JRC MARS Bulletin Vol. 27 No 3

European Commission

Period covered: 1 December 2019-10 March 2019
Issued: 18 March 2019

JRC MARS Bulletin
Crop monitoring in Europe
March 2019

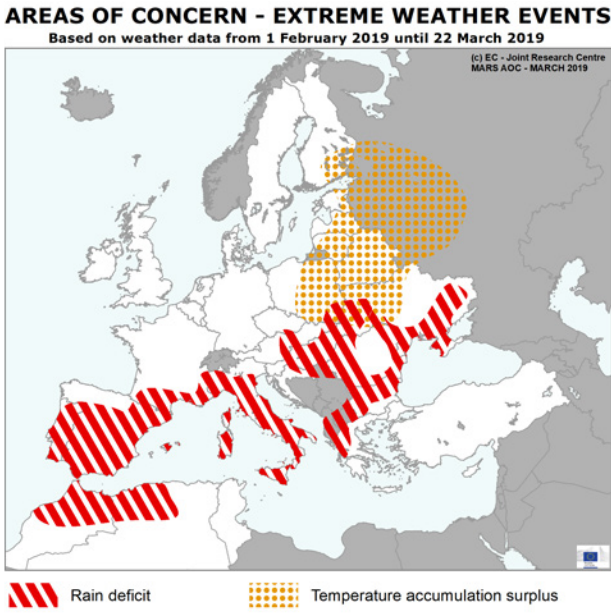
More rain needed in southern Europe

Winter cereals mostly in good condition

Winter crops are advanced and in good shape in most of Europe, following a mild winter without marked cold spells. Large parts of southern Europe experienced a precipitation deficit and more rain is needed to sustain good crop growth. At this early stage in the season, the yield forecasts reported are mostly based on historical trends or average values.

Since February, the whole of Europe has experienced milder-than-usual conditions, with the strongest temperature anomalies observed in the Baltic countries, eastern Poland, Belarus and western Ukraine.

Distinct rainfall deficits are experienced in central, western and south-western parts of the Mediterranean region. These deficits of precipitation started to build up since last year, and rain is needed soon to fully sustain crop growth.



Low levels in irrigation reservoirs have been reported for several regions of Spain, Italy and Portugal, where above-average rainfall in the coming months will be needed in order to ensure adequate water supply for irrigation during summer. Lack of precipitation occurred also in large parts of central and south-eastern Europe. In these regions, the deficit has been less marked but aggravated the condition of crops that were already affected by the unfavourable weather conditions around sowing and emergence in autumn.

In other parts of Europe (e.g. Germany, France), the knock-on effects of unfavourable conditions around sowing and emergence are mostly expressed in a reduced rapeseed area, part of which has been or will be resown with spring or summer crops as described in the country texts of this bulletin issue.

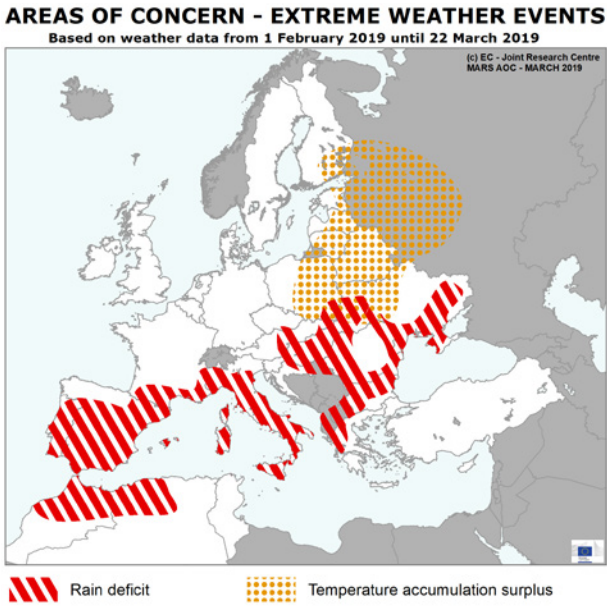
Crop	Yield t/ha				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
CEREALS*	5.49	5.19	**5.62**	+2.4	+8.3
Total Wheat	5.70	5.42	**5.81**	+1.8	+7.1
soft wheat	5.94	5.63	**6.04**	+1.7	+7.4
durum wheat	3.46	3.54	**3.51**	+1.5	-0.8
Winter barley	5.78	5.49	**6.02**	+4.1	+9.6
Rye	3.79	3.24	**3.93**	+3.6	+21
Triticale	4.13	3.76	**4.20**	+1.8	+12
Rape and turnip rape	3.23	2.85	**3.19**	-1.4	+12

Issued: 15 March 2019

* Only winter cereals are included in the calculation

1. Agrometeorological overview

1.1. Areas of concern



The whole of Europe has experienced a milder-than-usual period since February, but the strongest temperature anomalies were observed in north-eastern regions (the Baltic countries, eastern Poland, Belarus and western Ukraine), where average temperatures since 1 February have been 4 °C to 6 °C higher than usual.

Dry conditions are observed in central (Italy), western (southern France) and south-western (Spain, Portugal, Morocco, Algeria) Mediterranean regions. Since the beginning of February, these regions have experienced a precipitation deficit of more than 50 mm, and received less than 50 % of the amount of precipitation compared to the long-term average (LTA). The precipitation deficit in these regions had already started to build up last year, and thus rain is needed soon to sustain good crop growth.

Lack of precipitation also occurred in Hungary, eastern Slovakia, Romania, northern Bulgaria, northern Greece and in southern Ukraine. In these regions, the deficit during the period under review was less marked but, in many parts, aggravated the condition of crops that were already suffering due to the unfavourable conditions for emergence in November.

The effects of unfavourable conditions for sowing and emergence in autumn in other areas of Europe are not indicated on the map, as these were not aggravated by negative events during the period of analysis. These effects are mostly expressed in a reduced rapeseed area, part of which has been or will be resown with spring or summer crops. Please refer to the country texts of this bulletin and to the November 2018 issue ([1]) of the bulletin for a detailed description.

Concerns about low levels in irrigation reservoirs have been reported for some Mediterranean countries (Spain, Italy and Portugal). Above-average rainfall in the coming months will be needed to avoid limited water supply for irrigation during the summer.

1.2. Meteorological review (1 February-10 March)

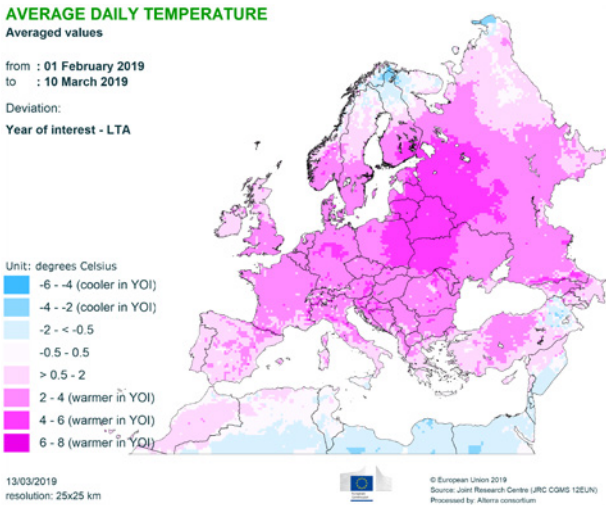
Warmer-than-usual conditions were observed in Europe, with daily mean temperature anomalies (with respect to the LTA) mainly between 2 °C and 4 °C. Higher warm anomalies (between 4 °C and 6 °C) were recorded in a large area of eastern Europe and western Russia. Meanwhile, only slightly warmer-than-usual conditions (daily mean temperature anomalies not exceeding 2 °C) were observed in the Iberian peninsula, southern Italy, Greece, Ireland, Scotland and a large area of the Scandinavian peninsula. These warmer conditions were also reflected in higher-than-usual daily maximum temperatures, reaching values above 14 °C in most of Europe. Daily maximum temperatures were exceeding 18 °C in most of central, western and south-eastern Europe, where large areas also recorded values above 22 °C.

Drier-than-usual conditions were observed in most of southern Europe and in large areas of eastern Europe. In these regions, cumulative precipitation during the period under analysis was 50-80 % lower than usual (locally 80-100 %). Values below 40 mm were recorded in many of these regions.

Wetter-than-usual conditions were observed in the Scandinavian peninsula, the United Kingdom and some areas of central Europe, with anomalies (with respect to the LTA) of between 30 % and 80 % (locally 100 % and above).

In most of Europe (except for the United Kingdom and the Scandinavian peninsula), the combination of warmer-than-usual and drier-than-usual conditions led to **negative anomalies in the climatic water balance**; most distinctly in southern Europe.

([1]) https://ec.europa.eu/jrc/en/mars/bulletins


AVERAGE DAILY TEMPERATURE
Averaged values
from : 01 February 2019
to : 10 March 2019
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
-2 - < -0.5
-0.5 - 0.5
> 0.5 - 2
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
13/03/2019
resolution: 25x25 km
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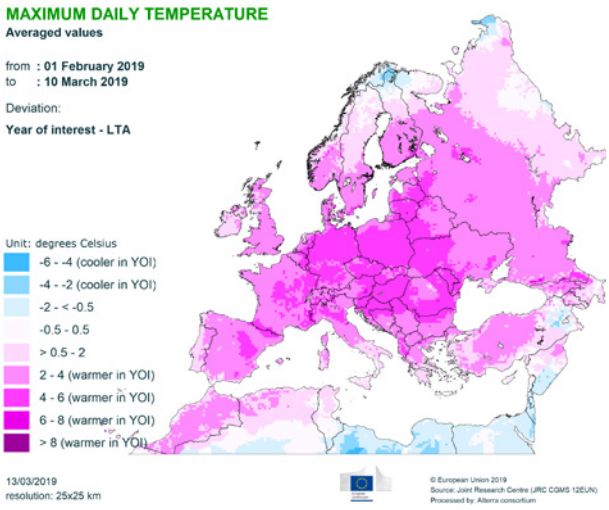
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


MAXIMUM DAILY TEMPERATURE
Averaged values
from : 01 February 2019
to : 10 March 2019
Deviation:
Year of interest - LTA
Unit: degrees Celsius
-6 - -4 (cooler in YOI)
-4 - -2 (cooler in YOI)
-2 - < -0.5
-0.5 - 0.5
> 0.5 - 2
2 - 4 (warmer in YOI)
4 - 6 (warmer in YOI)
6 - 8 (warmer in YOI)
> 8 (warmer in YOI)
13/03/2019
resolution: 25x25 km
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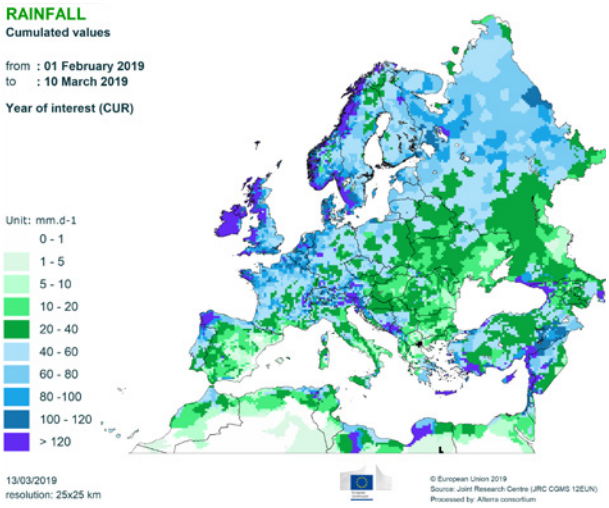
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 February 2019
to : 10 March 2019
Year of interest (CUR)
Unit: mm.d-1
0 - 1
1 - 5
5 - 10
10 - 20
20 - 40
40 - 60
60 - 80
80 -100
100 - 120
> 120
13/03/2019
resolution: 25x25 km
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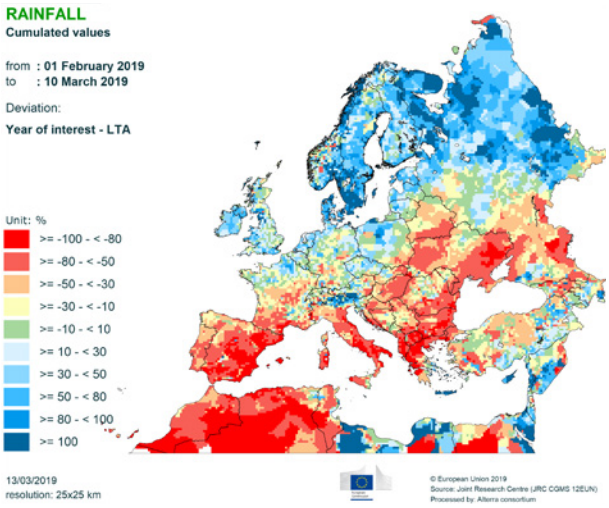
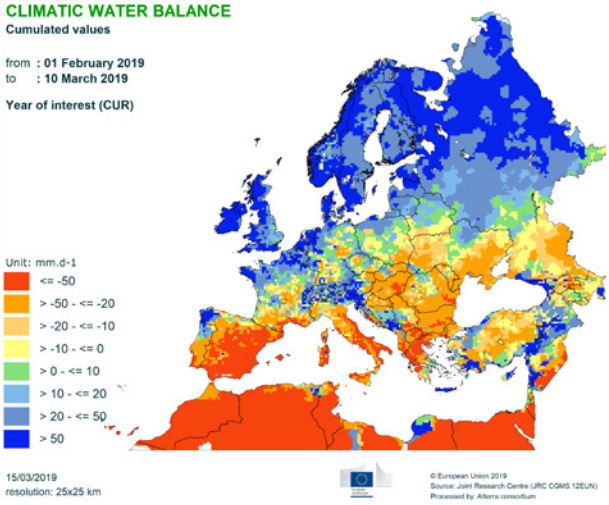
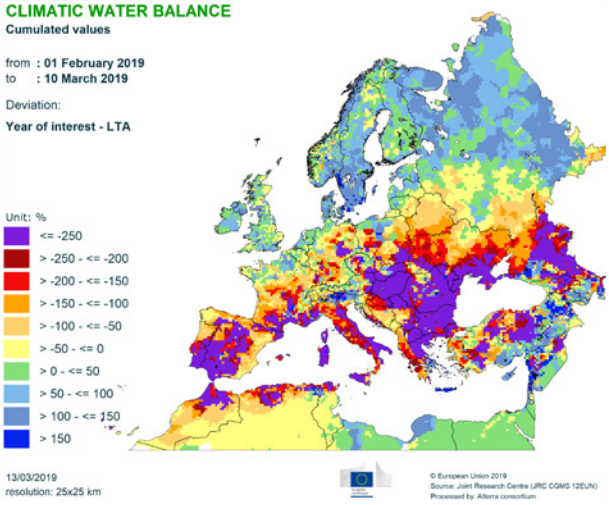
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 February 2019
to : 10 March 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
13/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


CLIMATIC WATER BALANCE
Cumulated values
from : 01 February 2019
to : 10 March 2019
Year of interest (CUR)
Unit: mm.d-1
<= -50
> -50 - <= -20
> -20 - <= -10
> -10 - <= 0
> 0 - <= 10
> 10 - <= 20
> 20 - <= 50
> 50
15/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


CLIMATIC WATER BALANCE
Cumulated values
from : 01 February 2019
to : 10 March 2019
Deviation:
Year of interest - LTA
Unit: %
<= -250
> -250 - <= -200
> -200 - <= -150
> -150 - <= -100
> -100 - <= -50
> -50 - <= 0
> 0 - <= 50
> 50 - <= 100
> 100 - <= 150
> 150
13/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium

1.3. Winter review (December, January, February)

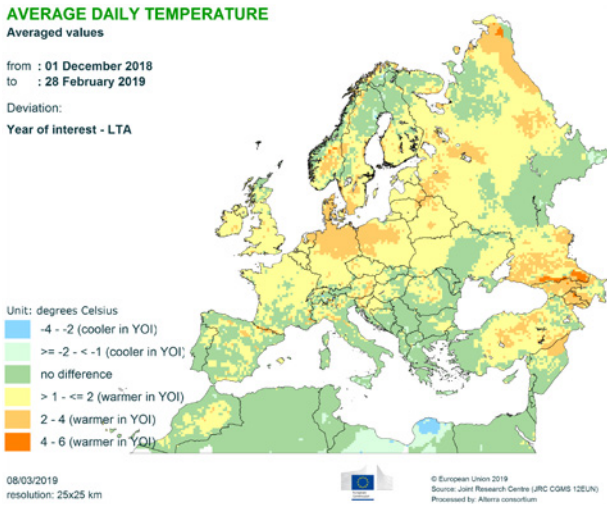
The winter was characterised by **warmer-than-usual temperature conditions** in most of Europe. **December** saw temperature anomalies of up to 4 °C in western, central and northern Europe. Temperatures returned to around the LTA in **January**, except in the eastern Black Sea region (warm weather anomaly), northern Scandinavia (cold weather anomaly) and the Mediterranean (cold weather anomaly). **February** presented a pronounced warm weather anomaly across all of Europe, with the highest deviations from the LTA in eastern and northern Europe (4-8 °C above the LTA). February was among the warmest on our records (i.e. since 1975) in the United Kingdom, Ireland, the Benelux countries, Denmark, Germany, France, Spain and Portugal. Maximum temperatures recorded in France, Spain, northern Italy and north-eastern Adriatic regions exceeded 20 °C on several days at the end of February.

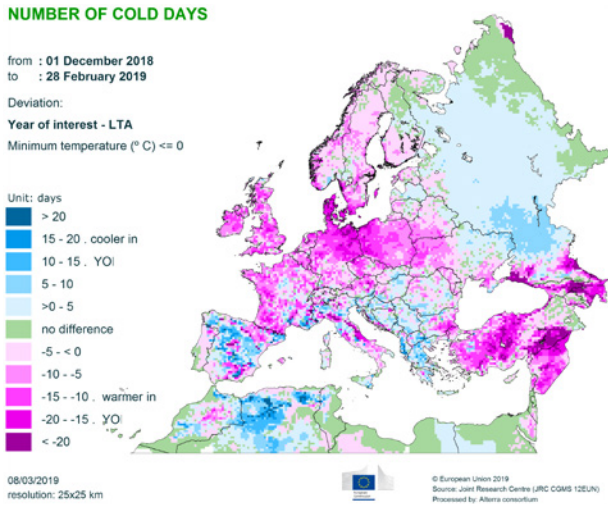
The sum of active temperatures (T_{base} = 0 °C) exceeded the LTA by more than 50 °C (regionally more than 100 °C) in western Europe.

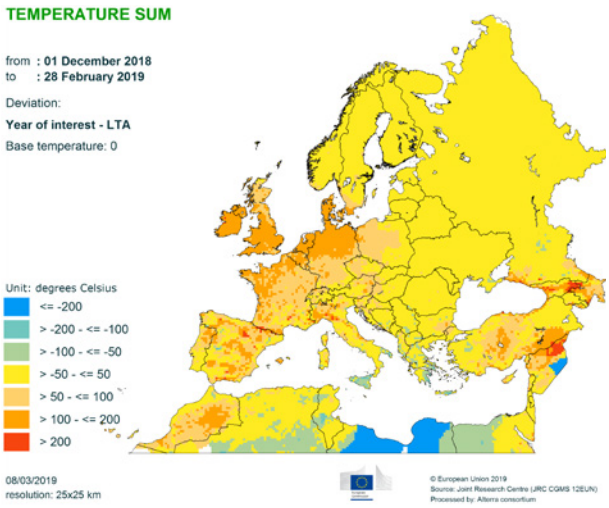
Slightly colder-than-usual (0.5-2 °C below the LTA) conditions occurred in **December**, in south-eastern Europe. A more pronounced **cold weather anomaly,** with air temperatures between 2 °C and 4 °C below the LTA, was recorded during **January** in northern Scandinavia and the Mediterranean. Minimum winter temperatures below – 10 °C were mainly limited to eastern and northern Europe and higher mountainous regions, while temperatures below – 18 °C were limited mainly to north-eastern Europe.

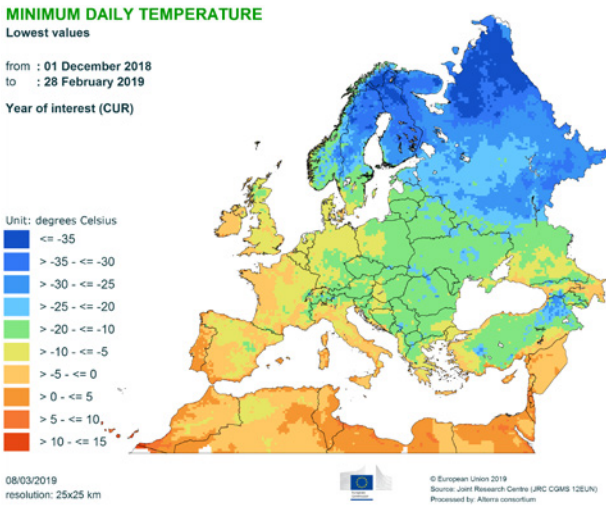
Substantially drier-than-usual conditions prevailed in the Iberian peninsula, central and southern France, northern Italy, the western part of the Pannonian basin, the north-eastern United Kingdom and the north-eastern Black Sea region. The most affected areas, in the eastern half of the Iberian peninsula, north-western Italy and western Hungary, recorded less than 60 mm (locally less than 40 mm) of winter precipitation, which corresponds to less than 50 % of the LTA in these regions.

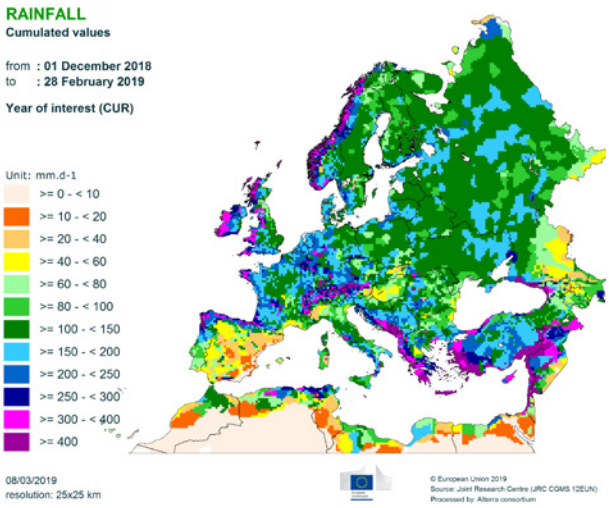
A significant precipitation surplus was recorded in the northern Alps region, Poland, central Scandinavia, Romania, Ukraine and Turkey. Precipitation cumulates in these regions exceeded 150 mm, with the northern Alps and coastal regions of Turkey even experiencing more than 300 mm. Coastal areas of the northern Atlantic and Balkan regions also experienced more than 300 mm of winter precipitation cumulates; however, this is fairly normal for these regions during the winter period.

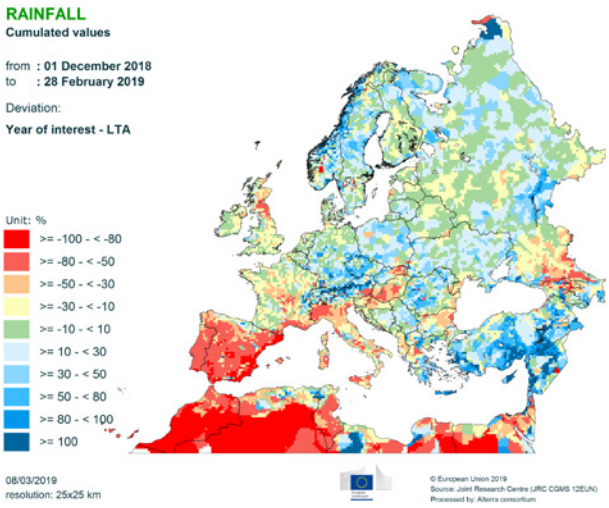





TEMPERATURE SUM
from : 01 December 2018
to : 28 February 2019
Deviation:
Year of interest - LTA
Base temperature: 0
Unit: degrees Celsius
<= -200
> -200 - <= -100
> -100 - <= -50
> -50 - <= 50
> 50 - <= 100
> 100 - <= 200
> 200
08/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


MINIMUM DAILY TEMPERATURE
Lowest values
from : 01 December 2018
to : 28 February 2019
Year of interest (CUR)
Unit: degrees Celsius
<= -35
> -35 - <= -30
> -30 - <= -25
> -25 - <= -20
> -20 - <= -10
> -10 - <= -5
> -5 - <= 0
> 0 - <= 5
> 5 - <= 10
> 10 - <= 15
08/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 December 2018
to : 28 February 2019
Year of interest (CUR)
Unit: mm.d-1
>= 0 - < 10
>= 10 - < 20
>= 20 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150 - < 200
>= 200 - < 250
>= 250 - < 300
>= 300 - < 400
>= 400
08/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 December 2018
to : 28 February 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
08/03/2019
resolution: 25x25 km
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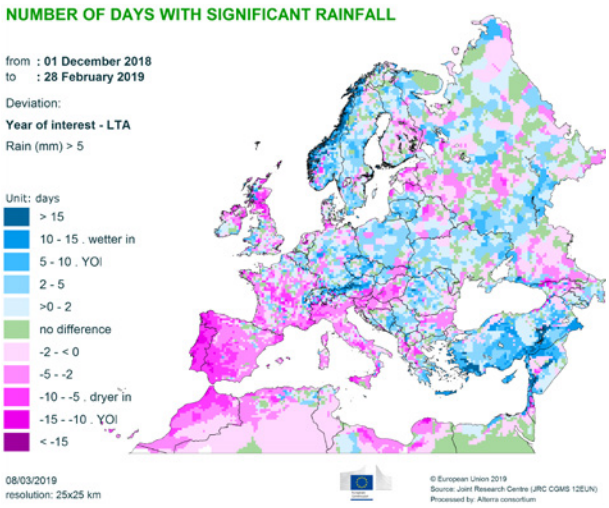
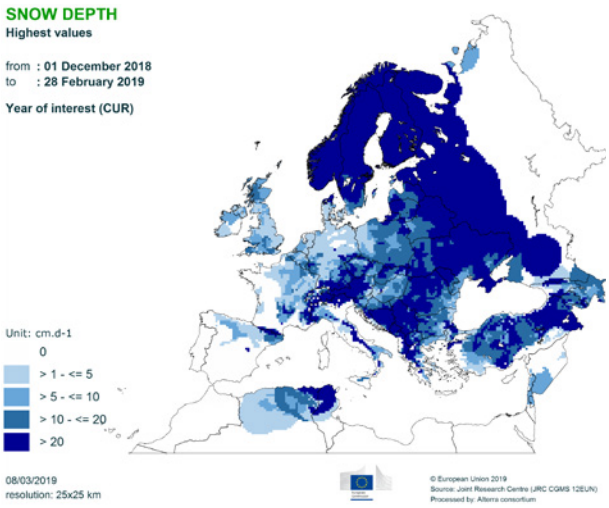
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 December 2018
to : 28 February 2019
Deviation:
Year of interest - LTA
Rain (mm) > 5
Unit: days
> 15
10 - 15 . wetter in
5 - 10 . YOI
2 - 5
>0 - 2
no difference
-2 - < 0
-5 - -2
-10 - -5 . dryer in
-15 - -10 . YOI
< -15
08/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium

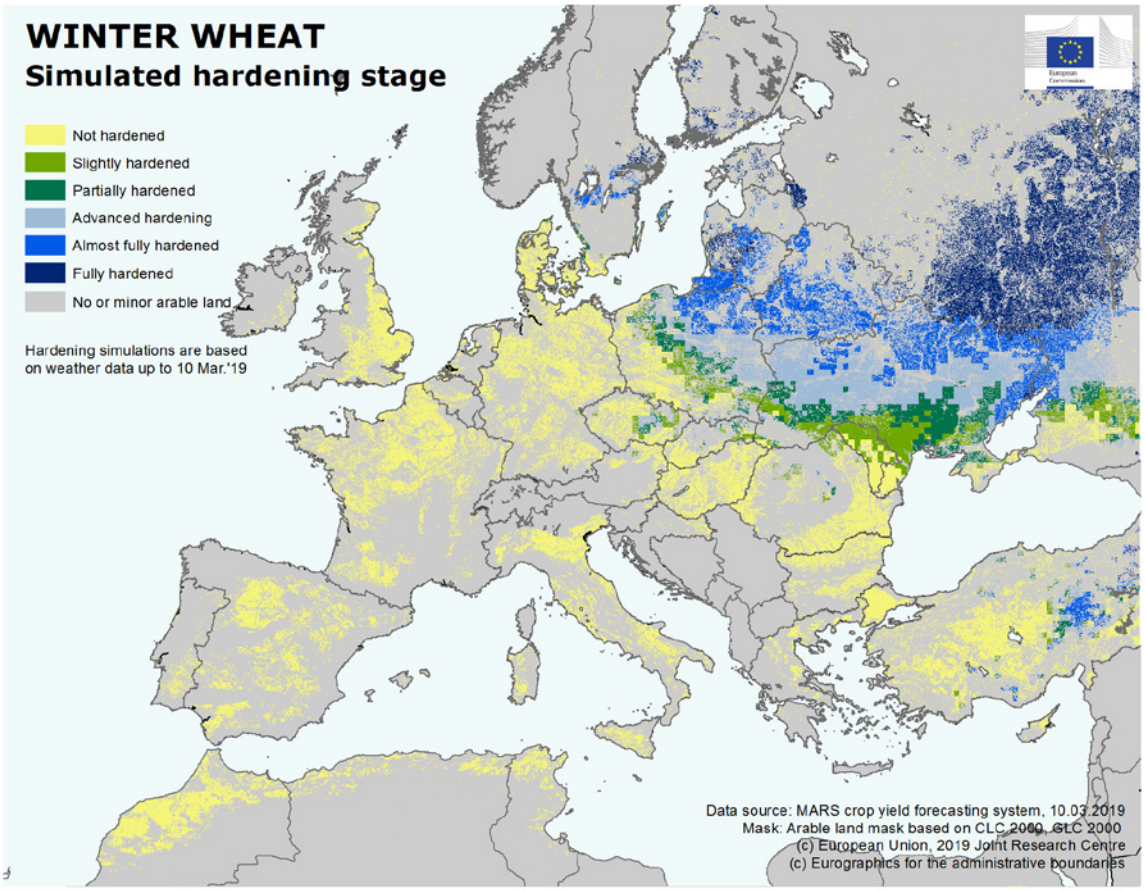

SNOW DEPTH
Highest values
from : 01 December 2018
to : 28 February 2019
Year of interest (CUR)
Unit: cm.d-1
0
> 1 - <= 5
> 5 - <= 10
> 10 - <= 20
> 20
08/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium

1.4. Frost-kill analysis

Our latest model simulation indicates not hardened or slightly hardened ([2]) winter cereals in western Europe (France, United Kingdom, Benelux countries) and extended territories of southern Europe and western Turkey. Mild daily temperatures led to earlier-than-usual de-hardening of winter cereals in Germany, Denmark, most of central Europe (except north-eastern areas), the Balkan peninsula and Romania, as well as along the Black Sea coastal regions of Ukraine and in southern Russia. The pace of de-hardening was remarkably high in recent days, due to extremely high temperatures in central and eastern Europe. Winter wheat is in partially hardened or still in advanced hardened state in central Poland, eastern regions of Slovakia, central Ukraine and in a wide belt of southern Russia between the Azovian Sea and the Caspian Sea. The full frost tolerance level has also started to decrease in southern Sweden, north-eastern Poland, Latvia, Lithuania, Belarus, northern regions of Ukraine and in the *Rostovskaya* and *Volgogradskaya oblasts* of Russia. Full hardening is maintained in the remaining eastern and northern areas of Europe.

Our latest frost-kill model simulation suggests no (additional) frost-kill damage since mid-February. Since the start of winter, frost damage in the EU has been mostly limited to minor occurrences in northern and central Europe (Denmark, Hungary, Poland, Romania, Sweden). Slight frost damage is likely to have occurred in the central and southern okrugs of Russia. Moderate (locally considerable) frost-kill damage may have occurred in the Volga okrug (especially in the western and southern territories) in November.

On the basis of the latest medium-range weather forecast (issued on 10 March), no further frost-kill damage is expected until 20 March.



([2]) Hardening is a bio-physiological process of winter cereals that occurs when, in response to cold conditions, the crops transform cellular starch to sugar thus gaining low-temperature tolerance to survive the harsh winter conditions.

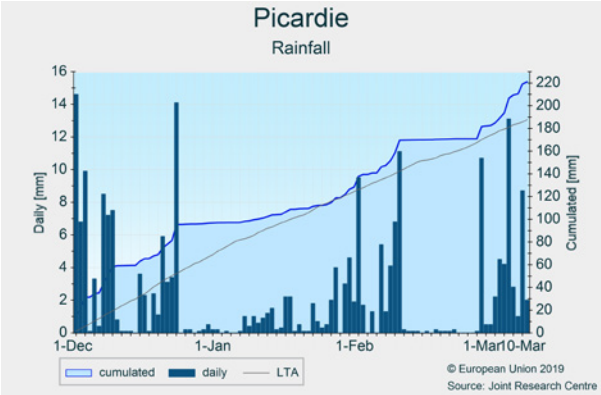
2. Country headlines

2.1. European Union

France

Winter crops partly recovered after difficult start to the season

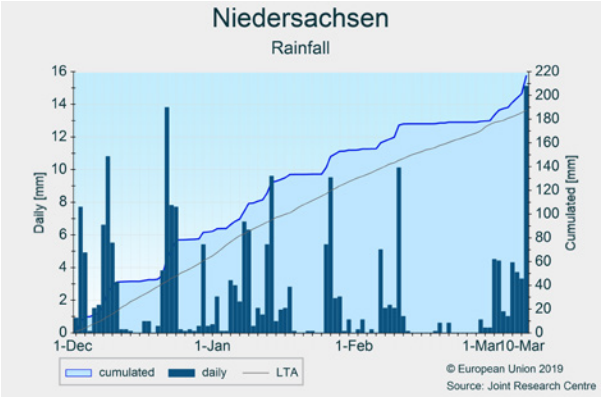
The dry conditions observed last summer and autumn impacted the start of the season for winter cereals and more particularly rapeseed. The most impacted regions are in north-eastern France (*Alsace-Lorraine* and *Champagne-Ardenne*) and Centre, especially in areas with shallow and chalky-clay soils. As a consequence of the dry start to the season, the rapeseed area is reported to be well below the level for the last 10 years (– 11.3 % compared to the average for 2014-2018, and – 16.8 % compared to last year ([3])). While some farmers did not sow rapeseed, some of the fields in poor condition have already been re-sown with spring barley, and others will be re-sown with maize later this season. Spring barley was sown a month earlier than in an average year, due to the mild temperatures observed during the second half of February. Since the beginning of March, substantial rainfall has been observed in the northern half of the country, improving the conditions for winter cereals. However, the same rainfall (and more forecast in the coming days) will delay sowing of sugar beet until soils are dried.



Germany

No major concerns for the start to the season

The dry autumn initially hampered the sowing of winter cereals, but this was eventually concluded with a clear increase in total winter cereal areas; however this was mostly at the expense of rapeseed, which decreased by around 25 % compared to 2018. The stable crumb structure allowed for good root development and the dry conditions ensured a good nitrogen uptake. The winter itself was fairly rainy and mild in December, with a clear precipitation surplus, except in *Brandenburg* and *Mecklenburg-Vorpommern*. January saw massive snowfall in the south and cooler temperatures overall, but no pertinent cold waves. A precipitation surplus was recorded in most regions, with the exception of *Schleswig-Holstein*. February was rich in sunshine and clear sky conditions, accentuating high temperature differentials between day and night. Rainfall amounts were moderate. For the period under review, most of Germany saw a precipitation surplus and soils are expected to be refilled after the prolonged drought, although some northern areas still have drier-than-usual soils at the start of spring.

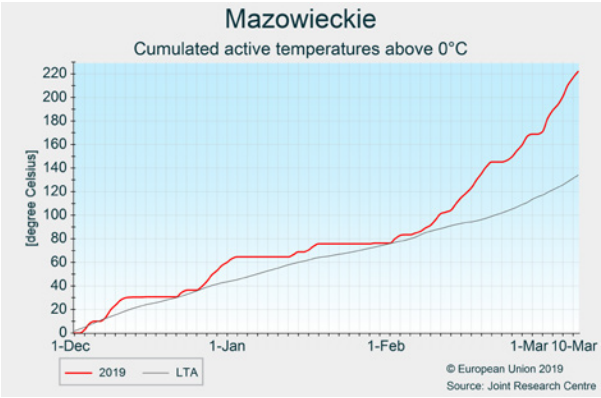


Poland

Generally good condition of winter crops after a mild winter

The winter was warmer-than-usual, with temperature anomalies of 4 °C in February and early March. January was only slightly warmer-than-usual and no pertinent cold waves occurred. Precipitation was significantly above the LTA, which resulted in full restoration of soil moisture levels.

Winter cereals are generally in good condition after the relatively warm winter. Despite dry conditions during sowing and emergence (in some western regions), the state of crops before winter dormancy was generally good due to favourable meteorological conditions in late autumn. The warm weather during the period of analysis resulted in advanced crop development but may cause increased pressure from pests and diseases. Spring fieldwork is ongoing and most sowing of spring crops is about to begin in the second half of March.



([3]) *Source:* Agreste, Ministère de l'agriculture, http://agreste.agriculture.gouv.fr/IMG/pdf/2019_017inforapgdesculturesv2.pdf

Ireland and United Kingdom

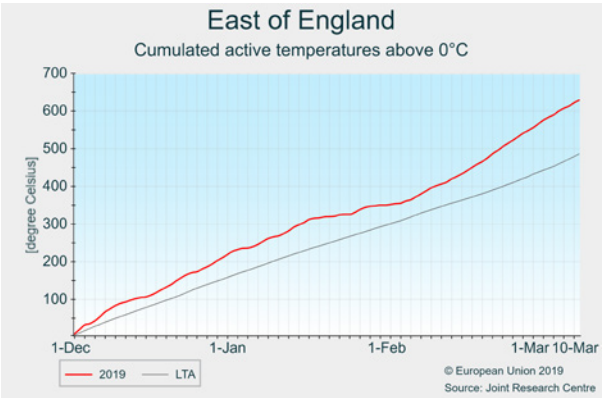
Mild conditions advance winter crop development

Overall thermal conditions during winter have been warmer than usual in Ireland and the United Kingdom, with the highest deviations from the LTA recorded in February in the West Midlands (7 °C above the LTA).

Overall precipitation levels were below-average in the northern, eastern and south-eastern United Kingdom; close to average in the western and south-western United Kingdom; and above average in Ireland.

The mild winter increased pest and disease pressure on winter crops, but weather conditions allowed farmers to apply plant health measures and fertiliser, and also permitted an early start to spring drilling in January (6 weeks to 7 weeks earlier than last year). Winter crops are showing advanced development.

The overall outlook for winter crops is positive.

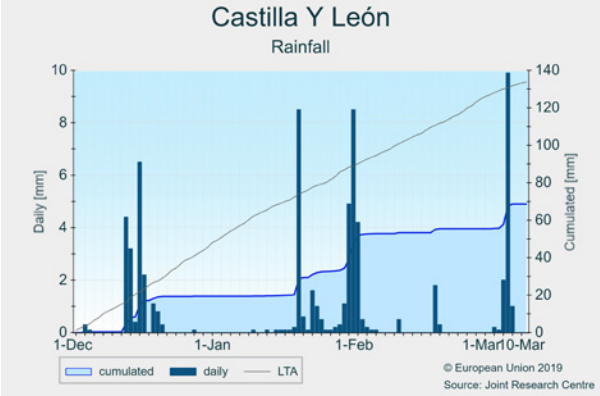


Spain and Portugal

Rainfall deficit

There is a widespread rainfall deficit, apart from in areas along the Spanish north coast, of between 50 % and 100 % compared to the LTA. According to the source www.embalses.net, Spain's water reserves currently amount to about 58 % of its reservoir capacity, which is 10 percentage points lower than the 10-year average. The climatic water balance deficit, compared to the LTA, is lowest in the central Spanish regions, in Andalucía and Catalunya, while in Portugal, the centre and south exhibit the strongest deficit.

Since 1 December, the Iberian peninsula has recorded slightly warmer-than-usual (by up to 2 °C) temperatures, which has triggered slightly accelerated crop development in both countries, except in the region of Catalunya. In terms of remote sensing, the above-average fAPAR levels after the earlier autumn rainfall dropped in most regions to close to the LTA; only for Aragón and Navarra is the fAPAR level registered higher-than-usual, indicating higher-than-usual biomass accumulation.



Italy

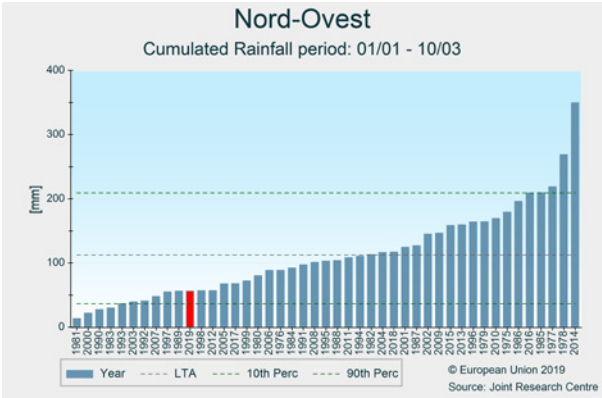
Dry winter poses a concern

In the whole peninsula, mild (1-2 °C above the LTA) and relatively dry weather conditions prevailed during the analysis period.

A distinct rain deficit (100-150 mm compared to the LTA) occurred in north-western regions, *Sicilia* and *Sardegna*. In these regions, relatively dry conditions have prevailed since autumn; while in the whole Po valley, *Toscana*, *Lazio* and southern agricultural regions, a marked rainfall deficit has developed since February.

In northern regions, the winter weather conditions did not pose an immediate threat to crop growth, but exposed crops to fragile conditions in the event of persistent rain deficit. Concerns are even rising about irrigation/water availability during summer.

In southern regions, the wheat season is progressing without major concern. The dry winter compensated for the overly wet start to the season; but further precipitation is now needed to sustain crop growth.



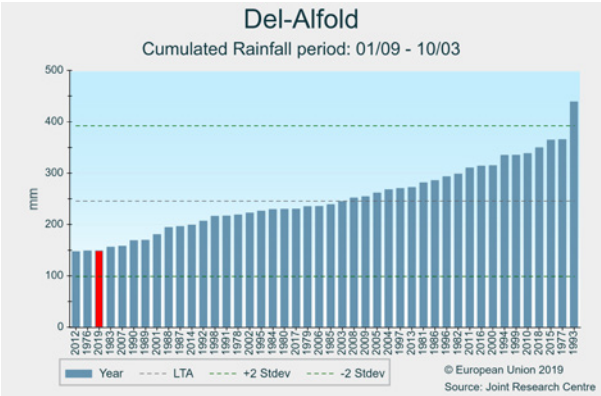
Hungary

Winter crops in suboptimal condition due to dry autumn and winter

December and January were characterised by alternating short colder- and warmer-than-usual periods. Since the last days of January, much warmer temperatures have prevailed, exceeding the LTA by 2 °C to 4 °C. Late February and early March were particularly mild, with daily maxima of nearly 20 °C on the warmest days. Mild late-winter temperatures could increase pest pressure this spring.

After the extremely dry autumn, precipitation increased in late November. Rainfall totals remained 20-80 mm below the LTA for the review period (1 December-10 March) as a whole. The below-optimal soil moisture conditions led to uneven (or even gappy) crop stands and below-average biomass accumulation; the winter crop status is therefore generally weaker than usual, especially in the southern and eastern part of Hungary. Our yield forecasts for winter crops are below the 5-year average.

The warm weather will allow an early start to the spring sowing campaign (sugar beet, spring barley), but the current dry topsoil conditions are also problematic for sowing and germination.

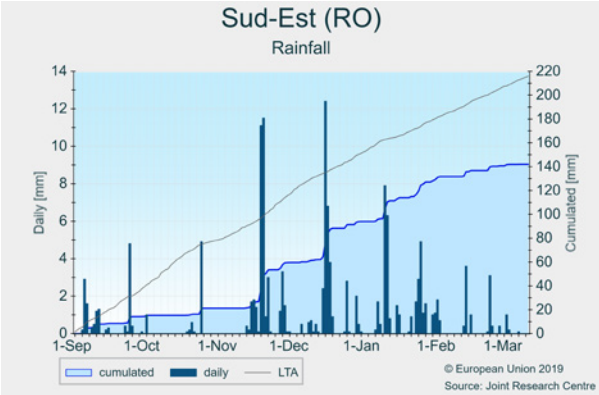


Romania

Winter crops not in best shape

In December and the first two dekads of January, temperatures fluctuated around or slightly below the average. Minimum temperature reached – 12 °C to – 18 °C on the coldest days, with moderate negative effects on winter crops. In the last dekad of January, temperatures started to rise, and February and early March turned out to be very mild, presenting a 3-5 °C positive thermal anomaly. The dormancy period for winter crops ended earlier than usual due to these extraordinary conditions.

Precipitation totals since 1 December have remained moderately (10-50 mm) below-average in the south-eastern areas and along the Hungarian border, while elsewhere *(Vest, Centru* and *Nord-Est)* they mostly reached or exceeded the average. Despite the near-normal rainfall supply this winter, the winter crops are in bad shape due to the difficult sowing campaign. In autumn, the dry soil conditions led to delayed sowing and slow emergence, resulting in underdeveloped and weak crop stands. The intended sowing area was not achieved and the area could decrease even further due to unsatisfying crop stands after wintering (e.g. for rapeseed).

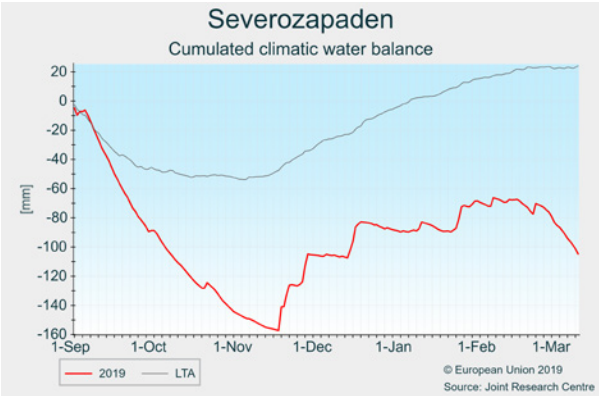


Bulgaria

Underdeveloped winter crops

Last autumn's drought hampered adequate preparation of the seedbed, as well as the timely sowing and emergence of winter crops. There is a decrease in the area sown. Winter cereals and rapeseed entered winter at a below-optimal stage of growth and development. In addition, precipitation totals for the review period (1 December-10 March) were 35-50 % lower than the LTA in the most important northern and eastern regions. Remote sensing images confirm the bad wintering and poor state of winter crops in early March. Colder-than-usual weather conditions characterised December and the first half of January, resulting in a 0.5-2 °C negative thermal anomaly. In mid-January, perceptible warming started and daily temperatures mostly fluctuated 2-4 °C above the average until 10 March.

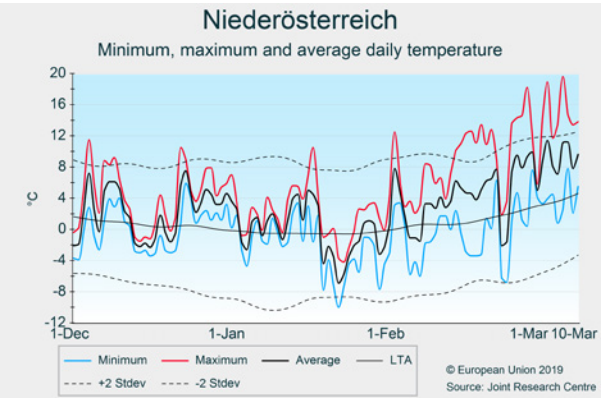
A reduction in the area of winter crops to be harvested is likely (particularly in the case of the most sensitive winter rapeseed), due to bad wintering. These areas could be replanted with summer crops; therefore, the sowing area of maize and sunflower could increase this year.



Czechia, Austria and Slovakia

Mild winter with contrasting precipitation

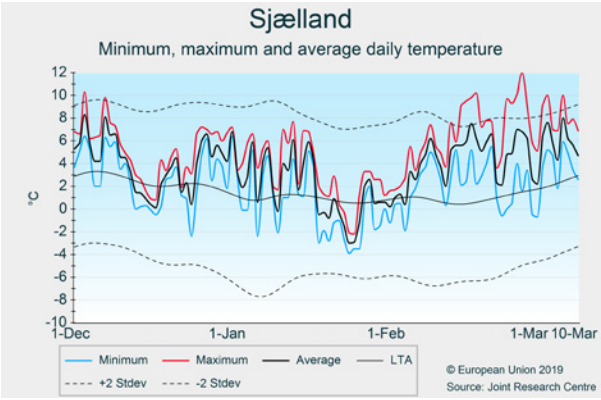
December and February presented a strong warm anomaly (which has also prevailed during the first dekad of March), with average temperatures up to 4 °C (locally 6 °C) above the LTA. Precipitation was abundant (more than double the LTA; locally > 500 mm) in eastern Austria, partly due to several heavy snow episodes in January. Above-average precipitation also characterised south-western and central parts of Czechia, and the western half of Slovakia. In contrast, precipitation in south-eastern Austria and eastern Slovakia was less than half the LTA, with winter cumulates barely exceeding 40 mm.
Spring re-growth of winter crops has been accelerated because of the absence of frost damage and the recent substantial warm weather anomaly. Due to recent lack of rainfall, and warm temperatures, a soil moisture deficit in north-western Czechia, eastern Slovakia and south-eastern Austria is presenting an increasingly important limitation factor for winter crops. Pest pressure, currently mostly affecting winter rapeseed, is another concern owing to the warm winter.



Denmark and Sweden

Favourable thermal conditions for winter crops

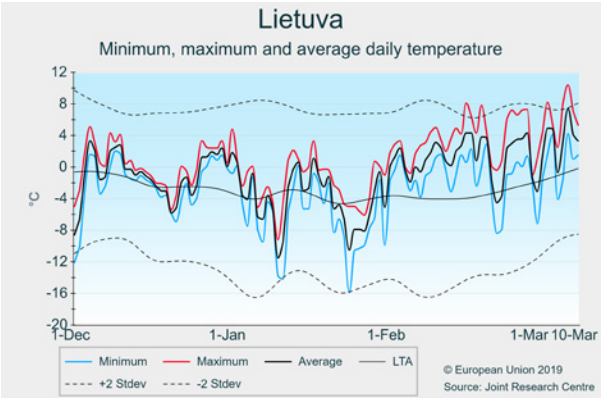
This winter, temperatures remained largely above the average, except during the second half of December and second half of January. Exceptionally warm thermal conditions have been observed from 5 February to 10 March, with temperatures 4 °C above the average. In Sweden, the snow cover melted in the south and only some light snowfall is expected in the coming days. The mild temperatures observed in February and the early start to spring are generally favourable for the yield of winter cereals. Since December, precipitation is above the LTA; soil moisture is nevertheless lower than in an average year, following last year's exceptional drought. Thanks to the mild winter, crops are in good condition, but it will still take some time before re-growth so we can evaluate the potential impact of the lower soil moisture level.



Estonia, Latvia, Lithuania and Finland

Mild winter with significant cold spells in January

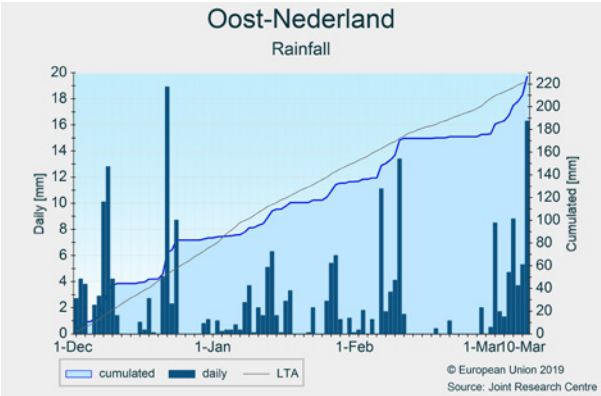
Winter conditions were warmer-than-usual, with the exception of significant cold spells that hit the countries during the last dekad of December and the first and last dekads of January. In particular, temperatures dropped well below the LTA in mid-January, reaching a minimum of – 16 °C in Lithuania and – 24 °C in Finland. In general, precipitation was regular and close to the LTA in Estonia, Latvia and Finland, and slightly above-average in Lithuania. Snow cover in most parts helped to protect crops, which are in good condition. Regrowth after winter dormancy has not yet started in Estonia and Finland. Meanwhile, remote sensing information shows above-average absorption of photosynthetic active radiation in Latvia and Lithuania since the end of February, indicating that the mild temperatures permitted an early start to regrowth of winter crops this year in the southern part of the Baltic countries.



Belgium, Luxembourg and the Netherlands

Positive start to the season

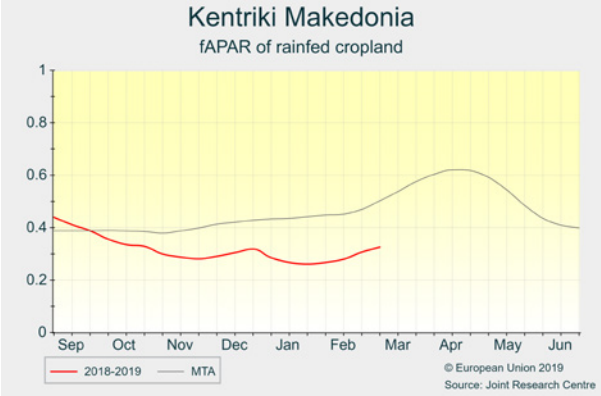
Winter was characterised by a predominance of warmer-than-usual temperatures and precipitation around the LTA. February was particularly warm and sunny.
These conditions benefited the growth and development of winter crops and allowed spring barley sowing and other spring field activities. Some farmers already started the sowing of sugar beet and early potatoes in February. Frequent rain during the first 10 days of March hampered further progress, but activities are expected to resume at full speed in the second half of the month, well within the first half of the commonly recommended window. The downside of the mild winter is the expectation of high pest pressure. It is also noted that, although rainfall has been more than sufficient to replenish soil moisture levels, groundwater levels on higher terrain have not yet returned to usual early spring levels, as a consequence of the 2018 drought.



Greece and Cyprus

Weak crop stands in large part of Greece; positive outlook in Cyprus

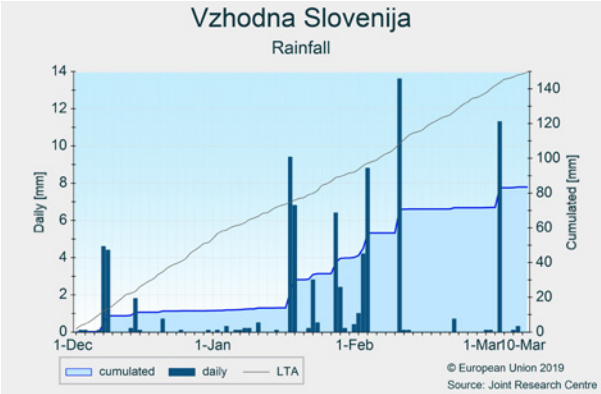
Winter temperatures (since 1 December 2018) for Greece show a north to south gradient, with slightly (up to 2 °C) warmer-than-average temperatures in the north, and up to 2 °C cooler-than-average temperatures in the south. In Cyprus, above-average temperatures prevailed.
After the dry autumn, December to early February saw abundant precipitation, locally causing damage or accompanied by frost. Since then, rain has been scarce everywhere except in Cyprus and Crete, which experienced abundant rain. Remote-sensing-based (fAPAR) observations on rain-fed arable land clearly indicate lower than usual biomass formation in large parts of northern Greece (e.g. *Kentriki Makedonia* and *Dytiki Makedonia*), rooted in earlier very dry autumn conditions. In these areas, winter crops have either not been sown/emerged or are in a weak state. The affected areas are of high significance for national crop production and are expected to impact Greece's final production. In Cyprus, the outlook for winter cereals is above average.



Croatia and Slovenia

Exceptionally warm end to winter, regionally strong rainfall deficits

With less than 100 mm of recorded precipitation, this winter has been substantially drier than usual in eastern Slovenia and northern Croatia. December and January have mainly seen seasonal temperatures, with the exception of central and northern Slovenia where a warm temperature anomaly prevailed. February and the beginning of March were characterised by an exceptionally warm weather anomaly, with average temperatures ranging between 2 °C and 6 °C above the LTA. Temperatures in February and the beginning of March were among the warmest on our records since 1975.
There was no tangible frost kill. However, the risk remains in the event of early spring frosts, due to advanced growth stages of winter crops, which are mainly a consequence of the recent exceptionally warm weather anomaly. The lack of rainfall has depleted soil moisture levels in eastern Slovenia and northern Croatia, which already represents a limiting factor for winter crops after spring re-growth.

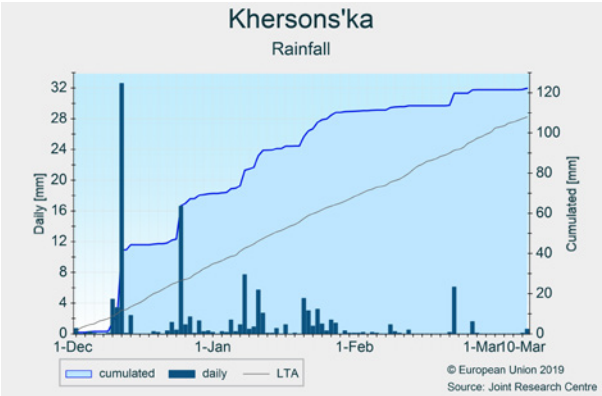


2.2. Black Sea area

Ukraine

Winter cereals benefit from mild winter and early start to spring

The snow cover melted at the end of February in the southern oblasts and at the beginning of March in the north; 1 month earlier than in an average season, because of the mild temperatures observed in February and the exceptionally mild temperatures so far during March. Conditions in December and January were also favourable to winter crops, as temperatures stayed close to the LTA and no exceptional cold spell was observed. Therefore, survival rate and plant density are expected to be high, similar to last year. An early start to spring is generally associated with a higher yield of winter cereals. Spring barley sowing should start early this year, which is also conducive to higher yield. Cumulative rainfall since December is close to the LTA. Soil moisture conditions are adequate; however, the southern oblasts have not received any substantial rainfall since the beginning of February. This could become a concern, if no substantial rain is observed in the coming weeks (soils in the southern oblast have a lower available water capacity). The yield forecast for soft wheat is maintained on the trend despite the positive impact of the mild temperatures in February, which could be counterbalanced by an eventual impact from the dry conditions in the south.



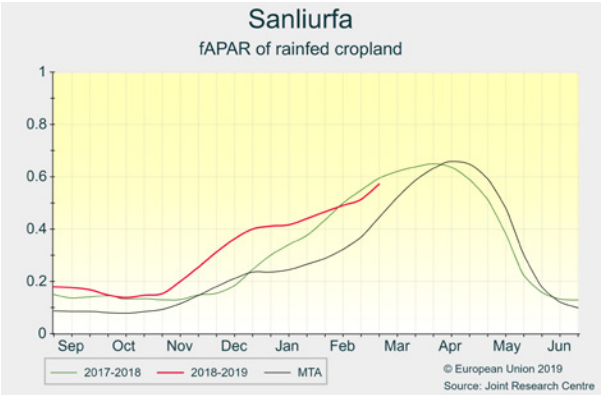
Turkey

Warm and wet: favourable winter conditions

Throughout the country, wet conditions were observed from autumn until the end of February. In western and south-eastern regions, precipitation anomalies since December reached more than 200 mm compared to the LTA, whereas in the central regions, the surplus generally remained within 100 mm.

Throughout the country, milder-than-usual temperatures prevailed throughout the winter, and most distinctly in February. In the western regions, the temperature anomaly was less marked.

In central Anatolian regions, winter crops benefited from the winter weather and growth restarted early compared to an average season, although quite late compared to last year. In the warmer south-eastern regions (e.g. *Sanliurfa*), wheat development is already approaching flowering, around 20 days ahead of an average season.



2.3. European Russia and Belarus

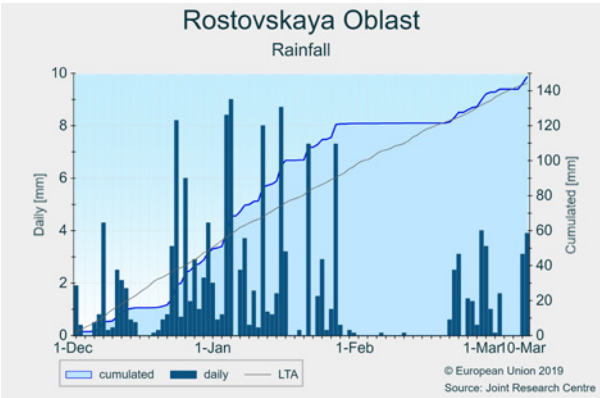
European Russia

Some concerns about crop conditions after wintering

Above-average temperatures dominated during the review period (1 December-10 March), resulting in 1-4 °C positive thermal anomaly. The second half of February and early March were exceptionally mild, leading in the southern regions to melting of the snow cover, early re-greening of winter cereals and an early start to the spring sowing campaign. Winter crops had adequate wintering, thanks to the above-average temperature and lack of long-lasting or extreme cold periods. Even the crops that were sown late, due to the autumn drought, have mostly started to germinate. In late autumn and early winter, moderate frost-kill events occurred primarily in Volga and central okrugs, but the wheat-producing southern regions were only slightly affected.

Precipitation during this winter was around the LTA, although February was relatively dry in the southern regions.

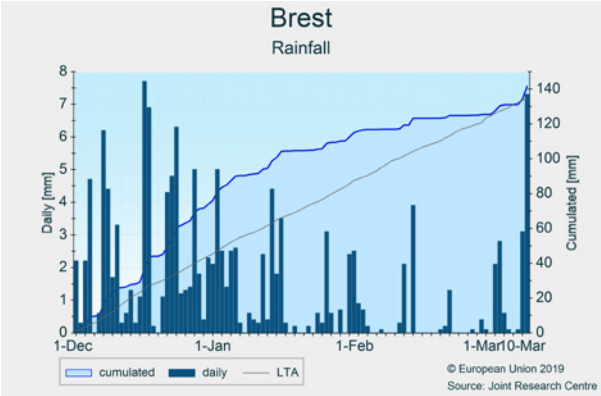
In the central, eastern and northern regions of Russia, winter wheat crops are still covered by a thick (20-70 cm) snow layer. This snow blanket was adequate to protect the crops from the harsh frost, and it is storing considerable water, which will replenish soil moisture levels once melted. Melting of the snow cover in March would be beneficial to avoid crop exhaustion from long wintering, which would cause a thinning of the crop stands. As a consequence, yield expectations (currently average) have a high margin of uncertainty.



Belarus

No serious concerns for winter cereals so far

Temperatures in February and early March were above the LTA. Brief cold spells in January, with minimum temperatures below – 15 °C, occurred without much impact on the fully hardened winter cereals. Precipitation was generally above the LTA, resulting in high soil moisture content at the beginning of March. Spring fieldwork, including the sowing of spring cereals in the south of the country, started in March; earlier than usual. Currently, the yield outlook for winter crops is positive, and in line with the historical trend.



2.4. Maghreb

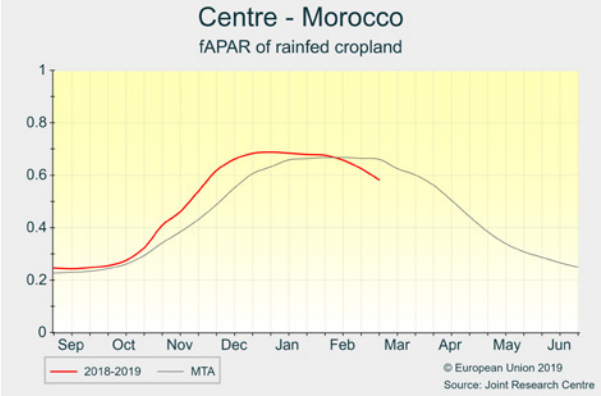
Morocco, Algeria and Tunisia

Positive outlook; advanced season in Morocco

In Morocco, scarce rain events have been observed since the beginning of December. However, so far this has not impacted on crop growth, thanks to the abundant and well-distributed rain in October and November. Remote sensing indicators suggest that crop cycles are advanced by almost 2 weeks, and that biomass accumulation is slightly above-average.

In Algeria, rainfall and thermal conditions have been in line with the LTA, in both coastal and inland provinces. Crops are currently (mid-March) close to the flowering phase. Consequently, our yield forecasts are above the 5-year average.

Similarly, in Tunisia, well distributed rainfall and temperatures above the LTA, almost throughout the analysis period, led to positive growing conditions in the northern wheat-producing regions of Bizerte, Bèja and Jendouba and the inland wheat-producing regions of Le Kef and Kairouan. Crops are approaching the heading phase. Our yield forecasts here are close to the 5-year average for wheat, and above the 5-year average for barley.



3. Crop yield forecasts

Country	TOTAL WHEAT (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
EU	5,70	5,42	**5,81**	+1,8	+7,1
AT	5,49	4,67	**5,36**	-2,4	+15
BE	8,56	8,72	**8,88**	+3,7	+1,8
BG	4,73	4,81	**4,61**	-2,4	-4,2
CY	-	-	**-**	-	-
CZ	6,09	5,39	**5,93**	-2,5	+10
DE	7,75	6,67	**7,79**	+0,5	+17
DK	7,60	6,36	**7,60**	+0,0	+19
EE	3,75	2,91	**3,69**	-1,6	+27
ES	3,12	3,90	**3,26**	+4,5	-16
FI	3,83	2,79	**3,87**	+0,8	+38
FR	6,90	6,84	**7,13**	+3,2	+4,1
GR	2,69	2,48	**2,58**	-3,9	+3,9
HR	5,23	5,38	**5,49**	+4,8	+2,0
HU	5,15	5,10	**4,90**	-4,9	-3,8
IE	9,86	8,8	**9,85**	-0,1	+12
IT	3,87	3,81	**4,06**	+4,9	+6,7
LT	4,54	3,67	**4,80**	+5,8	+31
LU	5,80	6,05	**6,10**	+5,1	+0,8
LV	4,20	3,43	**4,44**	+5,9	+30
MT	-	-	**-**	-	-
NL	8,88	8,82	**8,95**	+0,8	+1,5
PL	4,59	4,06	**4,72**	+2,9	+16
PT	2,13	2,32	**2,21**	+3,8	-4,8
RO	4,20	4,80	**4,54**	+8,2	-5,4
SE	6,42	4,34	**6,52**	+1,6	+50
SI	5,00	4,38	**4,71**	-5,8	+7,5
SK	5,25	4,77	**5,38**	+2,5	+13
UK	8,28	7,76	**8,20**	-1,0	+5,6

Country	SOFT WHEAT (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
EU	5,94	5,63	**6,04**	+1,7	+7,4
AT	5,55	4,71	**5,43**	-2,3	+15
BE	8,56	8,72	**8,88**	+3,7	+1,8
BG	4,73	4,82	**4,62**	-2,3	-4,1
CY	-	-	**-**	-	-
CZ	6,09	5,39	**5,93**	-2,5	+10
DE	7,77	6,69	**7,81**	+0,5	+17
DK	7,60	6,36	**7,60**	+0,0	+19
EE	3,75	2,91	**3,69**	-1,6	+27
ES	3,22	3,98	**3,37**	+4,7	-15
FI	3,83	2,79	**3,87**	+0,8	+38
FR	7,02	6,98	**7,25**	+3,2	+3,9
GR	2,80	2,51	**2,77**	-1,3	+10
HR	5,23	5,38	**5,49**	+4,8	+2,0
HU	5,16	5,11	**4,91**	-4,9	-4,0
IE	9,86	8,77	**9,85**	-0,1	+12
IT	5,16	5,13	**5,41**	+4,9	+5,5
LT	4,54	3,67	**4,80**	+5,8	+31
LU	5,80	6,05	**6,10**	+5,1	+0,8
LV	4,20	3,43	**4,44**	+5,9	+30
MT	-	-	**-**	-	-
NL	8,88	8,82	**8,95**	+0,8	+1,5
PL	4,59	4,06	**4,72**	+2,9	+16
PT	2,13	2,32	**2,21**	+3,8	-4,8
RO	4,20	4,80	**4,54**	+8,2	-5,4
SE	6,42	4,34	**6,52**	+1,6	+50
SI	5,00	4,38	**4,71**	-5,8	+7,5
SK	5,30	4,77	**5,50**	+3,8	+15
UK	8,28	7,76	**8,20**	-1,0	+5,6

Country	DURUM WHEAT (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
EU	3,46	3,54	**3,51**	+1,5	-0,8
AT	4,57	4,17	**4,50**	-1,6	+7,7
BE	-	-	**-**	-	-
BG	3,88	4,01	**3,89**	+0,3	-3,0
CY	-	-	**-**	-	-
CZ	-	-	**-**	-	-
DE	5,25	4,57	**5,24**	-0,1	+15
DK	-	-	**-**	-	-
EE	-	-	**-**	-	-
ES	2,69	3,54	**2,75**	+2,1	-22
FI	-	-	**-**	-	-
FR	5,13	5,05	**5,21**	+1,4	+3,2
GR	2,64	2,47	**2,50**	-5,1	+1,1
HR	-	-	**-**	-	-
HU	4,80	4,70	**4,74**	-1,3	+0,7
IE	-	-	**-**	-	-
IT	3,34	3,24	**3,45**	+3,4	+6,4
LT	-	-	**-**	-	-
LU	-	-	**-**	-	-
LV	-	-	**-**	-	-
MT	-	-	**-**	-	-
NL	-	-	**-**	-	-
PL	-	-	**-**	-	-
PT	-	-	**-**	-	-
RO	-	-	**-**	-	-
SE	-	-	**-**	-	-
SI	-	-	**-**	-	-
SK	4,63	4,82	**4,30**	-7,2	-11
UK	-	-	**-**	-	-

Country	WINTER BARLEY (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
EU	5,78	5,49	**6,02**	+4,1	+9,6
AT	6,31	5,77	**6,38**	+1,1	+11
BE	8,30	8,30	**8,97**	+8,1	+8,0
BG	4,22	4,25	**4,22**	+0,0	-0,8
CY	1,41	1,81	**1,64**	+17	-9,3
CZ	5,63	4,98	**5,42**	-3,8	+8,9
DE	7,18	6,06	**7,37**	+2,6	+22
DK	6,44	5,48	**6,20**	-3,6	+13
EE	-	-	**-**	-	-
ES	2,30	2,94	**2,47**	+7,4	-16
FI	-	-	**-**	-	-
FR	6,49	6,31	**6,73**	+3,6	+6,5
GR	2,61	2,64	**2,54**	-2,6	-4,0
HR	4,52	4,53	**4,75**	+5,1	+4,8
HU	5,09	4,92	**4,92**	-3,3	+0,1
IE	9,22	8,80	**9,36**	+1,6	+6,4
IT	3,92	4,05	**4,08**	+4,1	+0,7
LT	3,97	3,43	**4,33**	+9,1	+26
LU	-	-	**-**	-	-
LV	-	-	**-**	-	-
MT	-	-	**-**	-	-
NL	-	-	**-**	-	-
PL	4,32	3,78	**4,38**	+1,3	+16
PT	2,22	2,48	**2,23**	+0,7	-10
RO	4,22	5,12	**4,82**	+14	-5,8
SE	5,75	3,74	**5,74**	-0,2	+54
SI	4,64	4,20	**4,78**	+2,9	+14
SK	5,17	4,48	**5,64**	+9,1	+26
UK	7,03	6,79	**6,98**	-0,7	+2,9

Country	RYE (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
EU	3,79	3,24	**3,93**	+3,6	+21
AT	4,48	4,36	**4,60**	+2,6	+5,6
BE	-	-	**-**	-	-
BG	-	-	**-**	-	-
CY	-	-	**-**	-	-
CZ	4,93	4,74	**4,96**	+0,5	+4,6
DE	5,31	4,30	**5,27**	-0,8	+23
DK	5,98	5,50	**5,98**	+0,0	+8,6
EE	3,30	2,72	**3,40**	+3,1	+25
ES	2,05	2,85	**2,18**	+6,4	-24
FI	3,35	2,48	**3,35**	+0,0	+35
FR	4,55	4,58	**4,81**	+5,5	+4,8
GR	1,70	1,77	**1,84**	+7,8	+3,7
HR	-	-	**-**	-	-
HU	3,02	3,26	**3,11**	+2,9	-4,8
IE	-	-	**-**	-	-
IT	-	-	**-**	-	-
LT	2,41	2,07	**2,39**	-1,0	+16
LU	-	-	**-**	-	-
LV	3,79	3,76	**3,82**	+0,7	+1,5
MT	-	-	**-**	-	-
NL	-	-	**-**	-	-
PL	2,88	2,41	**2,88**	+0,2	+20
PT	0,89	0,93	**0,91**	+2,2	-2,1
RO	-	-	**-**	-	-
SE	6,07	4,53	**6,19**	+1,9	+37
SI	-	-	**-**	-	-
SK	3,57	3,39	**3,56**	-0,1	+5,0
UK	2,59	3,05	**3,44**	+33	+13

Country	TRITICALE (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
EU	4,13	3,76	**4,20**	+1,8	+12
AT	5,43	4,91	**5,42**	-0,2	+10
BE	-	-	**-**	-	-
BG	3,03	2,66	**3,06**	+1,0	+15
CY	-	-	**-**	-	-
CZ	4,82	4,55	**4,59**	-4,9	+0,9
DE	6,23	5,41	**6,16**	-1,1	+14
DK	-	-	**-**	-	-
EE	-	-	**-**	-	-
ES	2,35	3,08	**2,46**	+5,0	-20
FI	-	-	**-**	-	-
FR	5,00	4,87	**5,25**	+4,9	+7,7
GR	2,13	2,11	**2,08**	-2,4	-1,8
HR	3,86	3,66	**3,74**	-3,3	+2,0
HU	3,96	3,76	**4,02**	+1,4	+7,0
IE	-	-	**-**	-	-
IT	-	-	**-**	-	-
LT	3,35	2,69	**3,16**	-5,8	+18
LU	-	-	**-**	-	-
LV	-	-	**-**	-	-
MT	-	-	**-**	-	-
NL	-	-	**-**	-	-
PL	3,65	3,17	**3,68**	+0,9	+16
PT	1,68	1,80	**1,67**	-0,6	-7,2
RO	3,85	4,44	**3,89**	+1,2	-12
SE	5,46	3,38	**5,23**	-4,4	+55
SI	-	-	**-**	-	-
SK	-	-	**-**	-	-
UK	-	-	**-**	-	-

Country	RAPE AND TURNIP RAPE (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
EU	3,23	2,85	**3,19**	-1,4	+12
AT	3,27	2,98	**3,14**	-3,9	+5,4
BE	4,06	3,50	**4,13**	+1,6	+18
BG	2,74	2,49	**2,80**	+2,3	+12
CY	-	-	**-**	-	-
CZ	3,42	3,36	**3,34**	-2,3	-0,6
DE	3,64	2,99	**3,54**	-2,6	+18
DK	3,86	3,28	**3,94**	+2,0	+20
EE	2,04	1,64	**2,09**	+2,4	+28
ES	2,16	2,37	**2,24**	+3,6	-5,5
FI	1,50	1,32	**1,50**	+0,0	+14
FR	3,43	3,06	**3,34**	-2,4	+9,2
GR	-	-	**-**	-	-
HR	2,88	2,84	**3,03**	+5,2	+7,0
HU	3,09	2,88	**2,93**	-5,4	+1,6
IE	-	-	**-**	-	-
IT	2,49	2,45	**2,62**	+4,8	+6,8
LT	2,54	2,20	**2,58**	+1,4	+17
LU	-	-	**-**	-	-
LV	2,57	1,93	**2,76**	+7,4	+43
MT	-	-	**-**	-	-
NL	-	-	**-**	-	-
PL	2,90	2,58	**2,99**	+3,0	+16
PT	-	-	**-**	-	-
RO	2,60	2,32	**2,48**	-4,8	+6,9
SE	3,13	2,24	**3,26**	+4,1	+46
SI	-	-	**-**	-	-
SK	3,11	3,08	**3,45**	+11	+12
UK	3,60	3,41	**3,58**	-0,6	+4,8

Country	WHEAT (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
BY	3,71	3,71	**3,78**	+1,8	+1,9
DZ	1,54	NA	**1,73**	+12	NA
MA	1,80	NA	**1,65**	-8,4	NA
TN	1,93	NA	**1,94**	+0,8	NA
TR	2,69	2,74	**3,09**	+15	+13
UA	3,98	3,72	**4,03**	+1,2	+8,3

Country	BARLEY (t/ha)				
	Avg 5yrs	2018	MARS 2019 forecasts	%19/5yrs	%19/18
BY	3,35	3,40	**3,51**	+4,6	+3,1
DZ	1,26	NA	**1,36**	+8,1	NA
MA	1,21	NA	**1,31**	+8,2	NA
TN	1,10	NA	**1,23**	+12	NA
TR	2,62	2,67	**3,04**	+16	+14
UA	3,10	2,96	**3,04**	-2,0	+2,7

Note: Yields are forecast for crops with more than 10000 ha per country.

Sources: 2014-2018 data come from DG AGRICULTURE short term Outlook data (dated February 2019, received on 07/03/2019), EUROSTAT

Eurobase (last update: 05/03/2019) and EES (last update: 15/11/2017).

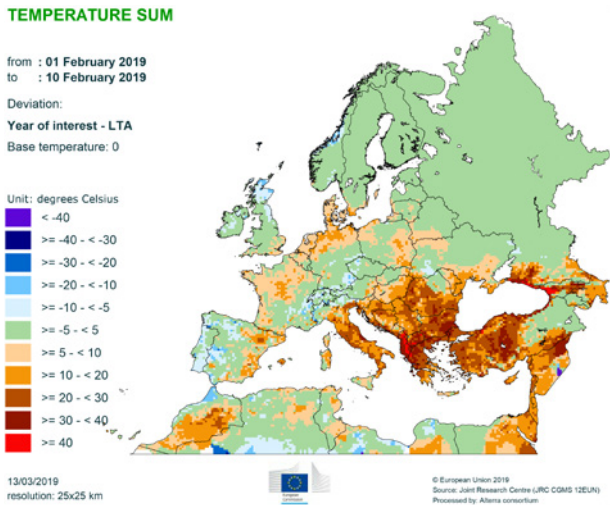
2014-2018 data come from USDA, DSASI-MADR Algeria, INRA Maroc,CNCT Tunisie,Turkish Statistical Institute (TurkStat),

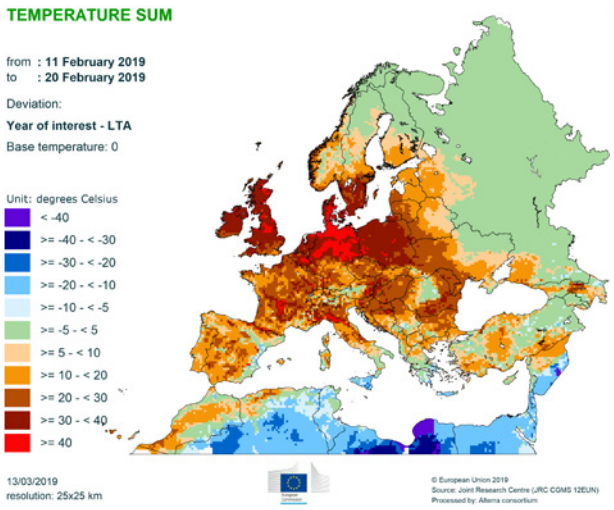
2019 yields come from MARS CROP YIELD FORECASTING SYSTEM (output up to 10/03/2019).

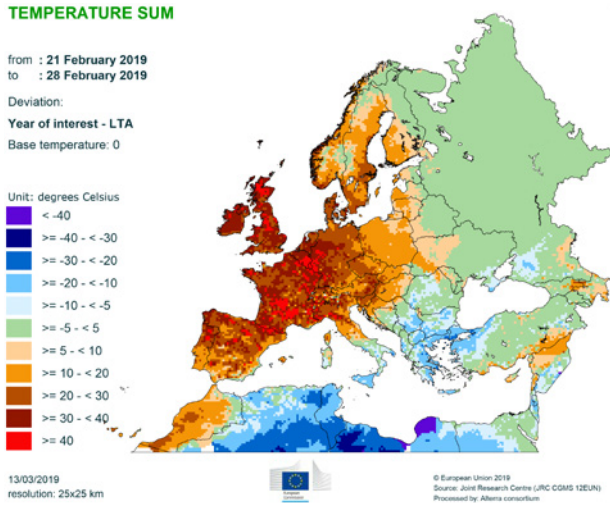
NA = Data not available.

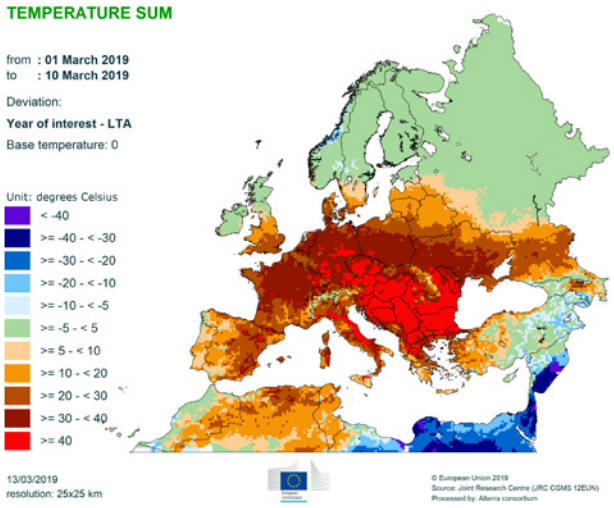
4. Atlas

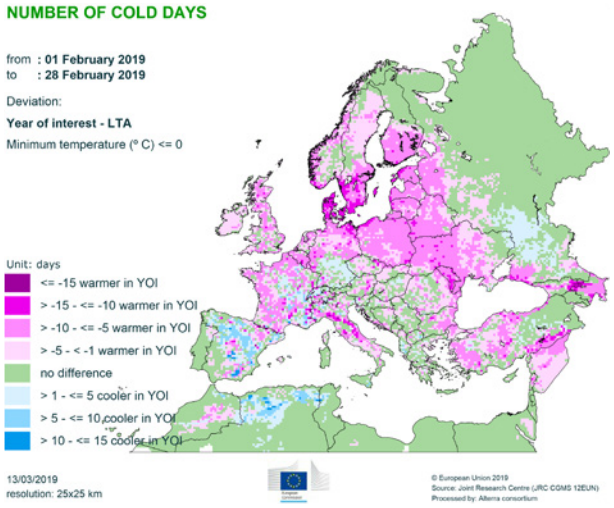
Temperature regime

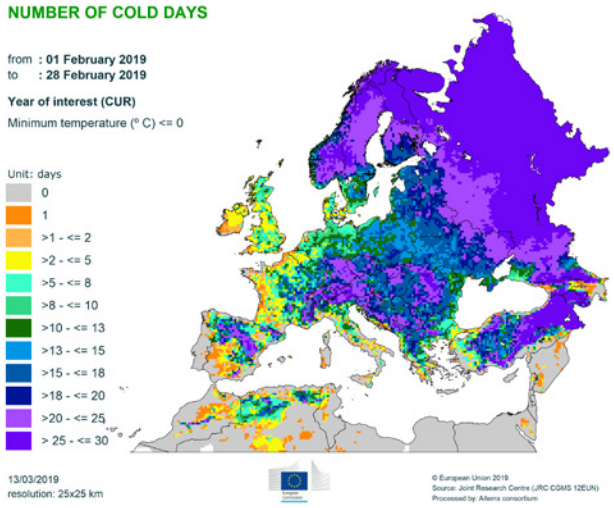


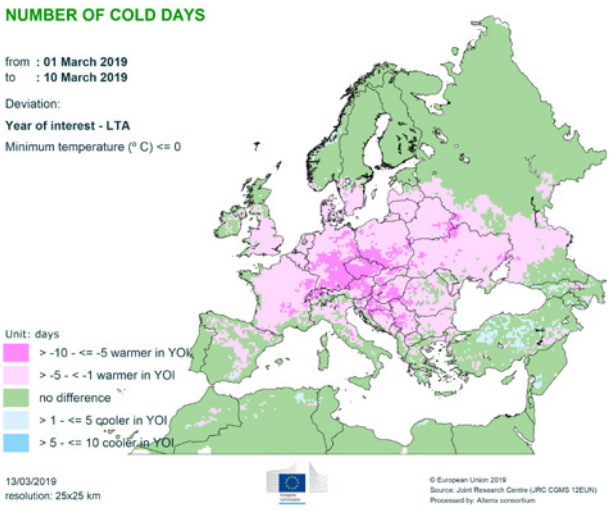


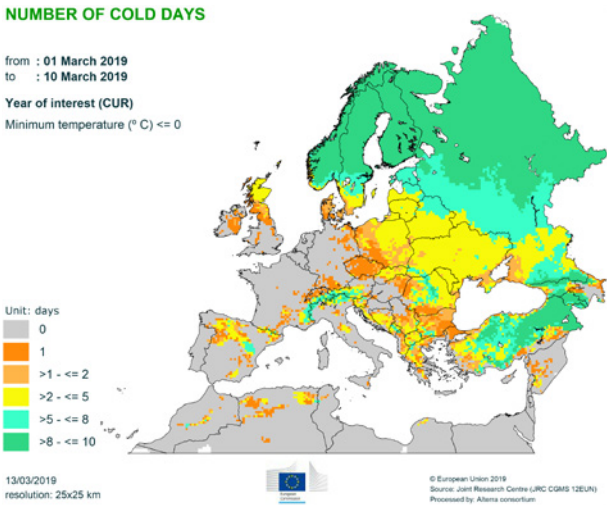




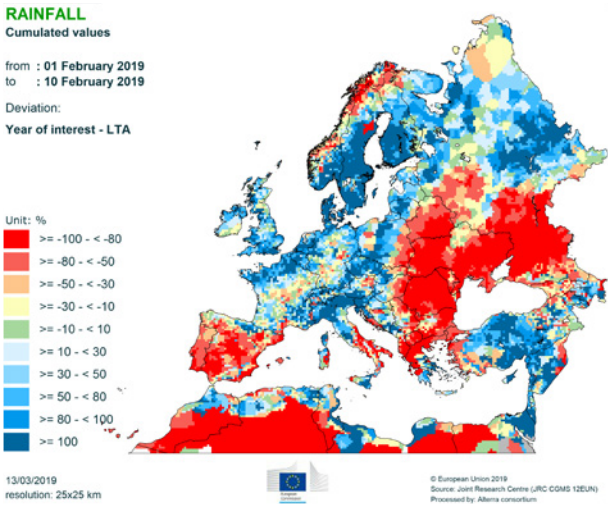


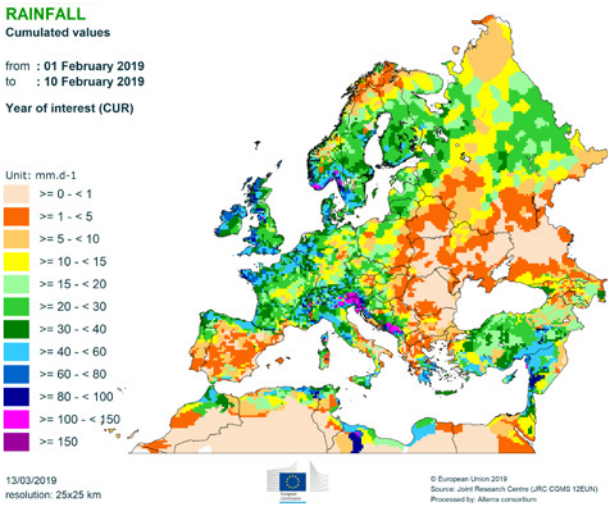


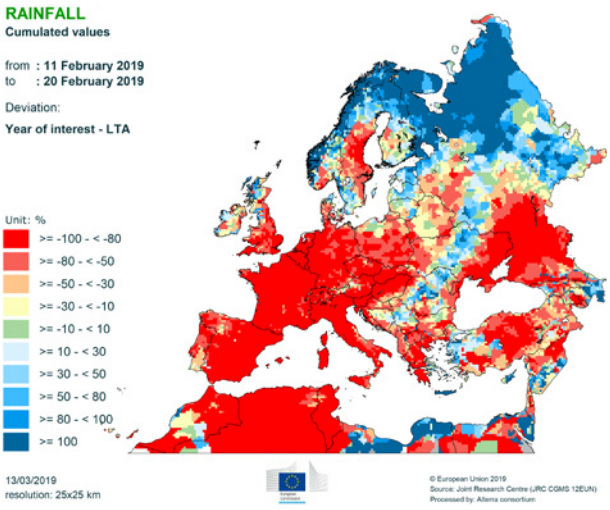


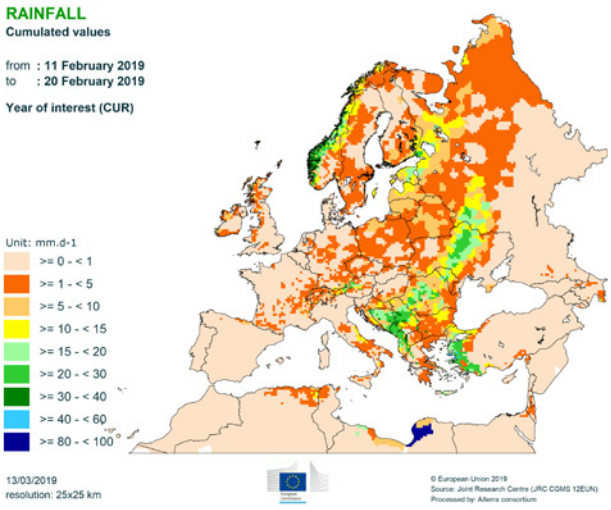


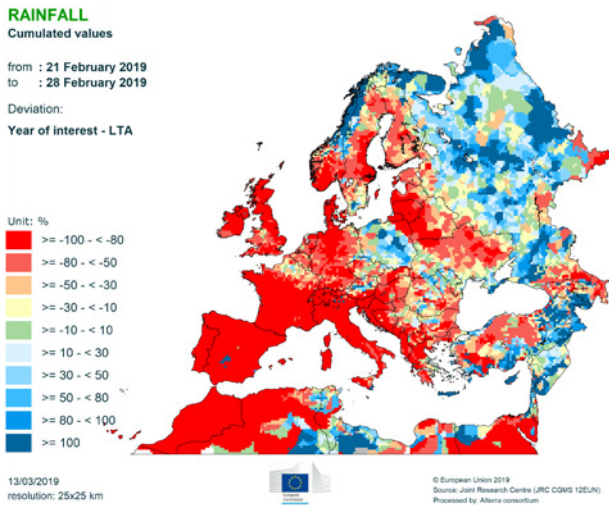
Precipitation

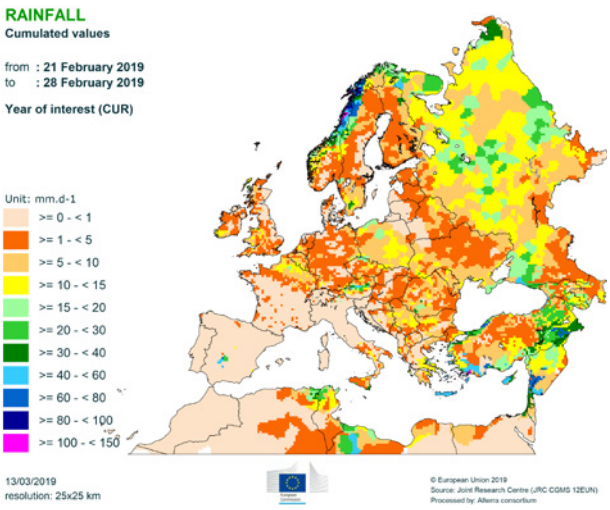


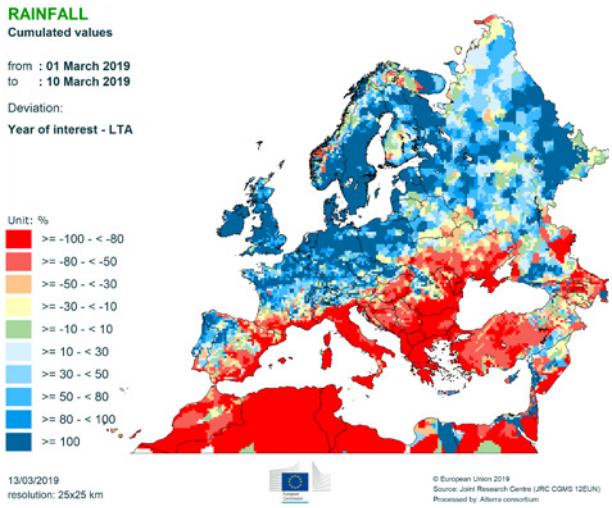


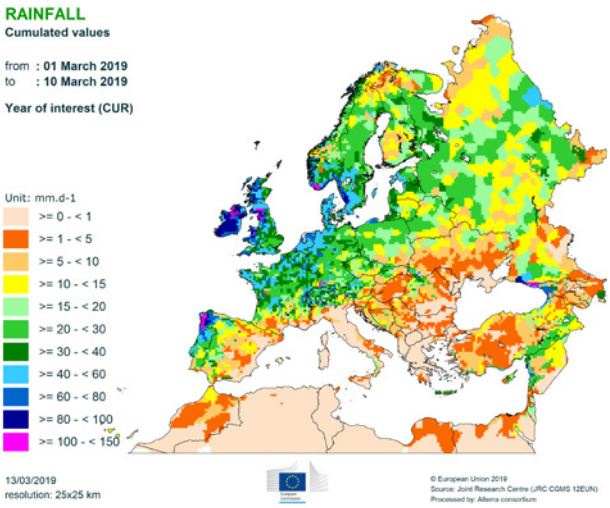





RAINFALL
Cumulated values
from : 21 February 2019
to : 28 February 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
13/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 21 February 2019
to : 28 February 2019
Year of interest (CUR)
Unit: mm.d-1
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
13/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 March 2019
to : 10 March 2019
Deviation:
Year of interest - LTA
Unit: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
13/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


RAINFALL
Cumulated values
from : 01 March 2019
to : 10 March 2019
Year of interest (CUR)
Unit: mm.d-1
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
13/03/2019
resolution: 25x25 km
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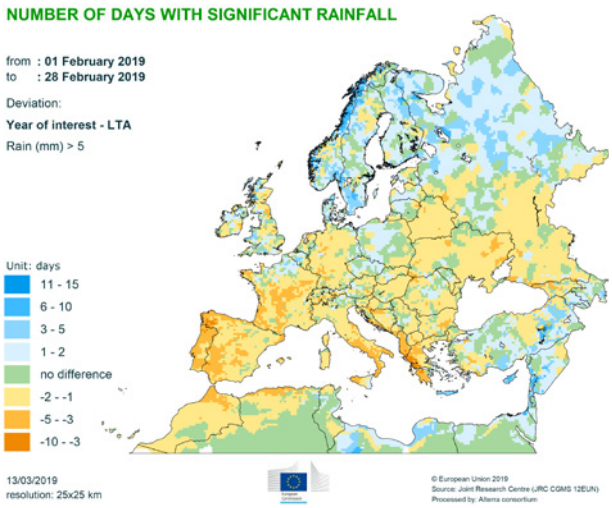
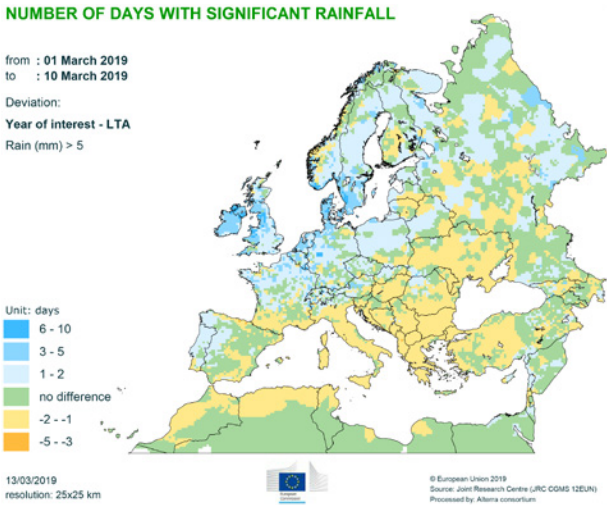

NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 February 2019
to : 28 February 2019
Deviation:
Year of interest - LTA
Rain (mm) > 5
Unit: days
11 - 15
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
-10 - -3
13/03/2019
resolution: 25x25 km
© European Union 2019
Source: Joint Research Centre (JRC CGMS 12EUN)
Processed by: Alterra consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 March 2019
to : 10 March 2019
Deviation:
Year of interest - LTA
Rain (mm) > 5
Unit: days
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
13/03/2019
resolution: 25x25 km
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JRC MARS Bulletins 2019

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

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*MARS stands for Monitoring Agricultural Resources

Technical note
The long-term average (LTA) used within this bulletin as a reference is based on an archive of data covering 1975–2017.

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