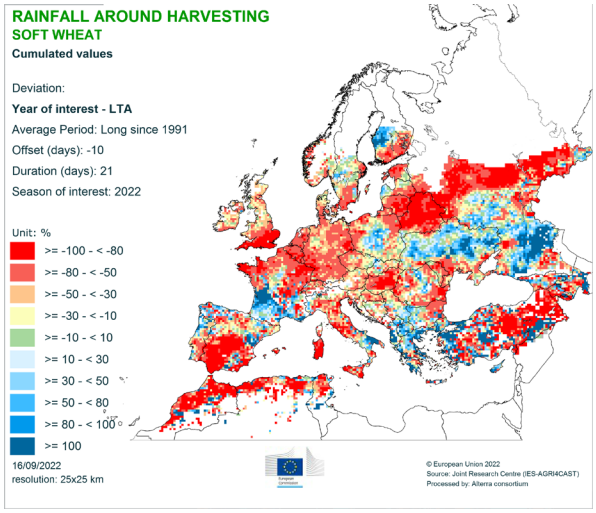


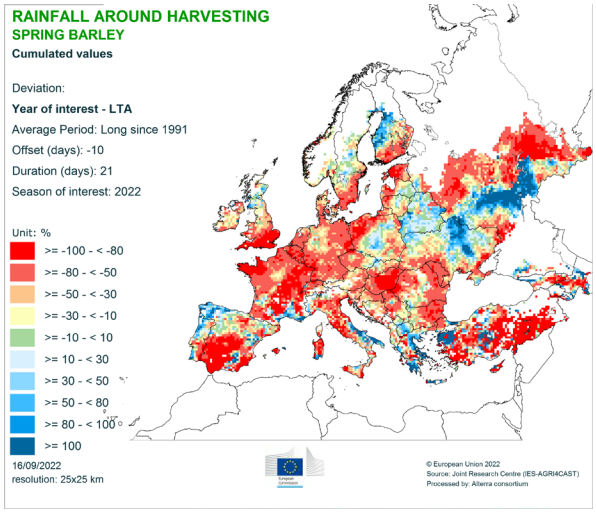
Rainfall and longest heat wave around ripening





Precipitation around harvesting





JRC MARS Bulletins 2022

Date	Publication	Reference
24 Jan	Agromet analysis	Vol. 30 No 1
21 Feb	Agromet analysis	Vol. 30 No 2
21 Mar	Agromet analysis, pasture analysis, yield forecast	Vol. 30 No 3
26 Apr	Agromet analysis, remote sensing, pasture analysis, sowing conditions, yield forecast	Vol. 30 No 4
23 May	Agromet analysis, remote sensing, pasture analysis, sowing update, yield forecast	Vol. 30 No 5
20 Jun	Agromet analysis, remote sensing, pasture analysis, rice analysis, yield forecast	Vol. 30 No 6
25 Jul	Agromet analysis, remote sensing, pasture analysis, harvesting conditions, yield forecast	Vol. 30 No 7
22 Aug	Agromet analysis, remote sensing, pasture update, harvesting update, yield forecast	Vol. 30 No 8
19 Sep	Agromet analysis, remote sensing, pasture analysis, rice analysis, harvesting update, yield forecast	Vol. 30 No 9
24 Oct	Agromet analysis, pasture update, sowing conditions, harvesting update, yield forecast	Vol. 30 No 10
21 Nov	Agromet analysis, sowing update, harvesting update	Vol. 30 No 11
19 Dec	Agromet analysis	Vol. 30 No 12

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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 1991-2021.

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