

JRC MARS Bulletin

Crop monitoring in Europe

February 2024

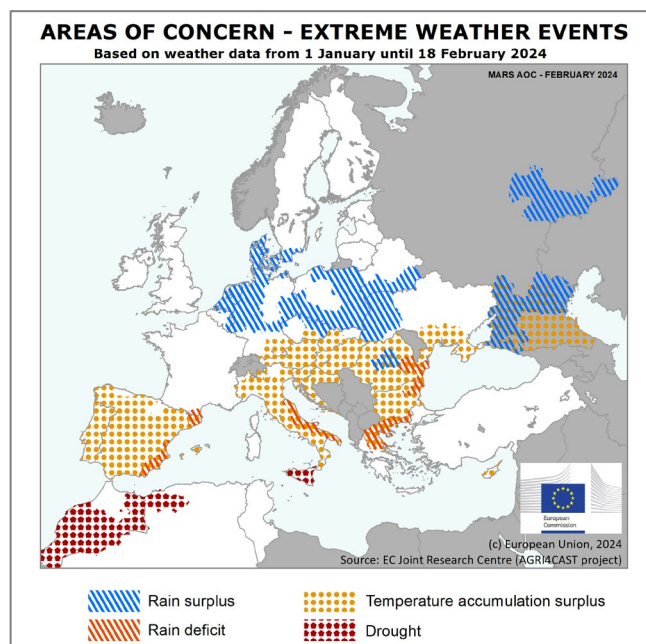
Wet and warm conditions have mixed effect on crops

Dry weather remains a concern in some southern regions

Warmer-than-usual conditions have prevailed in most parts of Europe, yet most distinctly in the south; whereas wetter-than-usual conditions prevailed in north-western, northern-central and eastern regions. Marked rainfall deficits occurred in several parts of the Mediterranean and Black Sea regions.

The map on the right provides a synthesis of weather anomalies that marked the review period, from 1 January to 18 February 2024. However, events that did not last beyond mid-January, such as the cold spell in northern Europe, which was reported in the January edition of the Bulletin, are not repeated here.

Continued *rain surplus* in the Benelux countries and north-western Germany, albeit less extreme than in the preceding months, maintained soil conditions at close to water saturation, and caused waterlogging – and localised flooding – in low-lying areas. Apart from being unfavourable for crops, overly wet fields cannot be worked and are hard to access, leading to delays in fertilisation. A similar situation is reported for Denmark and south-eastern Sweden, further exacerbated by intense rainfall on 5 and 6 February. Distinct precipitation surpluses in eastern Germany, Czechia, Poland, Belarus, western Ukraine, central Romania, and European Russia, mainly



due to very high precipitation in February, did not cause concern for crops.

Rain deficits negatively affected winter crops in south-eastern Romania and north-eastern Bulgaria, where rainfall during the review period was less than half of the long-term average (LTA). In some coastal Mediterranean areas of Spain, the ongoing rain deficit further deepened, to the detriment of crops and water reserves. The rain deficit and unusually high temperatures in the breadbasket regions of Greece did not affect crops thanks to adequate soil-moisture reserves. In many parts of Italy, the review period ranked between third and fifth driest in our records since 1991.

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1. Agrometeorological overview
2. Winter hardening and frost kill
3. Atlas

Covers the period from 1 January until 18 February 2024

Drought developed in Sicily, where long-lasting rain deficits were combined with above-average temperatures in areas with limited water availability. Drought conditions also persisted in Morocco and western Algeria, with serious impacts on cereal yield expectations. A more detailed analysis of the condition of crops and associated yield forecasts in the Maghreb region are provided in the Bulletin on North Africa in the Global Outlook series¹.

Distinct *temperature accumulation surpluses* have affected south-eastern Germany, Austria, Czechia and Slovakia since mid January. In Slovenia, Croatia, Hungary, Romania and Bulgaria, daily average temperatures exceeded the LTA by up to 4 °C (and in some regions up to 6 °C). Such unusually high temperatures at this time of

year tend to benefit crop development, especially of late-sown stands, but also cause a dehardening of winter crops, making them more vulnerable to cold spells. The temperature accumulation surplus zone extended eastwards into southern Ukraine and the southern parts of European Russia, where daily average temperatures exceeded the LTA by 2–3 °C. High temperatures also persisted in all regions of Italy, making the review period one of the five warmest in our records since 1991. In Portugal, Spain, and the main crop land regions of Greece, temperatures ranked among the highest in our records, but mostly without causing concern for crops. In Cyprus, above-average temperatures and average rainfall potentially benefited winter barley growth.

¹ <https://publications.jrc.ec.europa.eu/repository/handle/JRC136669>

1. Agrometeorological overview

1.1 Meteorological review (1 January –18 February 2024)

Warmer-than-usual conditions prevailed in most of Europe. Wetter-than-usual conditions were limited mainly to the North and East European Plains, whereas marked rainfall deficits occurred in several parts of the Mediterranean and Black Sea regions.

Warmer-than-usual conditions, with daily mean temperatures between 2 °C and 4 °C above the 1991–2023 long-term average (LTA), were observed in most of Europe. More distinct positive temperature anomalies (4–6 °C above the LTA) were observed locally in Spain, parts of central Europe, the Balkan Peninsula, Türkiye and the Black Sea region. In many of these regions, average daily temperatures ranked among the three warmest in our records since 1991 and the number of cold days was substantially below the LTA.

Colder-than-usual conditions, with temperature anomalies between 2 °C and 4 °C (in some areas as much as 6 °C) below the LTA, were observed in the Scandinavian Peninsula, the Baltic Sea region and northern European Russia. In parts of these regions, daily average temperatures ranked among the three coldest in our

records since 1991, with minimum daily temperatures reaching –20 °C or below.

Significantly wetter-than-usual conditions, with a rainfall total of more than 50 % (and in some regions more than 150 %) above the LTA, were observed in most of the Iberian peninsula, in a latitudinal band extending eastwards from the United Kingdom across the North European Plain and the Carpathian Mountains, and in central and southern European Russia. In many of these regions, the review period ranked among the three wettest in our records since 1991.

Drier-than-usual conditions, with a rainfall total of between 50 % and 100 % below the LTA, were observed in parts of Mediterranean coastal Spain and France, in Sicily and along the Adriatic coast of Italy, in southern Greece, eastern Romania and Bulgaria and parts of western Türkiye.

AVERAGE DAILY TEMPERATURE

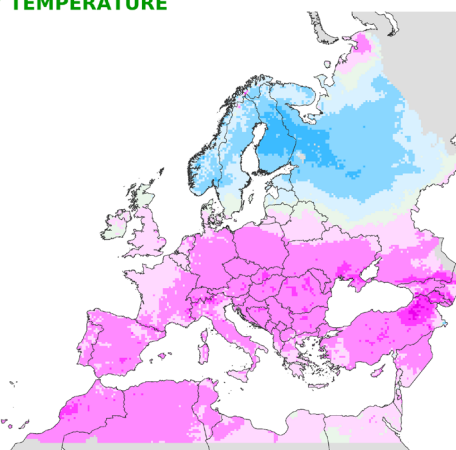
Averaged values

from: 01 January 2024
to: 18 February 2024

Deviation:
Year of interest - LTA

Units: °C

- 6 - -4 (cooler in YOI)
- 4 - -2 (cooler in YOI)
- 2 - -0.5 (cooler in YOI)
- 0.5 - 0.5
- 0.5 - 2 (warmer in YOI)
- 2 - 4 (warmer in YOI)
- 4 - 6 (warmer in YOI)
- 6 - 8 (warmer in YOI)



20/02/2024
Resolution: 25 x 25 km



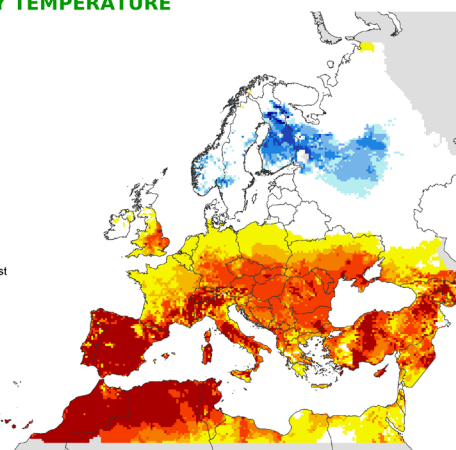
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Source: EC Joint Research Centre (AGRI4CAST project)

AVERAGE DAILY TEMPERATURE

from: 01 January 2024
to: 18 February 2024

Ranking since 1991

- Warmest year
- Second warmest
- Third warmest
- Fourth warmest
- From fifth to tenth warmest
- Others
- From fifth to tenth coldest
- Fourth coldest
- Third coldest
- Second coldest
- Coldest year



20/02/2024
Resolution: 25 x 25 km



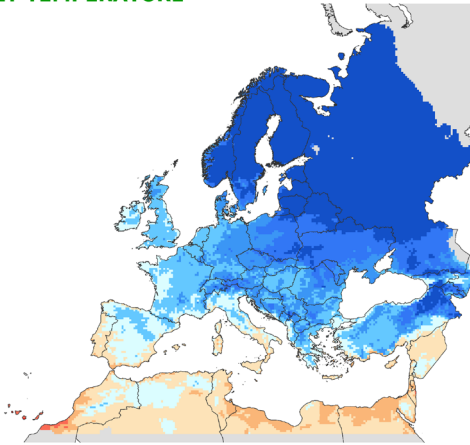
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)

MINIMUM DAILY TEMPERATURE
Minimum values

from: **01 January 2024**
to: **18 February 2024**

Units: °C

- ≤ -20
- > -20 - ≤ -15
- > -15 - ≤ -10
- > -10 - ≤ -5
- > -5 - ≤ 0
- > 0 - ≤ 5
- > 5 - ≤ 10
- > 10 - ≤ 15
- > 15 - ≤ 20



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Resolution: 25 x 25 km



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NUMBER OF COLD DAYS

from: **01 January 2024**
to: **18 February 2024**

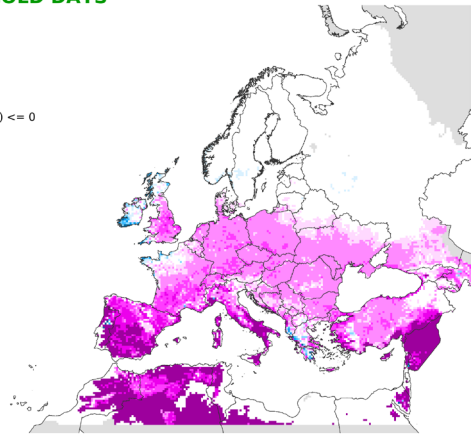
Deviation:

Year of interest - LTA

Minimum temperature (°C) ≤ 0

Units: %

- > 80
- 60 - 80
- 40 - 60
- 20 - 40
- 10 - 20
- 10 - 10
- 20 - -10
- 40 - -20
- 60 - -40
- 80 - -60
- < -80



26/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

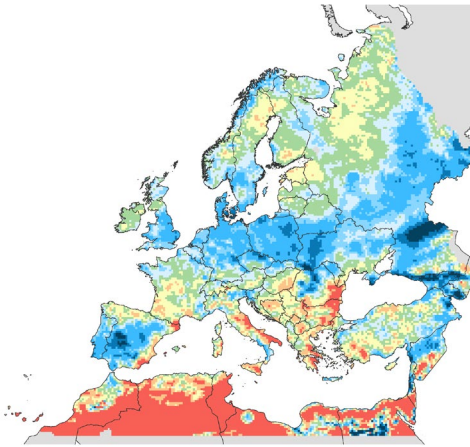
from: **01 January 2024**
to: **18 February 2024**

Deviation:

Year of interest - LTA

Units: %

- ≥ -100 - < -50
- ≥ -50 - < -30
- ≥ -30 - < -10
- ≥ -10 - < 10
- ≥ 10 - < 30
- ≥ 30 - < 50
- ≥ 50 - < 100
- ≥ 100 - < 150
- ≥ 150



20/02/2024
Resolution: 25 x 25 km



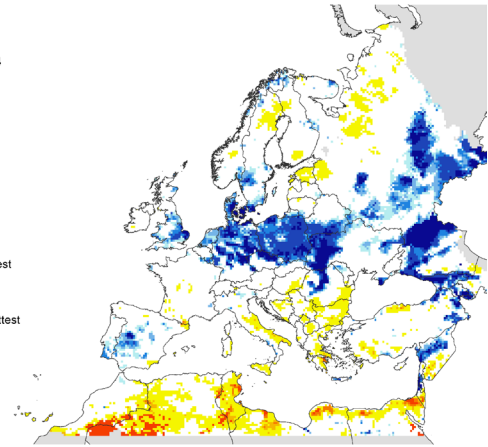
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: **01 January 2024**
to: **18 February 2024**

Ranking since 1991

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



20/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

1.2 Weather forecast (22 February – 2 March)

A low-pressure system pushes clouds, winds, and rain into western, central, and southern Europe, turning into snow in northern parts of the continent, while dry conditions are forecast in the east and southeast.

Colder-than-usual conditions, with average daily temperatures up to 2 °C, and locally up to 4 °C, below the long-term average (LTA), are forecast for most of the British Isles and the Iberian Peninsula, parts of southern France and northwestern Italy, and southern and central European Russia (in the latter region up to 8 °C below the LTA).

Much warmer-than-usual conditions are forecast for most of northern, central, and south-eastern Europe. The most substantial positive anomalies, between 4 °C and 6 °C above the LTA, are forecast for a wide south-north belt from the Balkan Peninsula to northern Scandinavia, Finland, and European Russia (in the latter region up to 10 °C below LTA).

Dry conditions (total precipitation below 3 mm) are forecast for the Black Sea region and most of European Russia, as well as along the Mediterranean coast of Spain.

Wet conditions (precipitation above 10 mm and up to 90 mm) are forecast for most other parts of Europe, while **very wet conditions** (above 90 mm) are forecast for northern parts of the Iberian Peninsula, western France, the Alps region, southern Italy, western Balkans, and southern Norway.

The long-range weather forecast for March-April-May points to moderately-to-highly likely warm conditions, exceeding the 24-year climatological median by up to 1°C in most of Europe and by up to 2°C in southern Europe, and precipitation up to 50 mm above the mean for southern and eastern Europe in March and below- or near-average in April and May.

AVERAGE DAILY TEMPERATURE

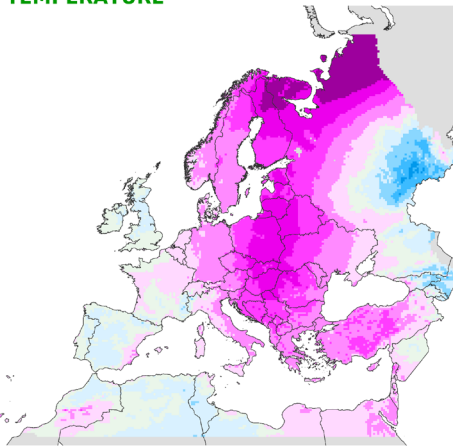
Averaged values

from: 22 February 2024
to: 02 March 2024

Deviation:

Year of interest - LTA

Units: °C



22/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

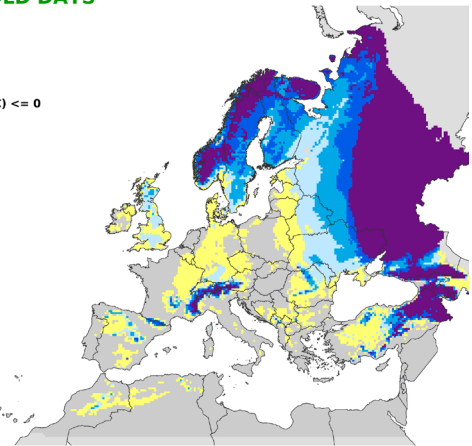
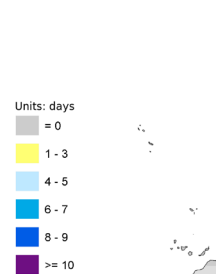
NUMBER OF COLD DAYS

from: 22 February 2024
to: 02 March 2024

Period of interest

Minimum temperature (°C) <= 0

Units: days



22/02/2024
Resolution: 25 x 25 km



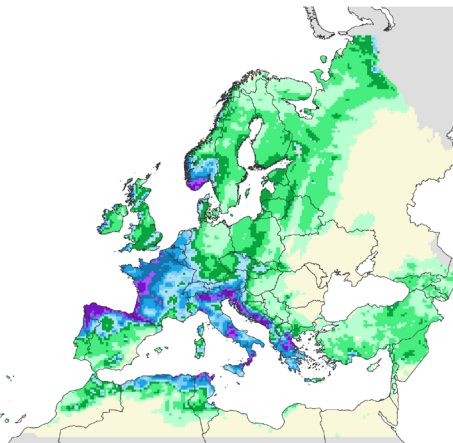
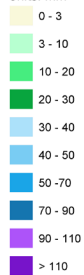
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Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL

Cumulative values

from: 22 February 2024
to: 02 March 2024

Units: mm



22/02/2024
Resolution: 25 x 25 km



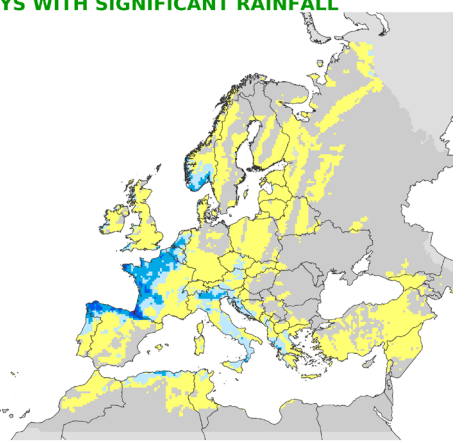
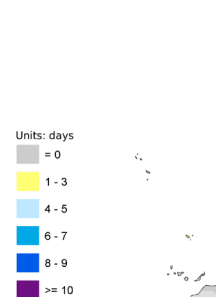
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF DAYS WITH SIGNIFICANT RAINFALL

from: 22 February 2024
to: 02 March 2024

Rain (mm) > 5

Units: days

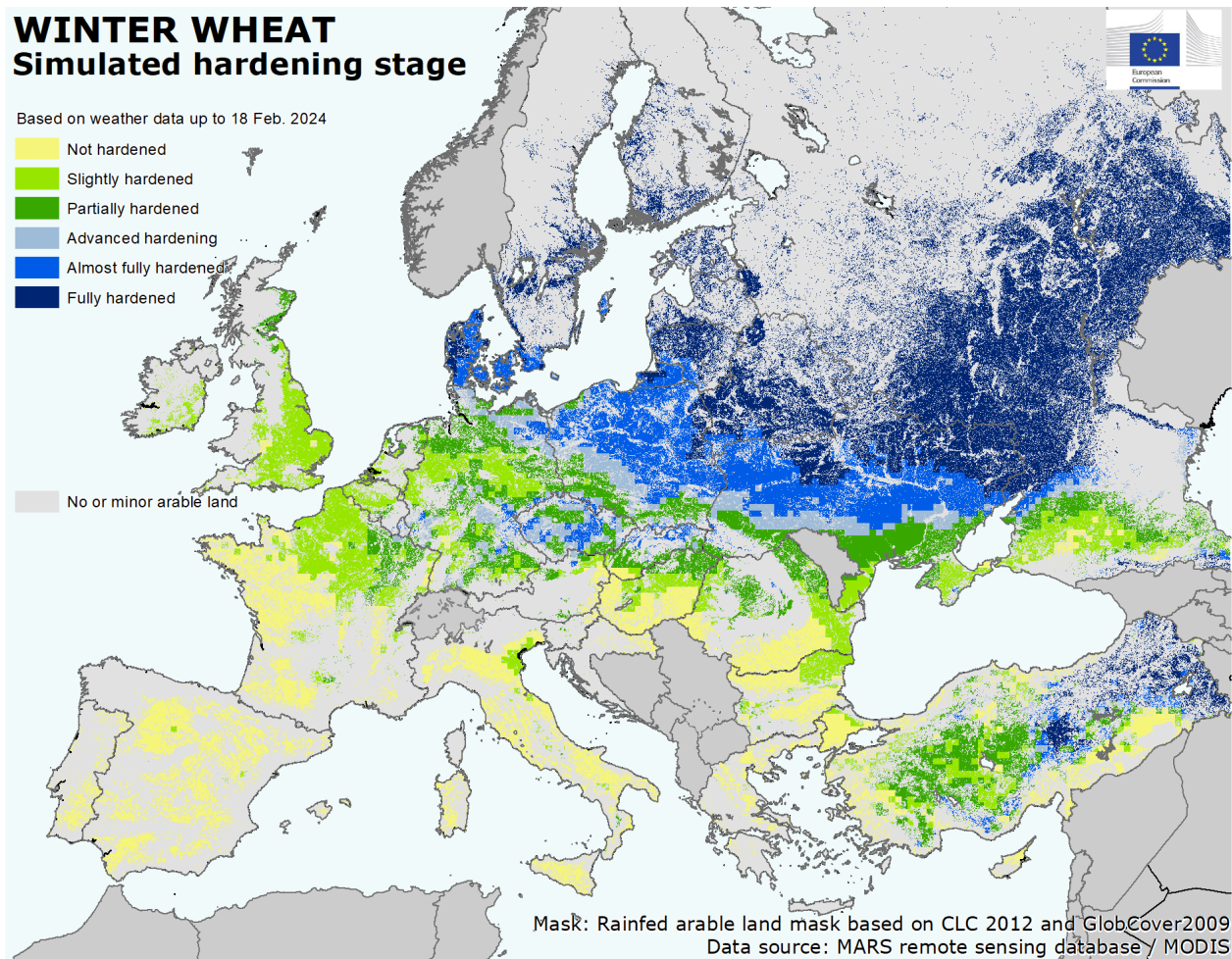


22/02/2024
Resolution: 25 x 25 km



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2. Winter hardening and frost kill



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

The review period started with a cold spell lasting until mid January, which caused minor damage throughout northern Europe and more severe damage in the Baltic Sea region, as reported in the January edition of the Bulletin. Since then, temperatures across Europe have increased rapidly and stabilised at levels above the LTA, except in the Scandinavian countries and parts of Russia, where temperatures stayed close to the LTA.

Consequently, no additional frost-related damages are expected to have occurred in Europe. The increase in temperatures and the longevity of the above-average temperature conditions have led to a fast dehardening

since mid January. Our models show that winter crops have completely dehardened in Spain, western and southern France, Italy, Slovenia, Croatia, Hungary, Greece, southern Romania and Bulgaria. A major shift from advanced or almost fully hardened to slightly or partially hardened crops is detectable in the British Isles, north-eastern France, Benelux, most of Germany, Austria, parts of Czechia and Slovakia, south-eastern Poland and northern Romania. Winter cereals in the Scandinavian and Baltic countries, most of Poland and Ukraine, and Russia are still in an advanced to fully hardened stage. The major dehardening at this time of year increases the vulnerability of winter crops to cold spells. Current temperature forecasts do not indicate concerns for the remainder of February.

3. Atlas

Temperature regime

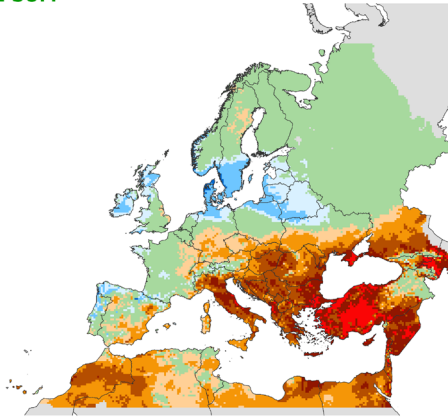
TEMPERATURE SUM

from: **01 January 2024**
to: **10 January 2024**

Deviation:
Year of interest - LTA
Base temperature: 0 °C

Units: °C

- >= -40 - < -30
- >= -30 - < -20
- >= -20 - < -10
- >= -10 - < -5
- >= -5 - < 5
- >= 5 - < 10
- >= 10 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40



19/02/2024
Resolution: 25 x 25 km



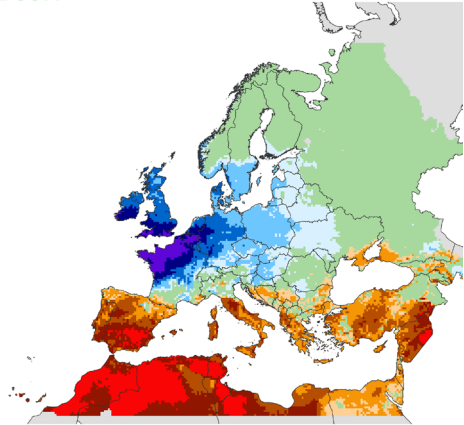
© European Union, 2024
Source: EC Joint Research Centre (AGR4CAST project)

TEMPERATURE SUM

from: **11 January 2024**
to: **20 January 2024**

Deviation:
Year of interest - LTA
Base temperature: 0 °C
Units: °C

- < -40
- >= -40 - < -30
- >= -30 - < -20
- >= -20 - < -10
- >= -10 - < -5
- >= -5 - < 5
- >= 5 - < 10
- >= 10 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40



19/02/2024
Resolution: 25 x 25 km



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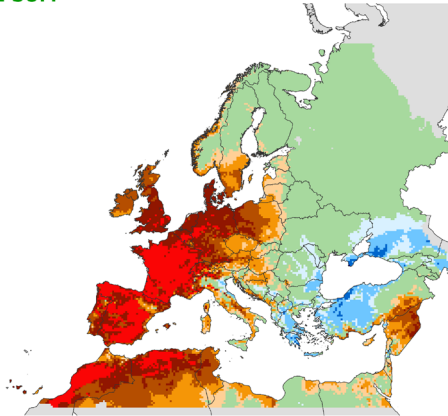
TEMPERATURE SUM

from: **21 January 2024**
to: **31 January 2024**

Deviation:
Year of interest - LTA
Base temperature: 0 °C

Units: °C

- >= -40 - < -30
- >= -30 - < -20
- >= -20 - < -10
- >= -10 - < -5
- >= -5 - < 5
- >= 5 - < 10
- >= 10 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40



19/02/2024
Resolution: 25 x 25 km



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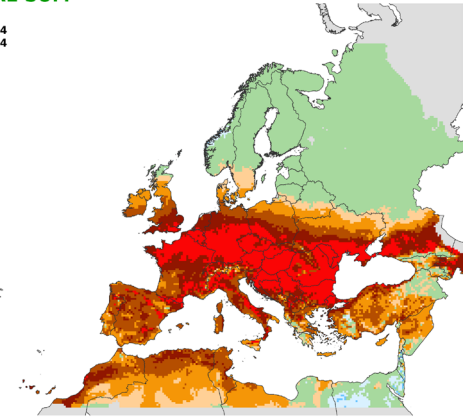
TEMPERATURE SUM

from: **01 February 2024**
to: **10 February 2024**

Deviation:
Year of interest - LTA
Base temperature: 0 °C

Units: °C

- >= -20 - < -10
- >= -10 - < -5
- >= -5 - < 5
- >= 5 - < 10
- >= 10 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40



19/02/2024
Resolution: 25 x 25 km



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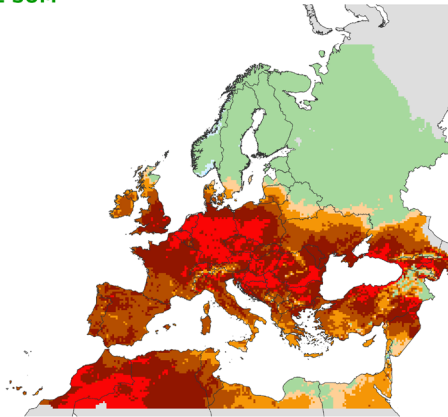
TEMPERATURE SUM

from: **11 February 2024**
to: **18 February 2024**

Deviation:
Year of interest - LTA
Base temperature: 0 °C

Units: °C

- >= -20 - < -10
- >= -10 - < -5
- >= -5 - < 5
- >= 5 - < 10
- >= 10 - < 20
- >= 20 - < 30
- >= 30 - < 40
- >= 40



19/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGR4CAST project)

NUMBER OF COLD DAYS

from: **01 January 2024**
to: **31 January 2024**

Deviation:

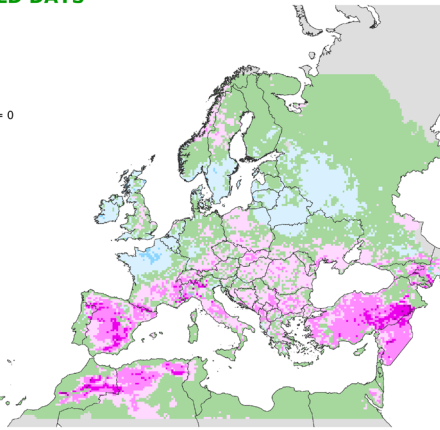
Year of interest - LTA

Minimum temperature (°C) <= 0

Units: days

- ≤ -15 warmer in YOI
- > -15 - ≤ -10 warmer in YOI
- > -10 - ≤ -5 warmer in YOI
- > -5 - < -1 warmer in YOI
- no difference
- > 1 - ≤ 5 cooler in YOI
- > 5 - ≤ 10 cooler in YOI

19/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF COLD DAYS

from: **01 January 2024**
to: **31 January 2024**

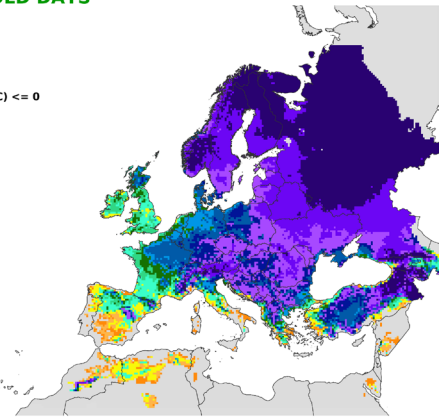
Period of interest

Minimum temperature (°C) <= 0

Units: days

- 0
- > 1 - ≤ 2
- > 2 - ≤ 5
- > 5 - ≤ 8
- > 8 - ≤ 10
- > 10 - ≤ 13
- > 13 - ≤ 15
- > 15 - ≤ 18
- > 18 - ≤ 20
- > 20 - ≤ 25
- > 25 - ≤ 30
- > 30

19/02/2024
Resolution: 25 x 25 km



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NUMBER OF COLD DAYS

from: **01 February 2024**
to: **18 February 2024**

Deviation:

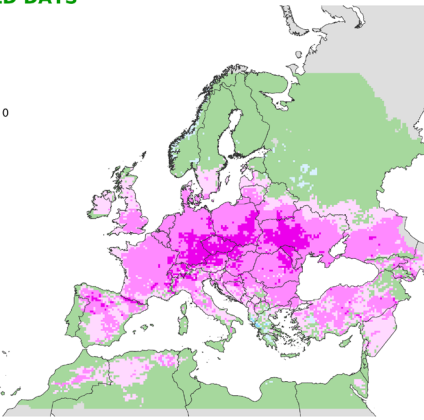
Year of interest - LTA

Minimum temperature (°C) <= 0

Units: days

- ≤ -15 warmer in YOI
- > -15 - ≤ -10 warmer in YOI
- > -10 - ≤ -5 warmer in YOI
- > -5 - < -1 warmer in YOI
- no difference
- > 1 - ≤ 5 cooler in YOI
- > 5 - ≤ 10 cooler in YOI

19/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

NUMBER OF COLD DAYS

from: **01 February 2024**
to: **18 February 2024**

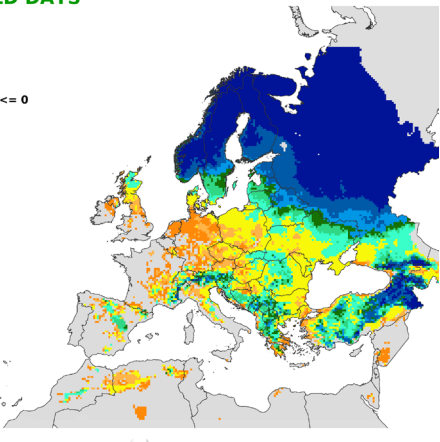
Period of interest

Minimum temperature (°C) <= 0

Units: days

- 0
- > 1 - ≤ 2
- > 2 - ≤ 5
- > 5 - ≤ 8
- > 8 - ≤ 10
- > 10 - ≤ 13
- > 13 - ≤ 15
- > 15 - ≤ 18
- > 18 - ≤ 20

19/02/2024
Resolution: 25 x 25 km



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Precipitation

RAINFALL Cumulative values

from: **01 January 2024**
to: **10 January 2024**

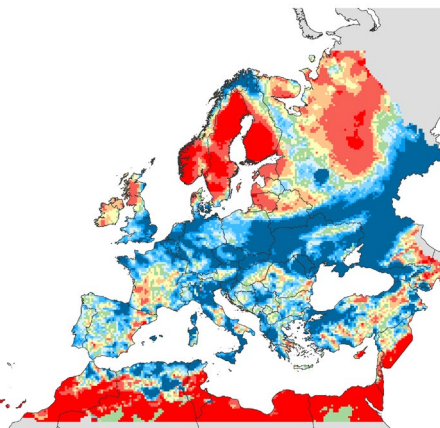
Deviation:

Year of interest - LTA

Units: %

- ≥ -100 - < -80
- ≥ -80 - < -50
- ≥ -50 - < -30
- ≥ -30 - < -10
- ≥ -10 - < 10
- ≥ 10 - < 30
- ≥ 30 - < 50
- ≥ 50 - < 80
- ≥ 80 - < 100
- ≥ 100

19/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

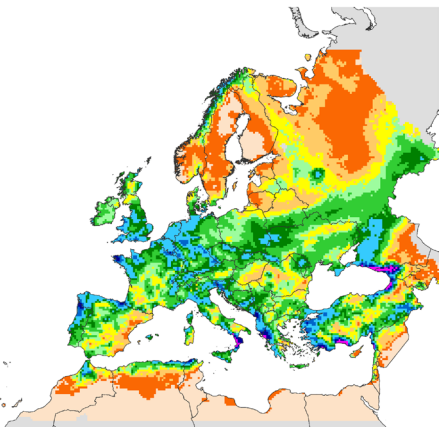
RAINFALL Cumulative values

from: **01 January 2024**
to: **10 January 2024**

Units: mm

- ≥ 0 - < 1
- ≥ 1 - < 5
- ≥ 5 - < 10
- ≥ 10 - < 15
- ≥ 15 - < 20
- ≥ 20 - < 30
- ≥ 30 - < 40
- ≥ 40 - < 60
- ≥ 60 - < 80
- ≥ 80 - < 100
- ≥ 100 - < 150
- ≥ 150

19/02/2024
Resolution: 25 x 25 km

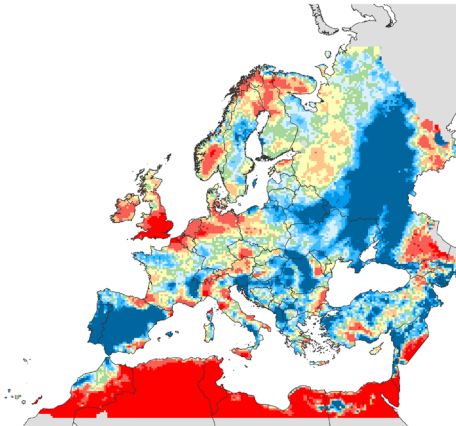


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Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: 11 January 2024
to: 20 January 2024

Deviation:
Year of interest - LTA



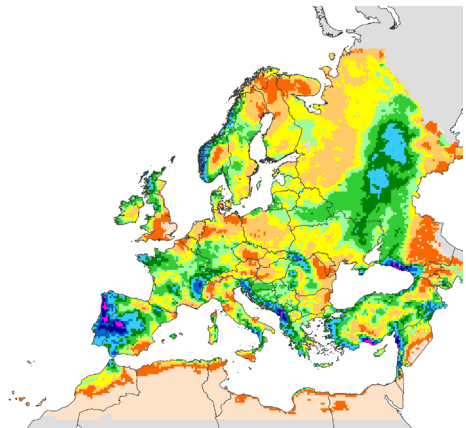
19/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: 11 January 2024
to: 20 January 2024



19/02/2024
Resolution: 25 x 25 km

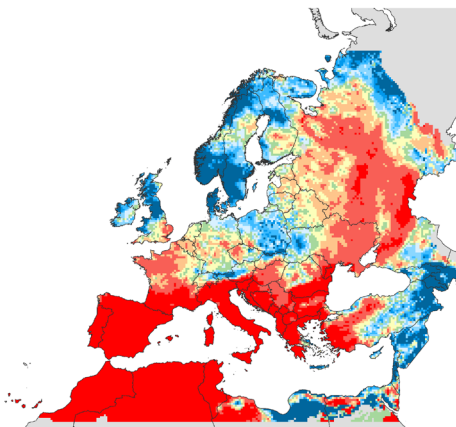


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Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: 21 January 2024
to: 31 January 2024

Deviation:
Year of interest - LTA



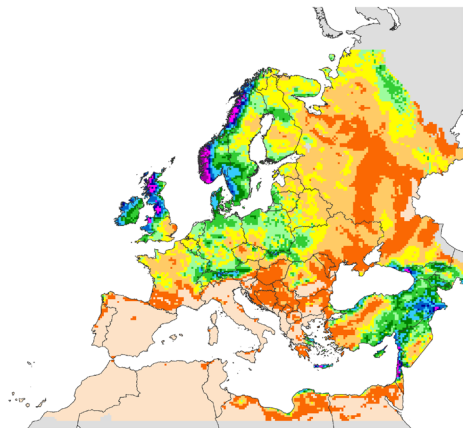
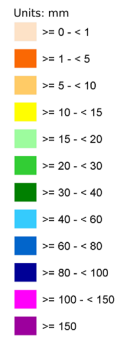
19/02/2024
Resolution: 25 x 25 km



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Source: EC Joint Research Centre (AGRI4CAST project)

RAINFALL
Cumulative values

from: 21 January 2024
to: 31 January 2024



19/02/2024
Resolution: 25 x 25 km

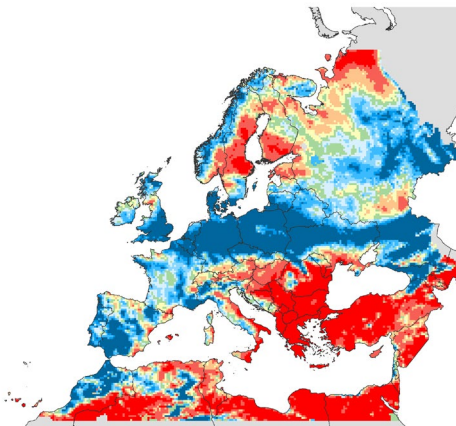
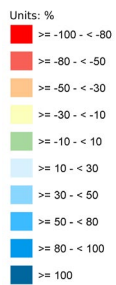


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RAINFALL
Cumulative values

from: 01 February 2024
to: 10 February 2024

Deviation:
Year of interest - LTA



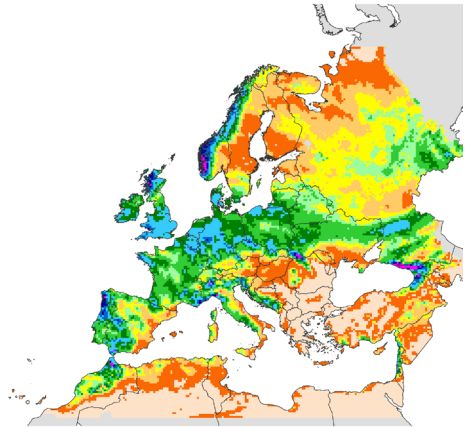
19/02/2024
Resolution: 25 x 25 km



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RAINFALL
Cumulative values

from: 01 February 2024
to: 10 February 2024



19/02/2024
Resolution: 25 x 25 km

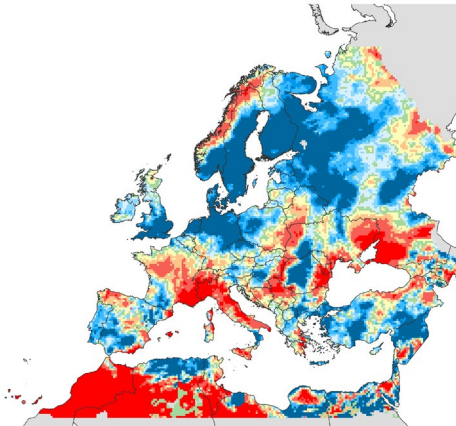
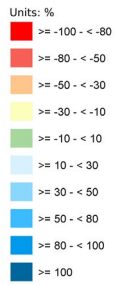


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RAINFALL
Cumulative values

from: 11 February 2024
to: 18 February 2024

Deviation:
Year of interest - LTA



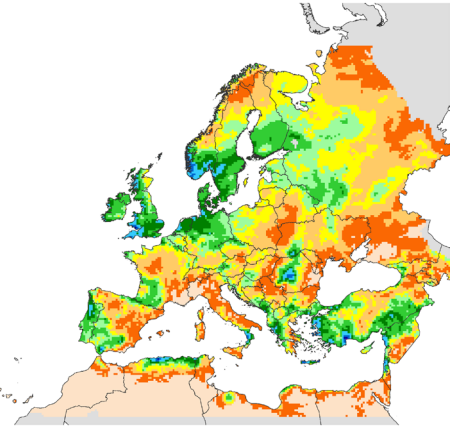
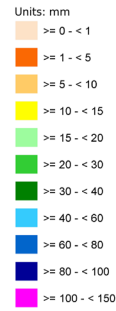
19/02/2024
Resolution: 25 x 25 km



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RAINFALL
Cumulative values

from: 11 February 2024
to: 18 February 2024



19/02/2024
Resolution: 25 x 25 km

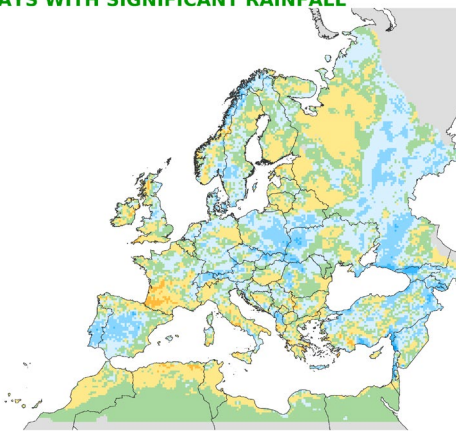
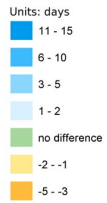


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NUMBER OF DAYS WITH SIGNIFICANT RAINFALL

from: 01 January 2024
to: 31 January 2024

Deviation:
Year of interest - LTA
Rain (mm) > 5



19/02/2024
Resolution: 25 x 25 km

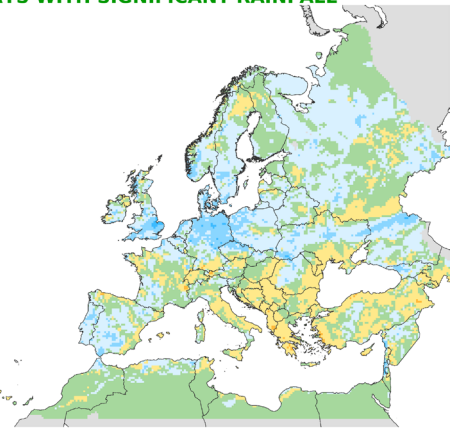


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NUMBER OF DAYS WITH SIGNIFICANT RAINFALL

from: 01 February 2024
to: 18 February 2024

Deviation:
Year of interest - LTA
Rain (mm) > 5



19/02/2024
Resolution: 25 x 25 km



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JRC MARS Bulletin 2024

Date	Publication	Reference
22 Jan	Agromet analysis	Vol. 32 No 1
26 Feb	Agromet analysis	Vol. 32 No 2
25 Mar	Agromet analysis, yield forecast	Vol. 32 No 3
22 Apr	Agromet analysis, remote sensing, pasture analysis, sowing conditions, yield forecast	Vol. 32 No 4
27 May	Agromet analysis, remote sensing, pasture analysis, sowing update, yield forecast	Vol. 32 No 5
24 Jun	Agromet analysis, remote sensing, pasture analysis, rice analysis, yield forecast	Vol. 32 No 6
22 Jul	Agromet analysis, remote sensing, pasture analysis, harvesting conditions, yield forecast	Vol. 32 No 7
26 Aug	Agromet analysis, remote sensing, pasture update, harvesting update, yield forecast	Vol. 32 No 8
23 Sep	Agromet analysis, remote sensing, pasture analysis, rice analysis, harvesting update, yield forecast	Vol. 32 No 9
28 Oct	Agromet analysis, pasture update, sowing conditions, harvesting update, yield forecast	Vol. 32 No 10
25 Nov	Agromet analysis, sowing update, harvesting update	Vol. 32 No 11
16 Dec	Agromet analysis	Vol. 32 No 12

Mission statement

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

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Analysis and reports

E. Tarnavsky, M. Rossi, A. Bussay, J. Morel, L. Seguini, I. Biavetti, M. Bratu, I. Cerrani, M. Claverie, P. De Palma, D. Fumagalli, J. Luque Reyes, G. Manfron, S. Niemeyer, L. Nisini, L. Panarello, P. Todoroff, M. van den Berg, A. Zucchini

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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 1991-2023.

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