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JRC MARS Bulletin
Crop monitoring in Europe
February 2023

Fair winter conditions after the very warm start

Dry weather remains a concern in southern regions

Winter crops in most parts of Europe remain in fair to good condition. In most agricultural regions, thermal conditions since the beginning of the year were characterised by a transition from exceptionally warm to more normal winter conditions, yet without distinct cold spells.

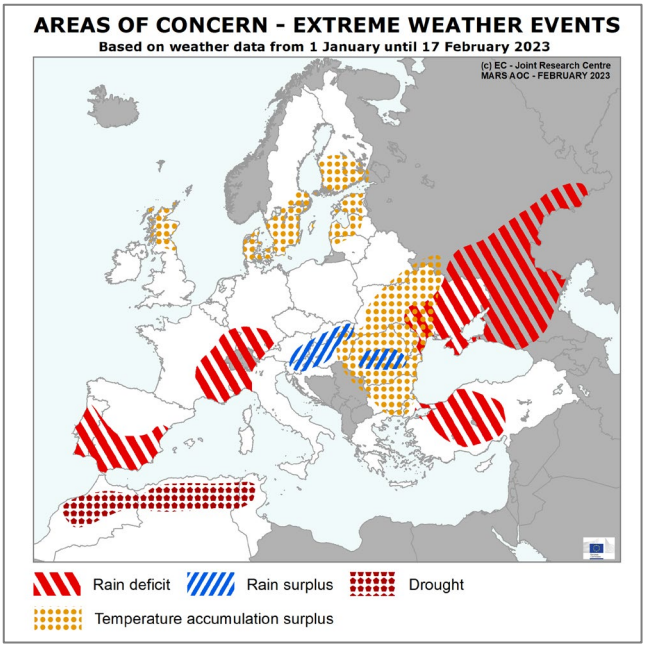
As a result, winter crops resumed the build-up of frost tolerance, and no frost kill damage is expected to have occurred in addition to the event reported in the January edition of the Bulletin. According to the current weather forecast (until 25 February), the risk of frost damage in the coming days remains very low, even in the regions in northern, southern-central, and eastern Europe, where the temperature surplus was more persistent.

Several regions experienced, or continued to experience a distinct rainfall deficit. This is of particular concern in southern and central Spain, northern Italy, western Türkiye and the Maghreb region. In Spain, Italy, and Türkiye, the main concern for crops regards the continued low level of water stored in reservoirs and in snow packs (particularly in northern Italy). This water will be needed for irrigation in spring and summer, as crop water demands increase. A detailed discussion of the drought situation in the Maghreb and the expected impacts on cereal yields, is provided in the JRC MARS Bulletin on North Africa.

A rainfall surplus is observed in parts of Slovakia, Hungary, and Croatia, as well as in central Romania, but drier-than-usual conditions are forecast for the coming days in these regions and crop impacts are not seen as a matter for concern at present.

Contents:

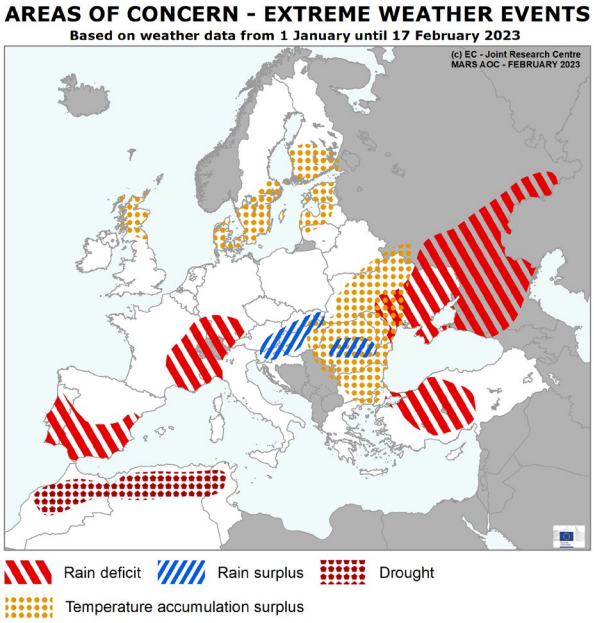
Covers the period from 1 January until 13 February 2023



Joint Research Centre

1. Agrometeorological overview

1.1 Areas of concern



The map above considers weather events relevant to agriculture from 1 January to 17 February, while it does not repeat events such as the rain surplus in the Baltic countries which was presented in the January issue of the Bulletin.

According to the current assessment, several regions are marked by distinct rainfall deficit. In southern Spain and Portugal, since 15 January a deficit of around 50 mm has been observed, meaning there has been less than 20% of the average rainfall for this period. The water levels in storage reservoirs remain worryingly low in central and southern Spain [1]. In Italy, a strong rainfall deficit is observed in north-western regions, where soil moisture conditions have not yet recovered from last year's drought; all northern regions are facing a snow deficit, comparable to last year[2], leading to increasing concerns related to the availability of water for irrigation during spring and summer. The rain deficit in south-western France and southern Germany is of lesser concern. A distinct rainfall deficit is also observed in the regions north and south of the Black Sea (eastern Ukraine, southern Russia, and Türkiye). Of particular concern are soil moisture levels in western Türkiye, where water reservoirs are depleted due to the dry and relatively warm winter. Concerns are particularly related to water availability during spring. Crop water demand is currently low and rainfall has been sufficient to support crop growth.

Drought conditions are still ongoing in the Maghreb and crops are suffering from the persistent drought. A detailed discussion of the situation there, and the expected impacts on cereal yields, is provided in the JRC MARS Bulletin on North Africa[3].

Above-average temperatures, reflected in a temperature accumulation surplus, persisted during most of the review period in Hungary, Romania, Bulgaria, and western Ukraine, which would have led to loss of frost tolerance in winter crops (de-hardening). However, frost tolerance in these regions was mostly regained in the colder-than-usual first half of February. Marked temperature surplus was also experienced in the Baltic Sea countries, Finland, Sweden, Denmark, and Scotland, but in most of these regions, temperatures were still sufficiently low to avoid de-hardening.

A rainfall surplus is observed in parts of Slovakia, Hungary, and Croatia, as well as in central Romania, but drier-than-usual conditions are forecast for the coming days in these regions and crop impacts are not seen as a matter for concern at present.

In central and northern France, the United Kingdom, and Ireland, a precipitation deficit occurred. However, this partially compensated for a rainfall surplus observed in the preceding period and is favourable for agricultural activities foreseen for this period. Hence, these regions are not marked on the map.

[1] https://www.embalses.net/
[2] https://drought.climateservices.it/bollettino-italia/bollettino-gennaio-2023/
[3] https://publications.jrc.ec.europa.eu/repository/handle/JRC132778

1.2 Meteorological review (1 January –13 February 2023)

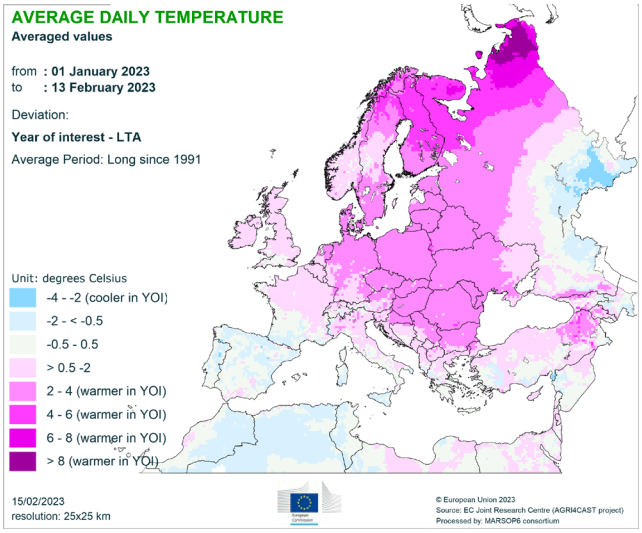
Weather in the review period has been characterised by a weakening La Niña event. Warmer-than-usual winter conditions occurred in large parts of Europe with fewer-than-usual cold days, while wetter-than-usual conditions developed in the Carpathian region.

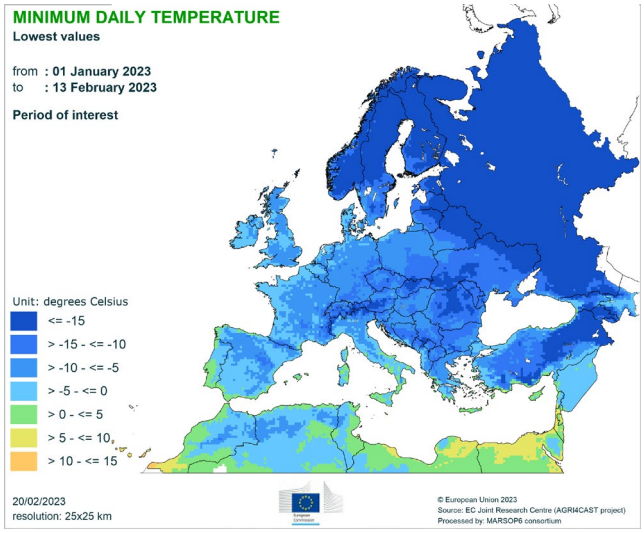
Warmer-than-usual conditions with daily mean temperatures between 2°C and 4°C above the 1991-2022 long-term average (LTA) were observed in most of the Netherlands, Germany, and central Europe, as well as in Romania and Bulgaria, most of eastern Europe, parts of Scandinavia, and eastern Türkiye. More distinct positive temperature anomalies (between 4-6°C and 6-8°C above the LTA) were observed in parts of northern Scandinavia and northern European Russia, with daily mean temperatures exceeding the LTA by more than 8°C in northernmost European Russia.

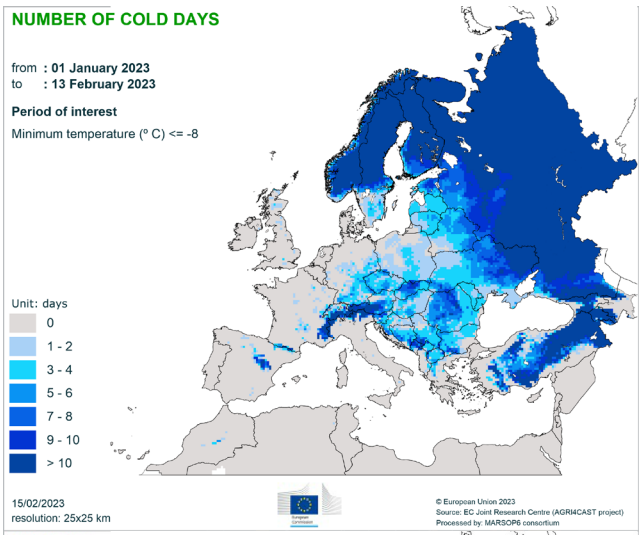
Slightly colder-than-usual conditions with temperature anomalies of 0.5°C to 2°C below the LTA were observed in parts of the Iberian Peninsula, southwestern France, southern Italy, and the islands of Sicily and Sardinia, parts of southwestern Türkiye, and eastern European Russia. In some parts of eastern European Russia daily mean temperatures down to 4°C below the LTA were observed.

Drier-than-usual conditions with precipitation anomalies of -50% or more negative (with respect to the LTA) were observed in parts of the Iberian Peninsula, southern France, north western Italy, and southernmost Germany, as well as in the southeasternmost part of Bulgaria, large parts of Türkiye, and most of Ukraine and central and southern European Russia. Rainfall observed in most of these regions was below 40 mm.

Wetter-than-usual conditions (50% or more with respect to the LTA) were observed in the western Carpathian region (central Romania, most of Slovakia, and westernmost Ukraine). Rainfall exceeding the LTA in these regions accumulated over up to 4 days, while in other areas, such as coastal Norway, north western Spain, and western Balkans, 4 and up to 8 days with rainfall above 15 mm were observed, accumulating over 100 mm rainfall



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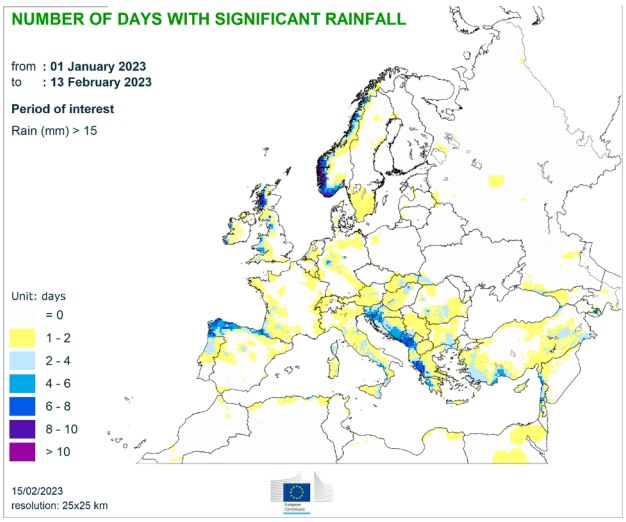
to : 13 February 2023
Period of interest
Minimum temperature (° C) <= -8
Unit: days
0
1 - 2
3 - 4
5 - 6
7 - 8
9 - 10
> 10
15/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
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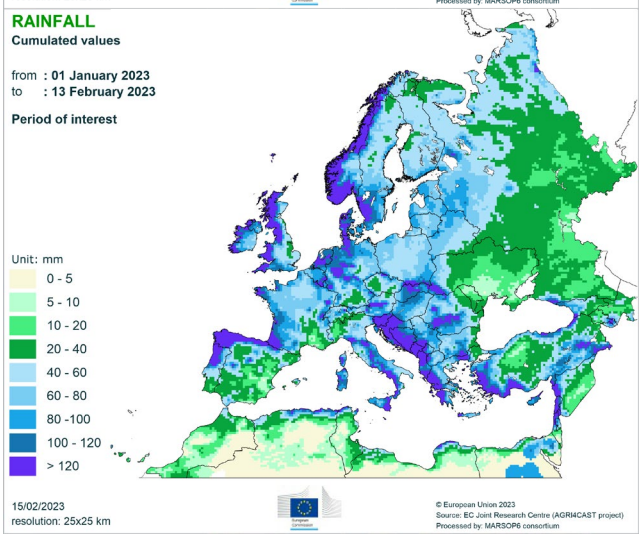
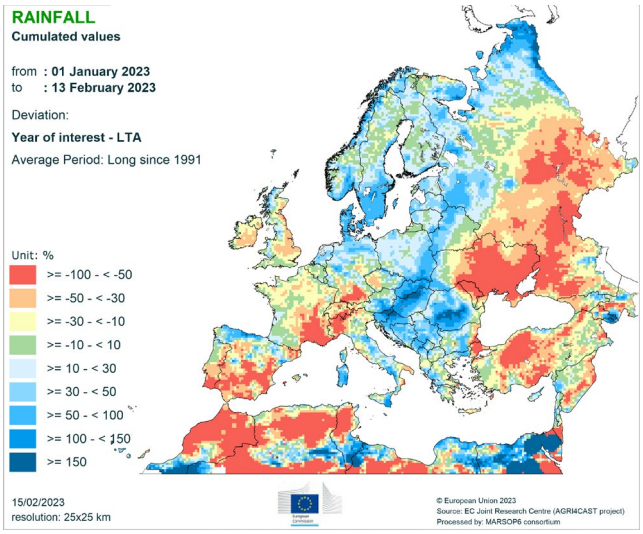
to : 13 February 2023
Period of interest
Rain (mm) > 15
Unit: days
= 0
1 - 2
2 - 4
4 - 6
6 - 8
8 - 10
> 10
15/02/2023
resolution: 25x25 km


RAINFALL
Cumulated values
from : 01 January 2023
to : 13 February 2023
Period of interest
Unit: mm
0 - 5
5 - 10
10 - 20
20 - 40
40 - 60
60 - 80
80 -100
100 - 120
> 120
15/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium


RAINFALL
Cumulated values
from : 01 January 2023
to : 13 February 2023
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
15/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium

1.3 Weather forecast (16-25 February)

Warmer-than-usual temperatures are forecast for most parts of Europe, while colder-than-usual temperatures are expected in most of European Russia. Drier-than-usual conditions are forecast for Italy, southern central and south-eastern Europe, and most of Türkiye, with wet spells in some mountainous and coastal regions.

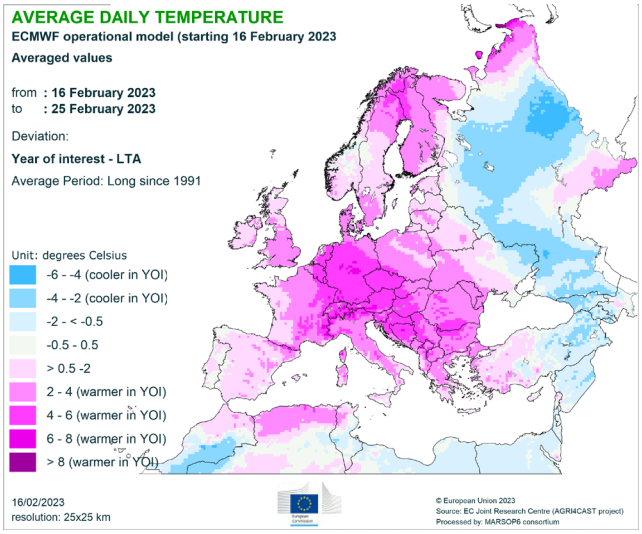
Warmer-than-usual conditions, with average daily temperatures up to 6 °C above the 1991-2022 long-term average (LTA) are forecast in most of western, central, and south-eastern Europe, parts of Scandinavia, the Kara Sea coastal region, and the Caspian Depression in European Russia, as well as in western Türkiye. Minimum daily temperatures will remain above 0 °C in most of the Iberian Peninsula and Italy, as well as in the western United Kingdom, Ireland, and Greece.

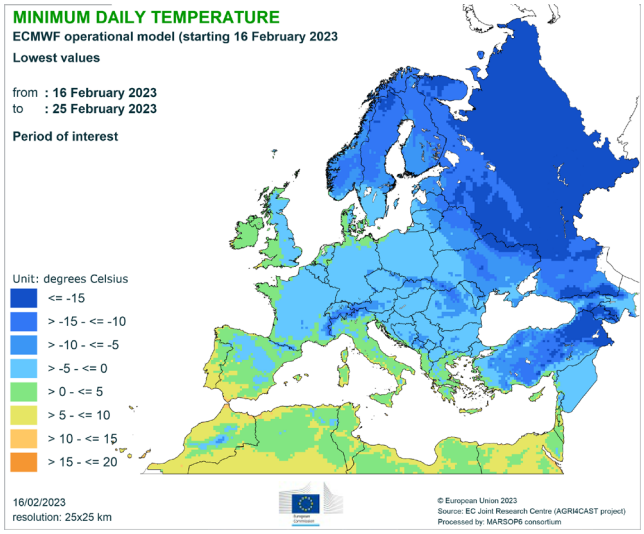
Colder-than-usual conditions, with temperature anomalies down to 4 °C below the LTA, are forecast for most of European Russia, with more distinct anomalies (down to 6 °C below the LTA) in a region west of the central Ural Mountains. Minimum daily temperatures below -15°C are expected for most of these areas, as well as in parts of Scandinavia, easternmost parts of Belarus and Ukraine, and eastern Türkiye.

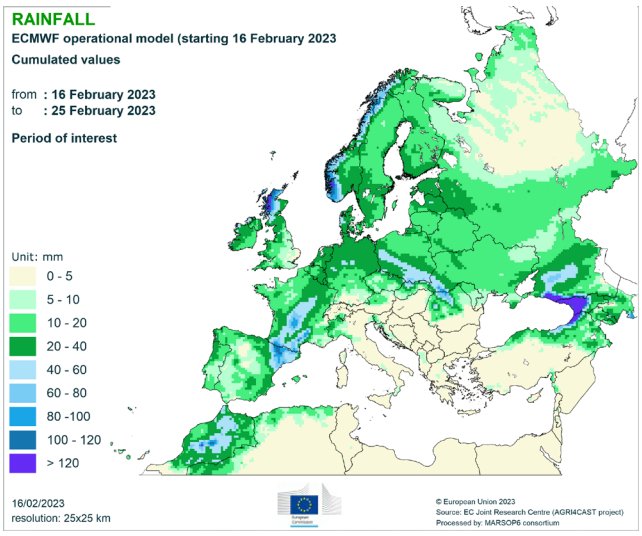
Dry conditions (rainfall below 5 mm) are expected in most of Italy, southern central Europe, the Balkan Peninsula, most of Türkiye, and the northern part of European Russia.

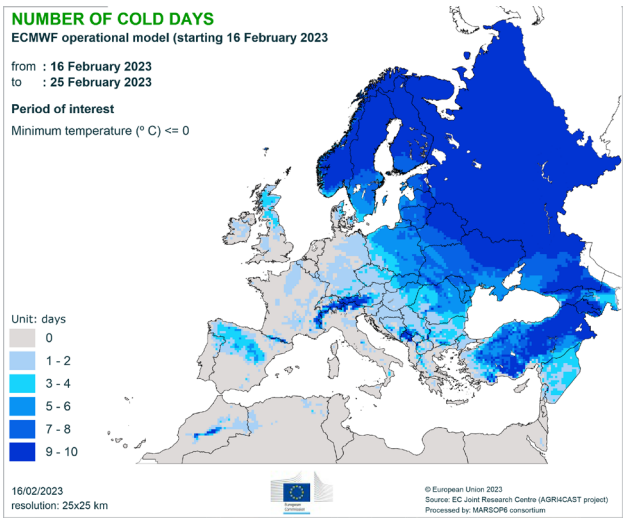
Wet conditions (between 40 and 120 mm of rainfall) are forecast for parts of Scotland, coastal Norway, the Pyrenees, the Massif Central in France, and the Carpathian Mountains, while more than 120 mm rainfall are forecast for the eastern Black Sea coastal region.

The **seasonal forecast** is for very likely warmer-than-usual conditions during March in southern Italy, as well as in parts of the Balkan region and eastern Europe. The likelihood of wetter-than-usual conditions in March is relatively low for southern Spain and the western Balkans, while in April and May rainfall is expected to stay close to median values in most of Europe.

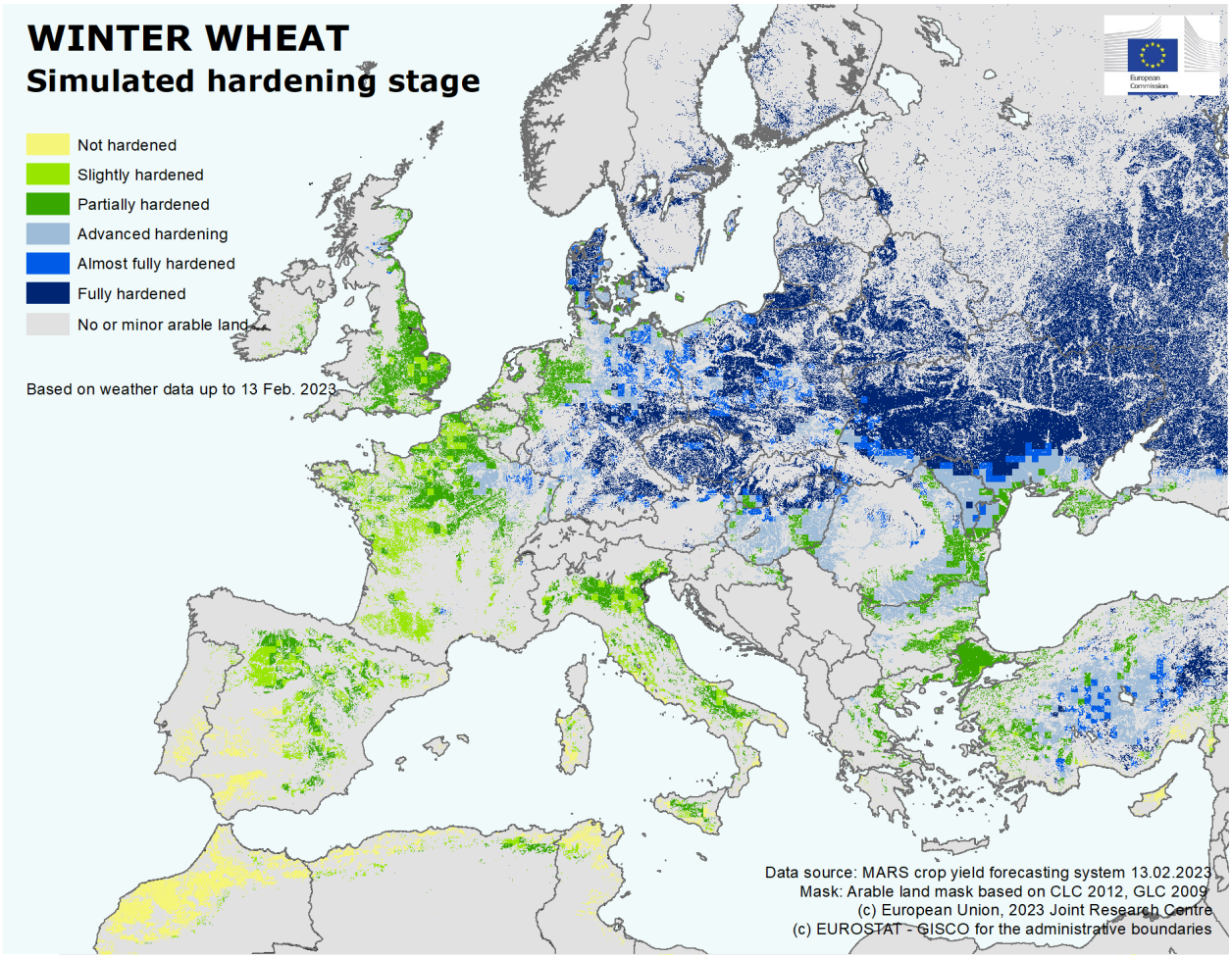





RAINFALL
ECMWF operational model (starting 16 February 2023
Cumulated values
from : 16 February 2023
to : 25 February 2023
Period of interest
Unit: mm
0 - 5
5 - 10
10 - 20
20 - 40
40 - 60
60 - 80
80 -100
100 - 120
> 120
16/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium


NUMBER OF COLD DAYS
ECMWF operational model (starting 16 February 2023
from : 16 February 2023
to : 25 February 2023
Period of interest
Minimum temperature (° C) <= 0
Unit: days
0
1 - 2
3 - 4
5 - 6
7 - 8
9 - 10
16/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium

2. Winter hardening and frost kill



Hardening is the bio-physiological process whereby winter cereals gain low-temperature tolerance to withstand freezing conditions that occur during the winter dormancy period.

As reported in the January edition of the Bulletin, the warmer-than-usual temperatures that prevailed across Europe during the end of December and the first half of January led to a de-hardening process in most winter cereals producing areas.

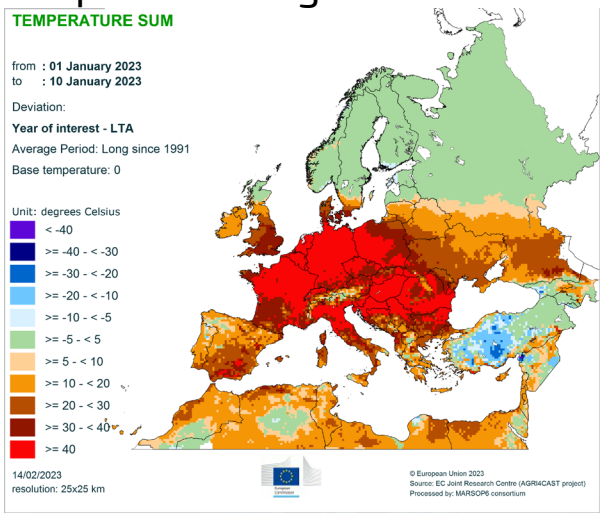
During the second half of January, temperatures were back to near seasonal levels in western and central European countries, while above-average temperatures continued in southern and northern Europe. Since then, below-average temperatures prevailed in large parts of Europe, although remaining above the critical threshold for frost damage. These conditions led to more advanced hardening levels, especially in Germany, Poland, Czechia, Slovakia, Hungary and Romania.

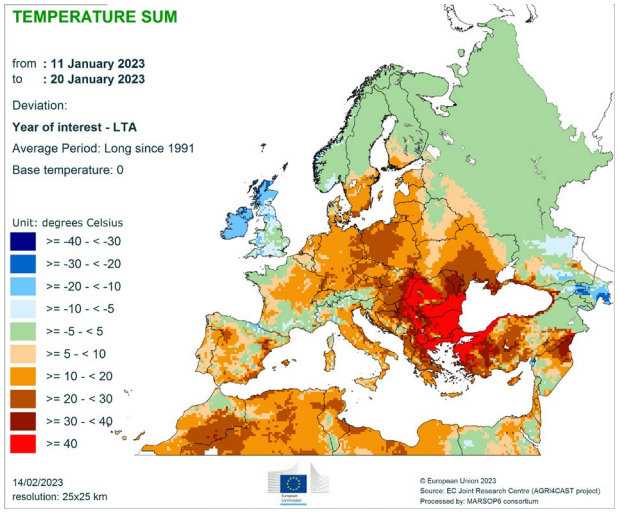
Concerning frost damage, as reported in the January Bulletin, around 10 January minor frost kill damage in the Volga okrug is expected to have happened as a result of a severe cold spell and lack of snow cover observed in the eastern part of European Russia. No additional frost kill damage is expected to have happened since then.

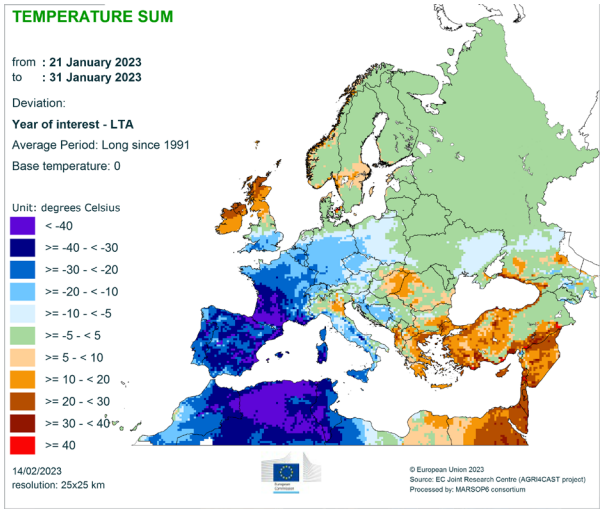
The current weather forecast (until 25 February) shows above-average temperatures in most Europe. Hence, the risk of frost kill damage in the coming days remains very low.

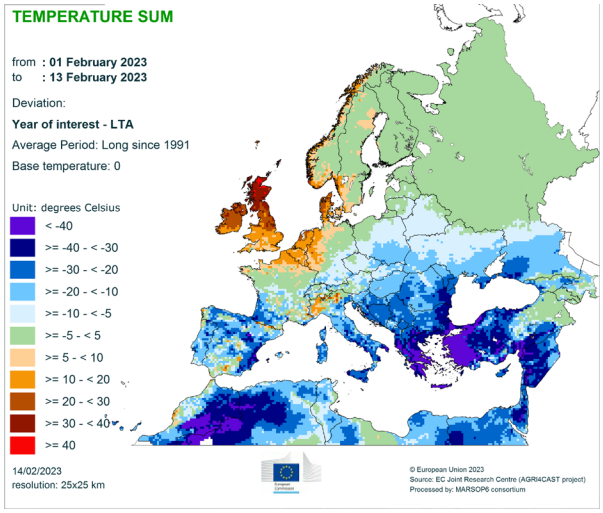
3. Atlas

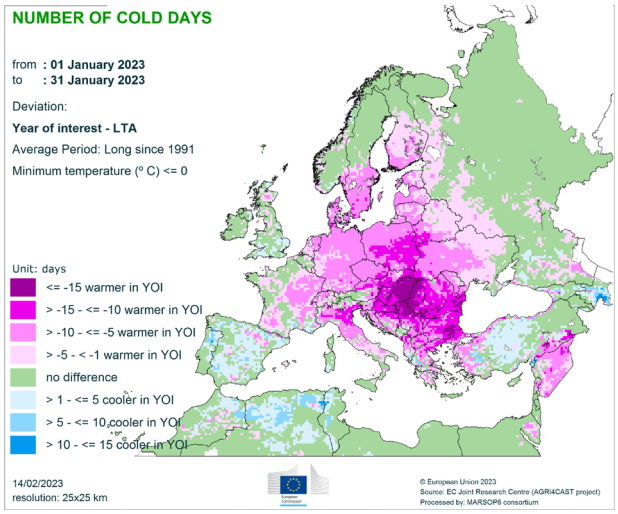
Temperature regime

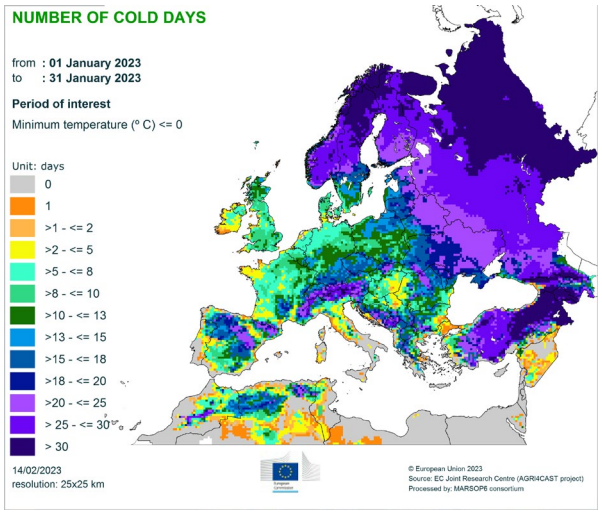


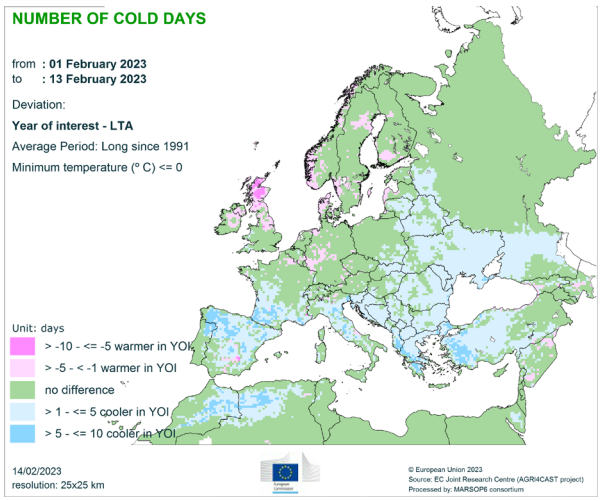


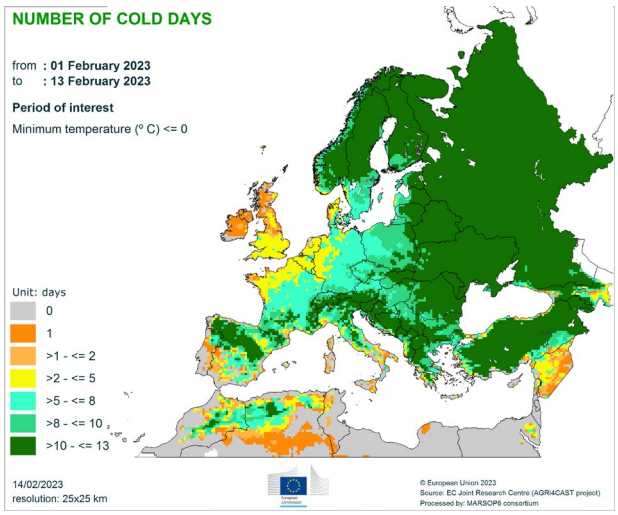




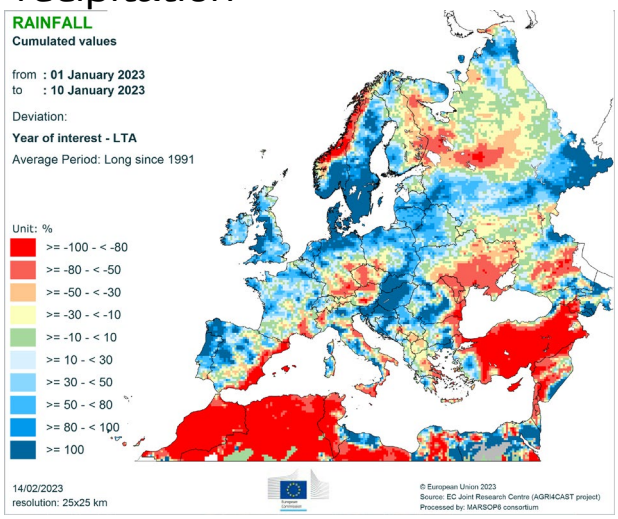


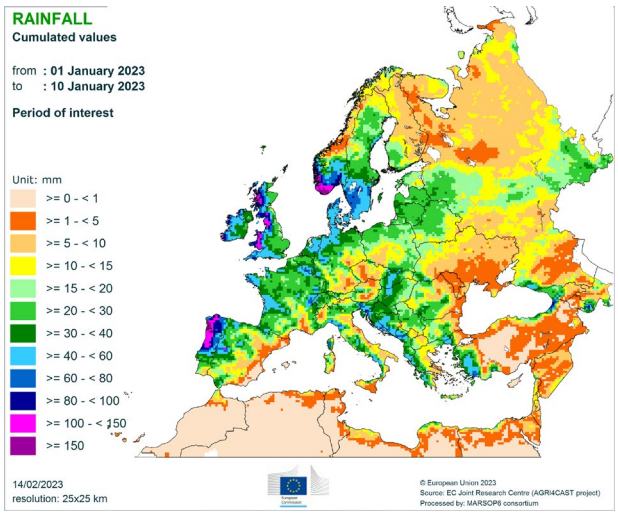


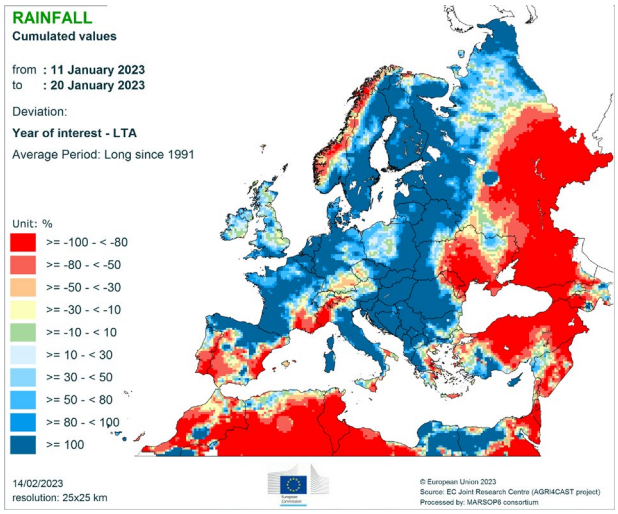


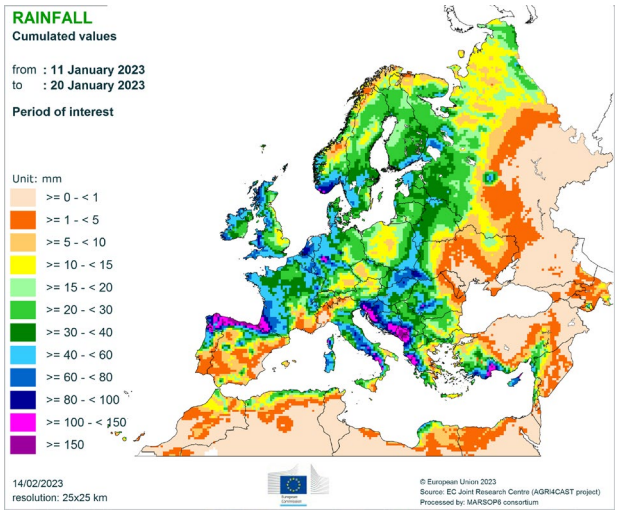


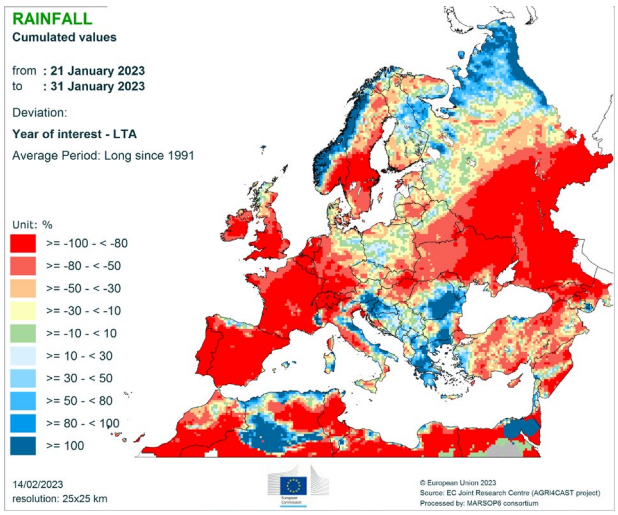
Precipitation







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to : 31 January 2023
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Unit: %
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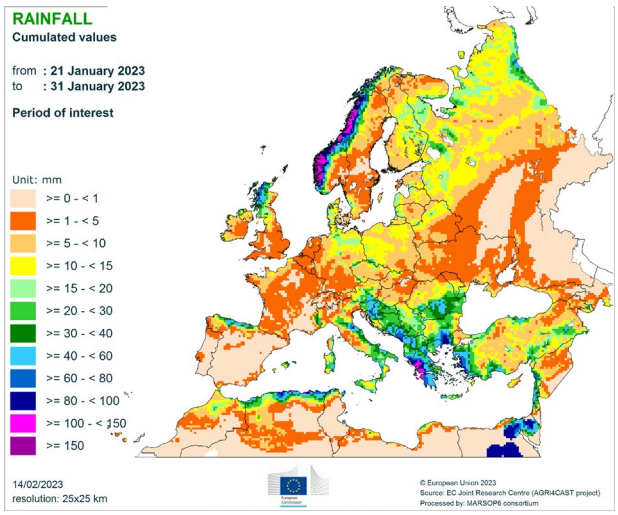
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
14/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium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Cumulated values
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to : 31 January 2023
Period of interest
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>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150
14/02/2023
resolution: 25x25 km
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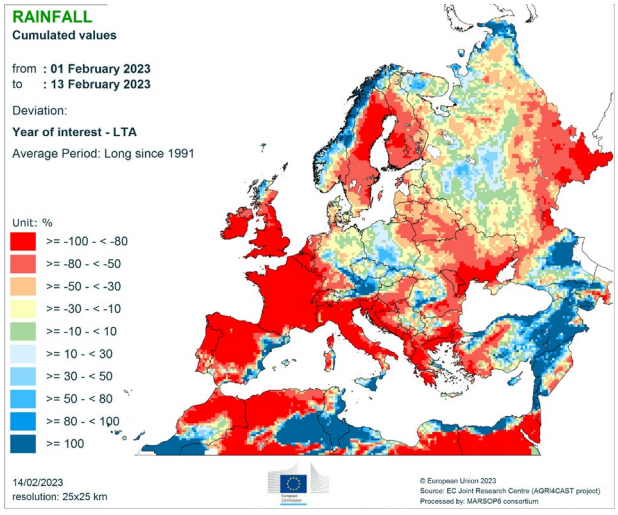
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium


RAINFALL
Cumulated values
from : 01 February 2023
to : 13 February 2023
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Unit: %
>= -100 - < -80
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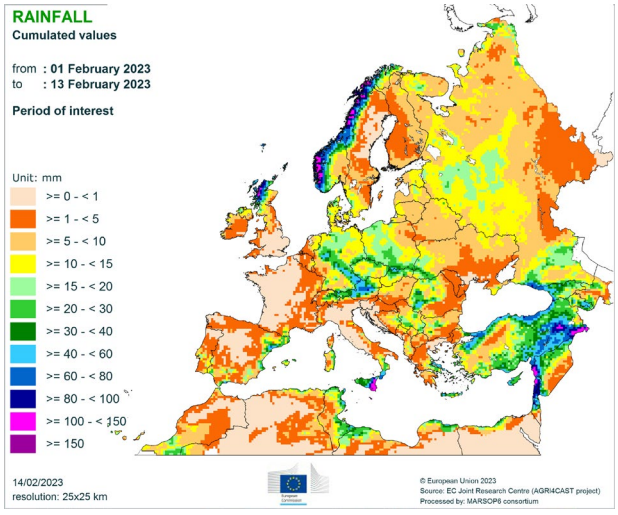
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
14/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium


RAINFALL
Cumulated values
from : 01 February 2023
to : 13 February 2023
Period of interest
Unit: mm
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150
14/02/2023
resolution: 25x25 km
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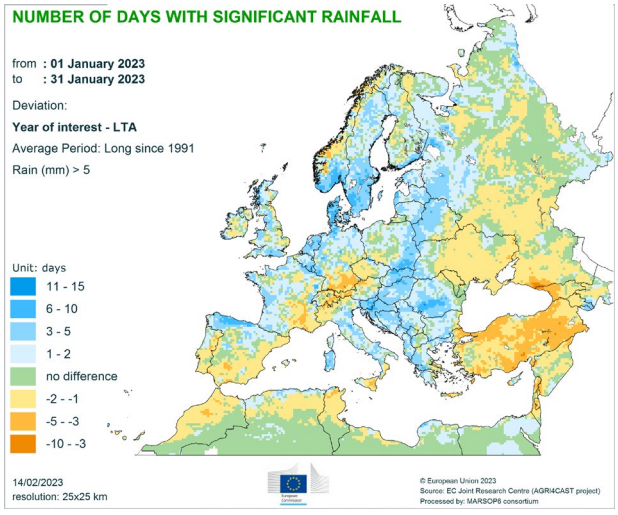
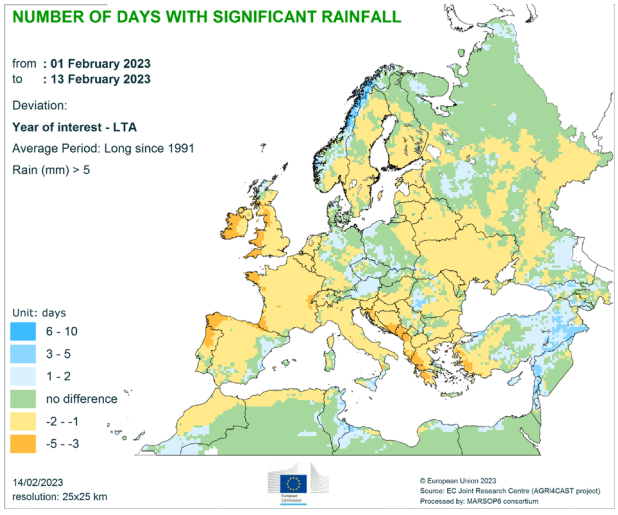
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 January 2023
to : 31 January 2023
Deviation:
Year of interest - LTA
Average Period: Long since 1991
Rain (mm) > 5
Unit: days
11 - 15
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
-10 - -3
14/02/2023
resolution: 25x25 km
© European Union 2023
Source: EC Joint Research Centre (AGRI4CAST project)
Processed by: MARSOP6 consortium


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from : 01 February 2023
to : 13 February 2023
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
14/02/2023
resolution: 25x25 km
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JRC MARS Bulletins 2023

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

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

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