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European Commission

JRC MARS Bulletin
Crop monitoring in Europe
January 2024

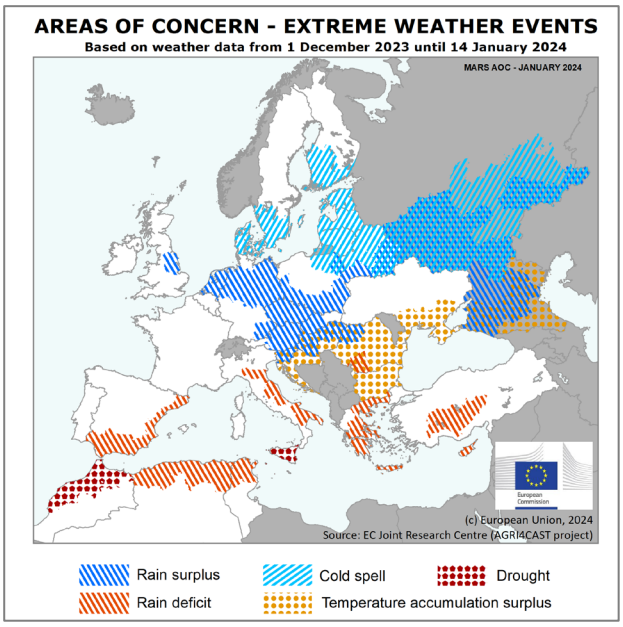
Start to 2024 marked by weather contrasts

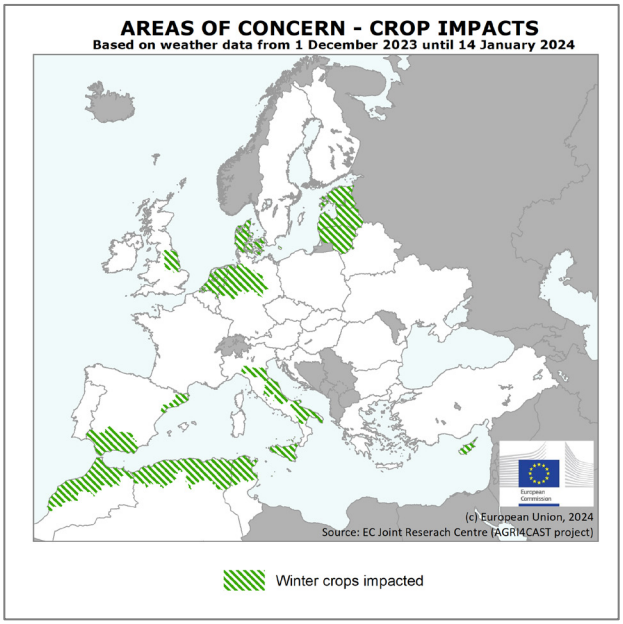
Negative impacts on crops by cold spell in the north and rain deficit in the south

After a period of relatively mild weather conditions during the final weeks of 2023, large parts of northern Europe experienced a distinct cold spell at the beginning of the New Year. Distinctly warmer than usual conditions prevailed in south-eastern Europe. A pronounced precipitation surplus continued to affect many parts of north-western, central, and eastern Europe. Mediterranean regions were affected by a marked rain deficit, which in some regions developed into a situation of drought.

In Denmark, the sudden temperature drop followed a period of abundant rainfall, which led to frozen waterlogged fields, locally associated with mechanical damage to winter crops. The sharp temperature drop in the Baltic Sea region in late December and early January likely caused frost damage to winter crops, especially in Estonia, Latvia, and Lithuania, where the snow layer was relatively thin. The cold spell affected also north-eastern Poland and most of Belarus, but lasted only 2 days in these regions, with minor, if any, damage to crops. Also in central European Russia, the cold spell is expected to have had a limited negative impact on winter crops, which are protected by a thick insulating snow layer.

A distinct precipitation surplus occurred in central parts of the United Kingdom, the Benelux countries, and large parts of central and eastern Europe. In the Benelux countries, particularly the Netherlands, rain excess and wet soils





Contents:

Covers the period from 1 December until 14 January 2024

Joint Research Centre

continued to hamper the sowing of winter crops. Some farmers took advantage of the improved soil carrying capacity during a mild frost period in early January. In Germany, Austria, Czechia, and Poland, continuous precipitation during the review period locally exceeded the LTA threefold. High precipitation accompanied by rapid snowmelt due to above-average temperatures - especially in the second half of December - further increased soil water in already overly soils, as well as river discharge; this resulted in waterlogged fields and local floods, particularly in Niedersachsen and Sachsen-Anhalt. Distinct precipitation surplus without significant negative impacts on crops occurred in Slovenia, Slovakia, Hungary, north-western Romania, and north-eastern Italy, as well as in Belarus and parts of European Russia, and Türkiye.

A marked rain deficit was observed along the Mediterranean coast in Spain, in several parts of central and southern Italy, south-western Romania, Greece, Cyprus, central Türkiye, and the Maghreb region. In Italy, drought conditions continued in Sicily, with negative impact on biomass accumulation of winter crops. In Spain, persistent rain deficit in the Mediterranean coastal regions continued hampering the sowing and initial development of winter cereals. In both countries, particularly durum wheat is affected. In Cyprus rain deficit combined with record-high temperatures (warmest since 1991) negatively impacted barley development. The rain deficit in Greece is expected to have potential negative impacts on fruit trees. In Morocco, the combination of distinctly below-average rainfall and above- average temperatures, resulted in a drought situation causing reduced crop biomass accumulation. In Algeria, similar conditions since the beginning of the winter crop season, resulted in below-average crop development in all agricultural areas of the country. The rainfall and somewhat milder temperatures during the current review period did not bring significant relief, nor did they trigger crop recovery. In Tunisia, where similar conditions prevailed, crop recovery was observed in some of the most productive regions thanks to beneficial rains in mid-December and the beginning of January.

Distinctly warmer-than-usual conditions were observed in Hungary, Slovenia, Croatia, Bulgaria, and Romania, where the period from 10 December to the first week of January was exceptionally warm; as well as in southern Ukraine, southern European Russia, and central and north-eastern Türkiye. The mild thermal conditions in these regions supported the strengthening of late-sown winter cereals, primarily in the Balkan peninsula, but weakened the low-temperature tolerance, thus increasing the risk of frost damage, particularly in southern European Russia.

1. Agrometeorological overview

1.1 Meteorological review (1 December 2022– 14 January 2024)

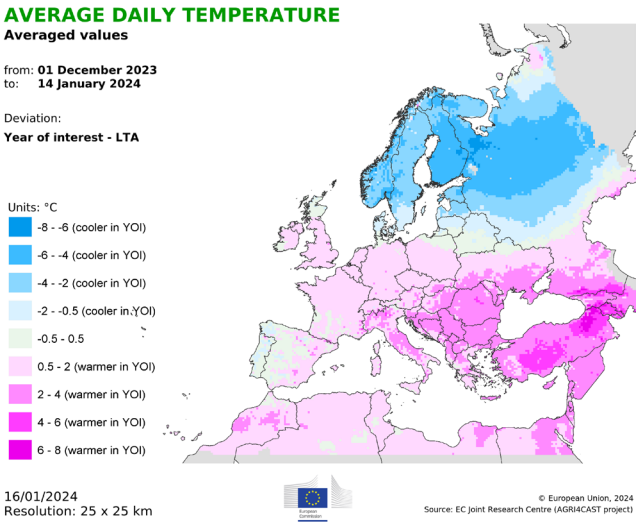
Drier- and colder-than-usual conditions prevailed in northern Europe, while it was warmer than usual in the Black Sea Region and wetter than usual in large parts of the Great European Plain.

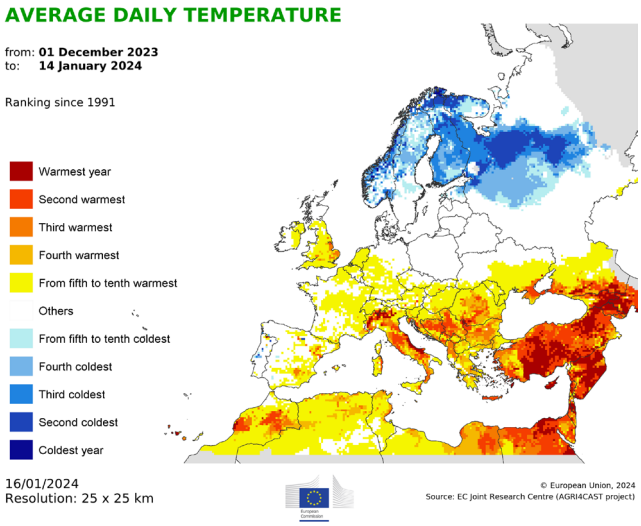
Warmer-than-usual conditions, with daily mean temperatures between 2 °C and 4 °C above the 1991–2023 long-term average (LTA), were observed in parts of Italy, Hungary and Slovakia, in most of the Balkan peninsula and in the Black Sea Region. More distinct positive temperature anomalies (4 °C to 6 °C above the LTA) were observed locally in Romania, in southernmost European Russia and in parts of Türkiye. In many of these regions, average daily temperatures ranked among the three warmest in our records since 1991.

Colder-than-usual conditions, with temperature anomalies between 2 °C and 4 °C (and in some areas as much as 6 °C) below the LTA were observed in the Scandinavian peninsula and northern European Russia, where minimum daily temperatures reached –20 °C during a cold spell in the first week of January. In some of these regions, daily average temperatures ranked among the three coldest in our records since 1991.

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 United Kingdom, across much of the North European Plain and East European Plain, and the Alps and Carpathians, 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 the Iberian peninsula, Italy, Scandinavia, the Balkan peninsula, Türkiye and northernmost European Russia. In northernmost European Russia, and locally in central Italy, the review period ranked among the three driest in our records since 1991.



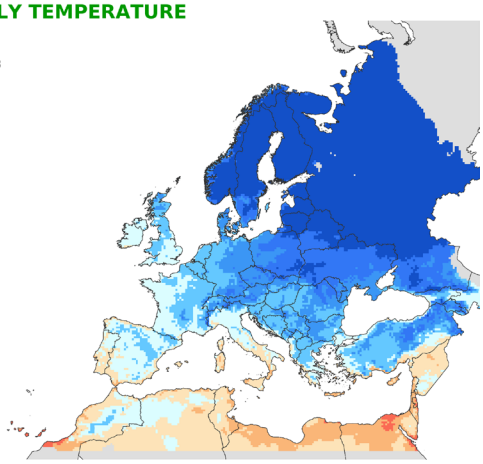


MINIMUM DAILY TEMPERATURE

Minimum values

from: **01 December 2023**
to: **14 January 2024**

Units: °C
- <= -20
- > -20 - <= -15
- > -15 - <= -10
- > -10 - <= -5
- > -5 - <= 0
- > 0 - <= 5
- > 5 - <= 10
- > 10 - <= 15
- > 15 - <= 20

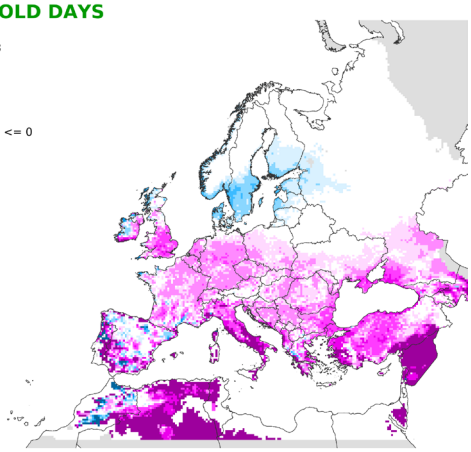


16/01/2024
Resolution: 25 x 25 km

NUMBER OF COLD DAYS

from: **01 December 2023**
to: **14 January 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



16/01/2024
Resolution: 25 x 25 km

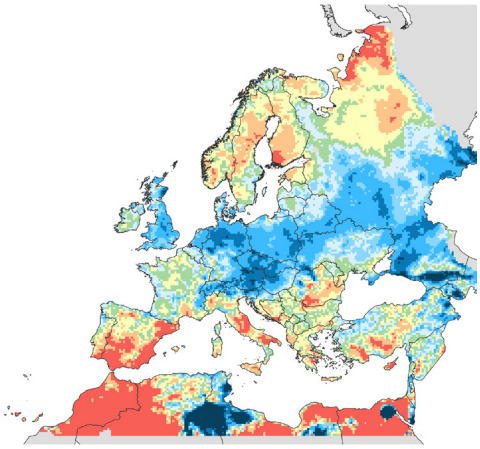
RAINFALL

Cumulative values

from: **01 December 2023**
to: **14 January 2024**

Deviation:
Year of interest - LTA

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



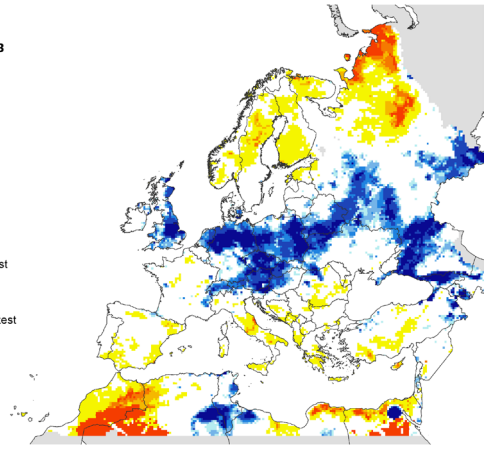
16/01/2024
Resolution: 25 x 25 km

RAINFALL

Cumulative values

from: **01 December 2023**
to: **14 January 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



16/01/2024
Resolution: 25 x 25 km

1.2 Weather forecast (19-28 January)

A low-pressure system pushes across south-eastward of the Great European Plain, bringing snow and freezing rain into central and eastern Europe. Heavy snowfall and strong winds are forecast for the Baltic Sea region.

Colder-than-usual conditions, with average daily temperatures between 0.5 °C and 2 °C (locally as much as 4 °C) below the LTA, are forecast for the southern Scandinavian peninsula and parts of central European Russia.

Warmer-than-usual conditions are forecast for most other parts of Europe. The most substantial positive anomalies, between 4 °C and 6 °C above the LTA, are forecast for the Pyrenees and Alps regions, for parts of Türkiye and in the northern Ural Mountains region in European Russia.

Dry conditions (total precipitation below 3 mm) are forecast for parts of Spain and for southern France, central and north-western Italy and Sicily.

Substantial rainfall (total precipitation above 10 mm and up to 90 mm) are forecast for most other parts of Europe. **Very wet conditions** (rainfall above 90 mm) are forecast for parts of the British Isles, for southern Norway and for the western Balkans, and along the south and east coasts of the Black Sea.

The long-range weather forecast points to a moderate likelihood of warm conditions, exceeding the 24-year climatological median by up to 1 °C in most of Europe and 2 °C in parts of southern Europe, during February–April, while precipitation is forecast to remain around the LTA in most of Europe.

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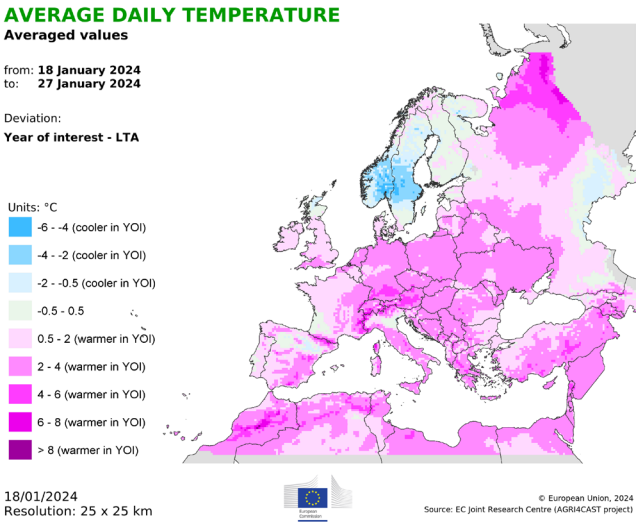
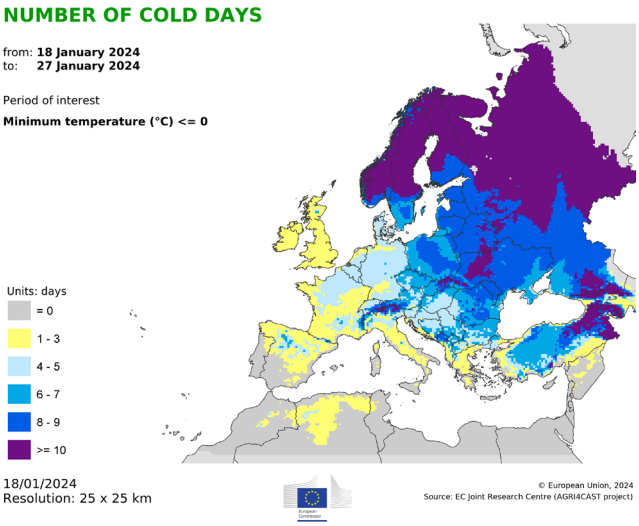
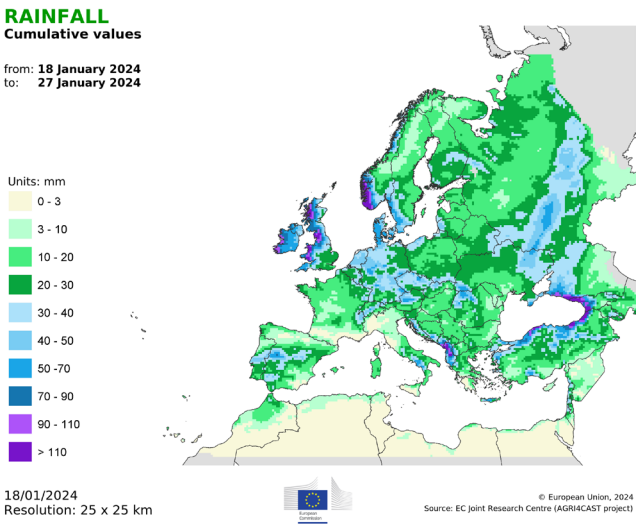
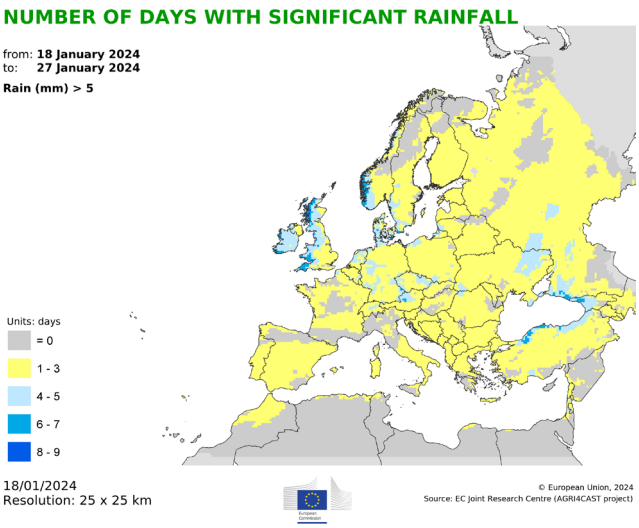
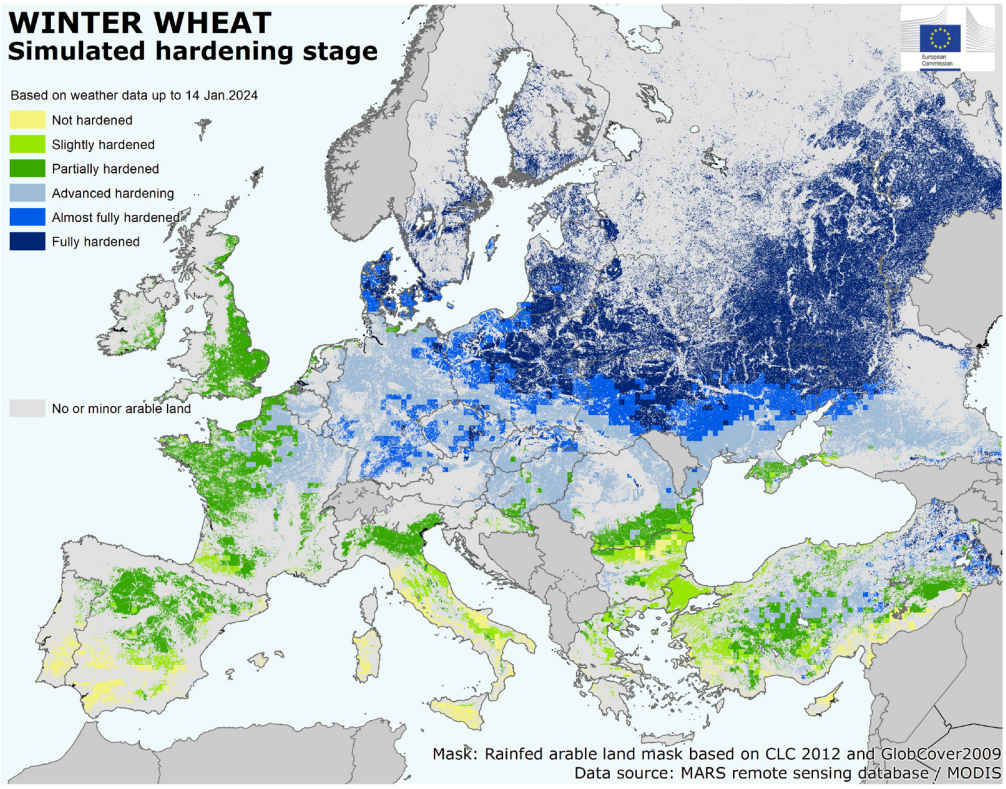








2. Winter hardening and frost kill



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

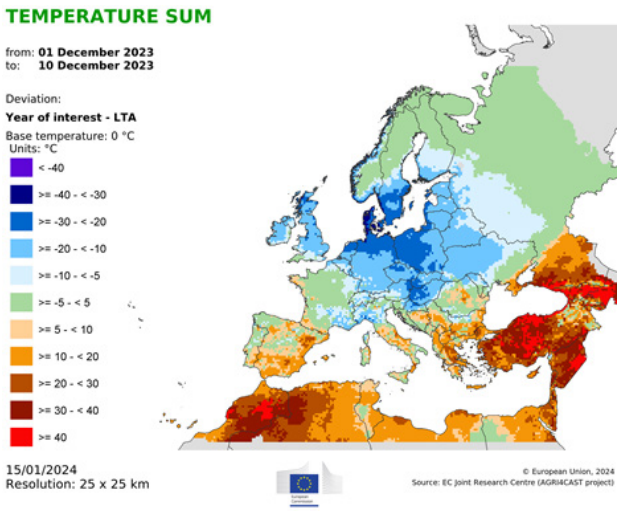
During the first dekad of December, colder-than-usual temperatures characterised central, northern and eastern Europe, with temperatures reaching – 15°C, as reported in the December edition of the bulletin. This was followed by a period of distinctly (2–6 °C) warmer-than-usual conditions until the end of 2023 in a wide belt across Europe, Türkiye and southern Russia, from the British Isles to the Volga okrug. These mild conditions slowed down the progress of the hardening and led to atypical dehardening in numerous regions. Then, a sudden and severe cold air intrusion started in northern Europe and lasted until 7 January. During this period, minimum temperatures in Czechia, Poland, Lithuania, Latvia, Belarus and northern Ukraine reached – 20 °C for a period of up to 1 week. This cold intrusion was felt most in southern Finland and in Estonia, with temperatures as low as – 25 °C for 1 week. In southern Finland temperatures dropped from -5°C to as low as -26°C within 4 days In the Baltic states, these cold temperatures occurred while soils were covered by only a thin snowpack. European Russia, except for the areas north of the Caucasus, also experienced extremely cold weather during the first half of January.

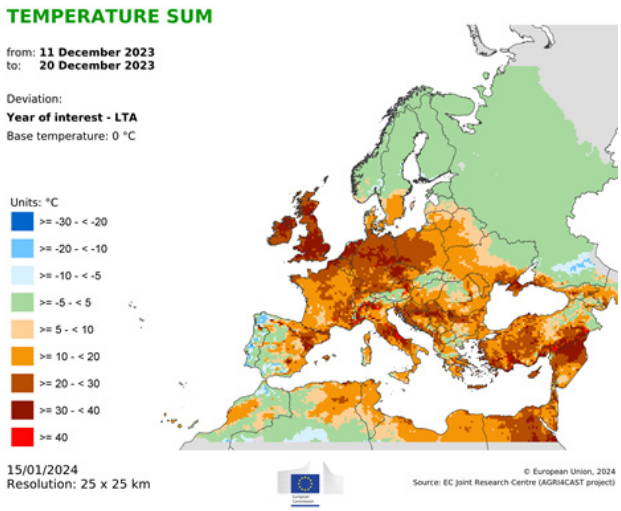
The sharp decrease in temperatures and the long duration of the cold temperatures are expected to have caused damage to winter cereals in several regions. Our model simulations indicate considerable frost kill damage in the Baltic states, especially in regions with low snow accumulation, and possibly in the Volga okrug. Less severe local frost damage is expected in Sweden, Finland and southern European Russia (Southern and North Caucasian okrugs). Considering the sudden cooling in January and the absence of a thick snowpack, north-eastern Germany and western areas of Poland are expected to have suffered minor damage. In northern Germany and in Denmark, the combination of waterlogged soils and low temperatures led to freezing on the fields, potentially damaging or further exhausting winter crops.

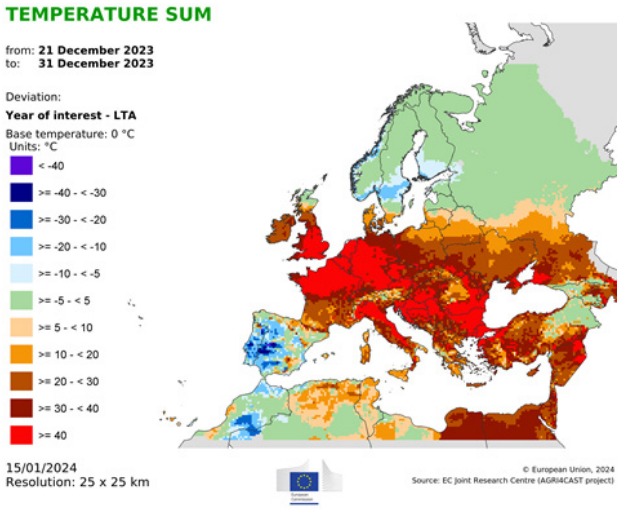
The hardening of crops progressed well during the review period despite the warm temperatures in the second half of December. Wheat has almost or fully hardened in Scandinavia, Poland, the Baltic states, Belarus, northern Ukraine and most of Russia, while advanced hardening has been noted in the Benelux countries, Germany, Austria, Czechia, Hungary, Slovakia, Romania, southern Ukraine and southern Russia. Winter wheat has slightly or partially hardened in Spain, France, Ireland, the United Kingdom, Italy, Bulgaria, Greece, and most of Türkiye.

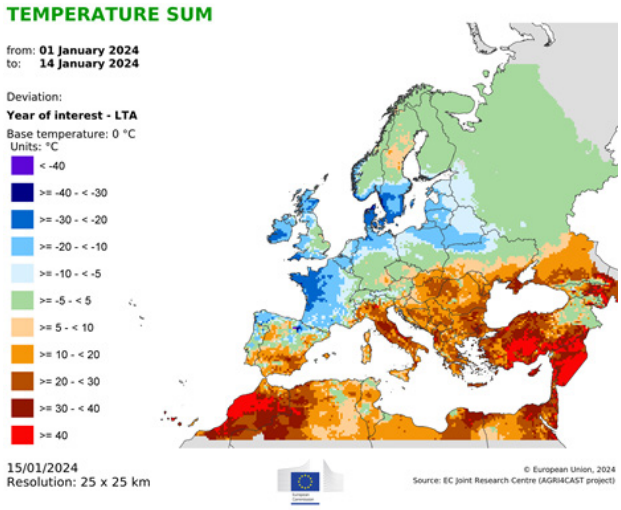
3. Atlas

Temperature regime









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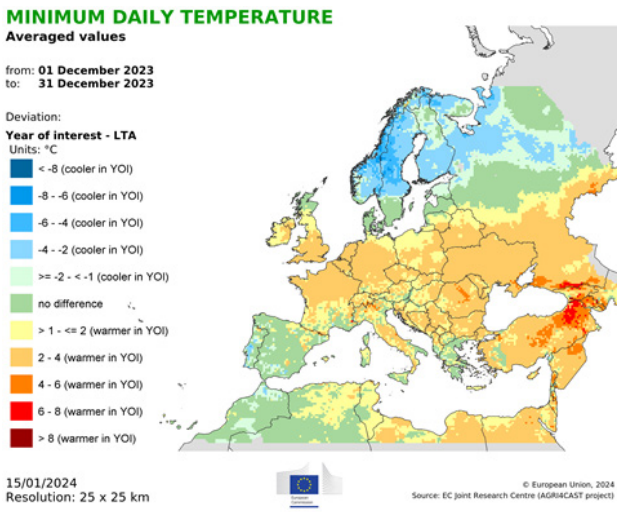
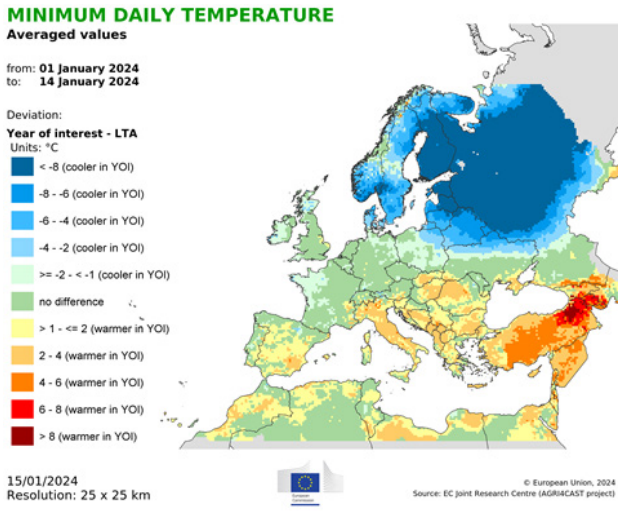
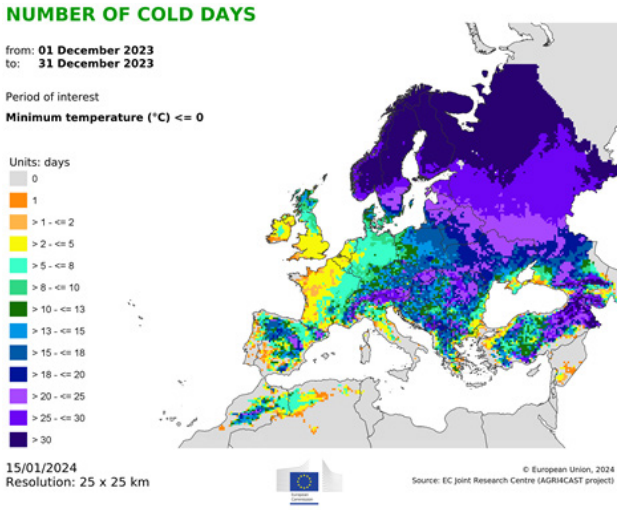
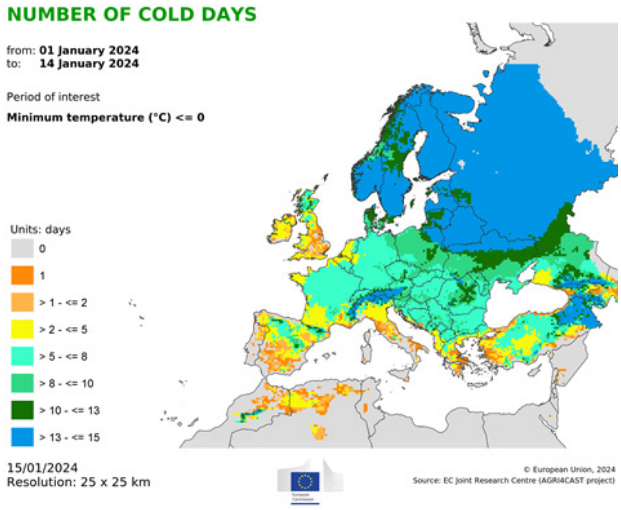
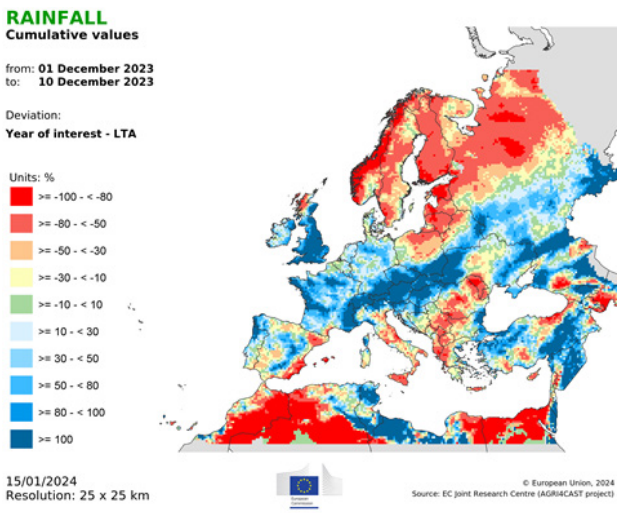


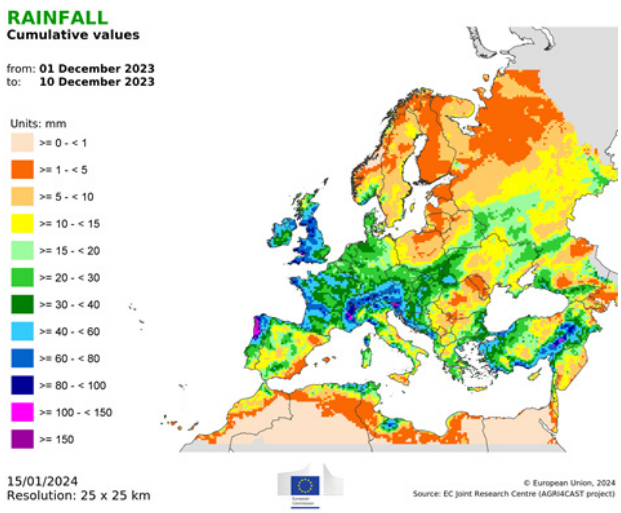


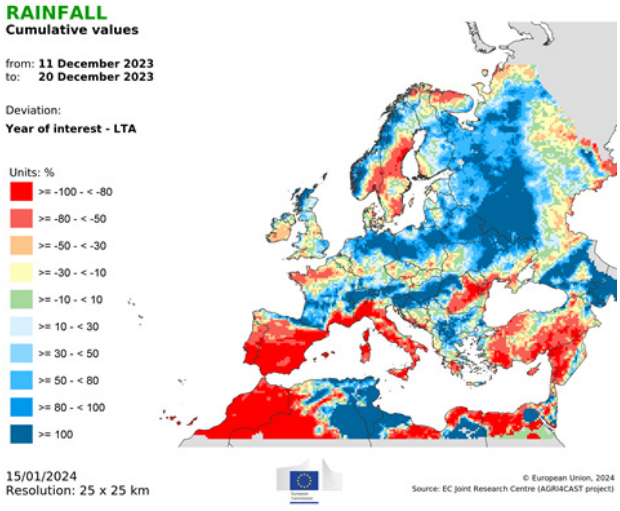


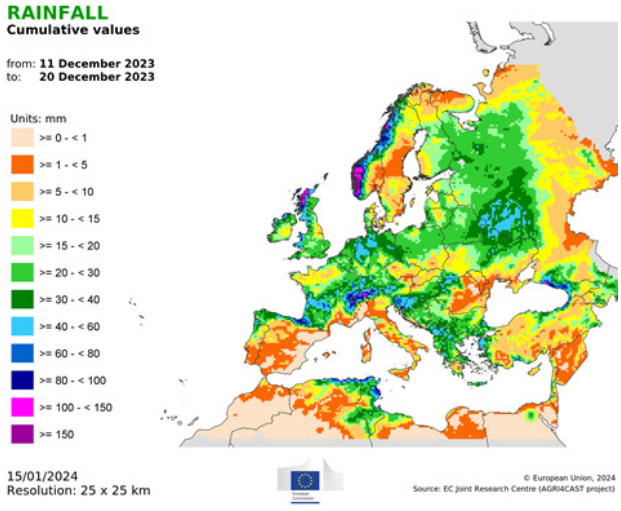


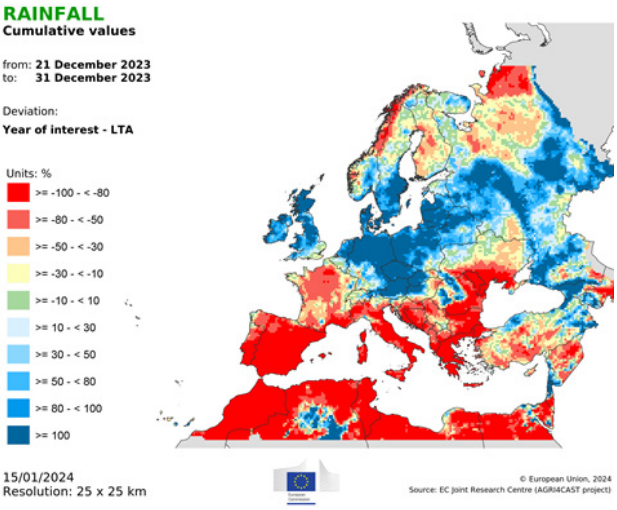
Precipitation

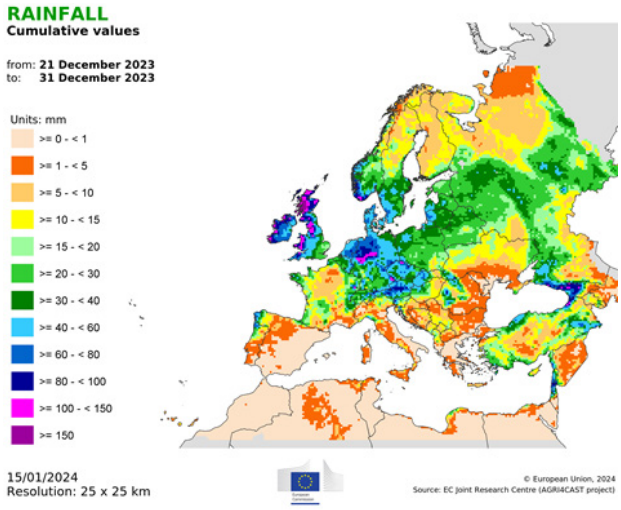


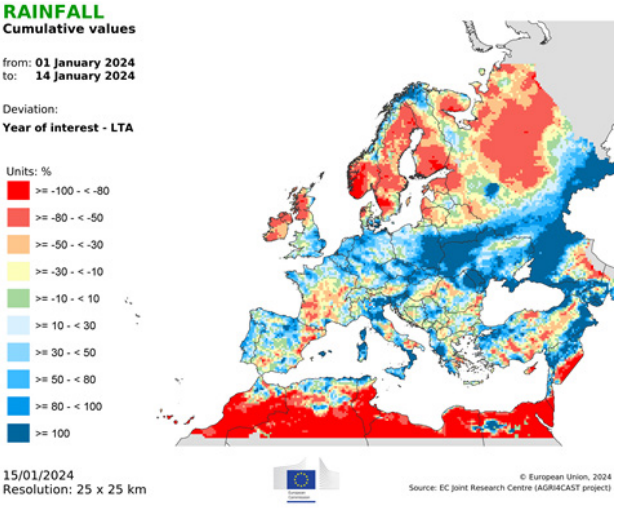


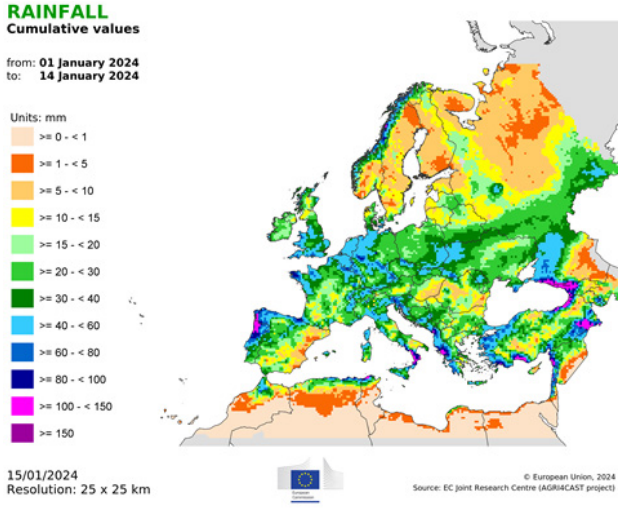





RAINFALL
Cumulative values
from: 21 December 2023
to: 31 December 2023
Deviation:
Year of interest - LTA
Units: %
>= -100 - < -80
>= -80 - < -50
>= -50 - < -30
>= -30 - < -10
>= -10 - < 10
>= 10 - < 30
>= 30 - < 50
>= 50 - < 80
>= 80 - < 100
>= 100
15/01/2024
Resolution: 25 x 25 km
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)


RAINFALL
Cumulative values
from: 21 December 2023
to: 31 December 2023
Units: mm
>= 0 - < 1
>= 1 - < 5
>= 5 - < 10
>= 10 - < 15
>= 15 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40 - < 60
>= 60 - < 80
>= 80 - < 100
>= 100 - < 150
>= 150
15/01/2024
Resolution: 25 x 25 km
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)


RAINFALL
Cumulative values
from: 01 January 2024
to: 14 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
15/01/2024
Resolution: 25 x 25 km
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)


RAINFALL
Cumulative values
from: 01 January 2024
to: 14 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
15/01/2024
Resolution: 25 x 25 km
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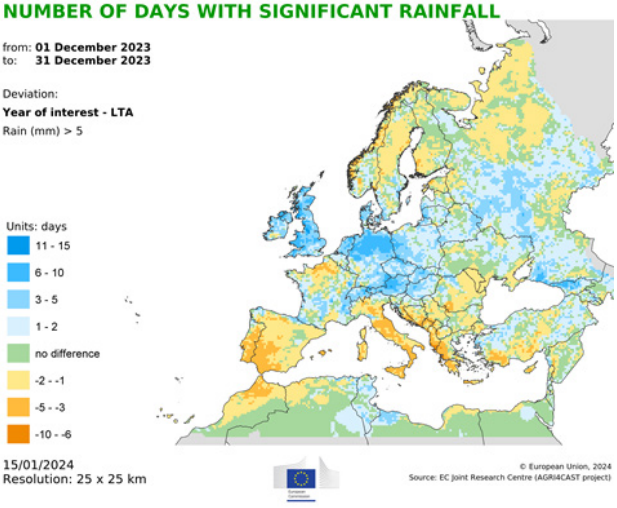
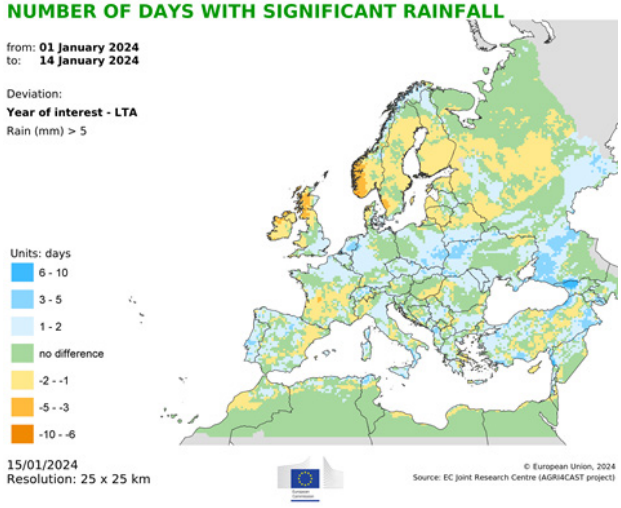
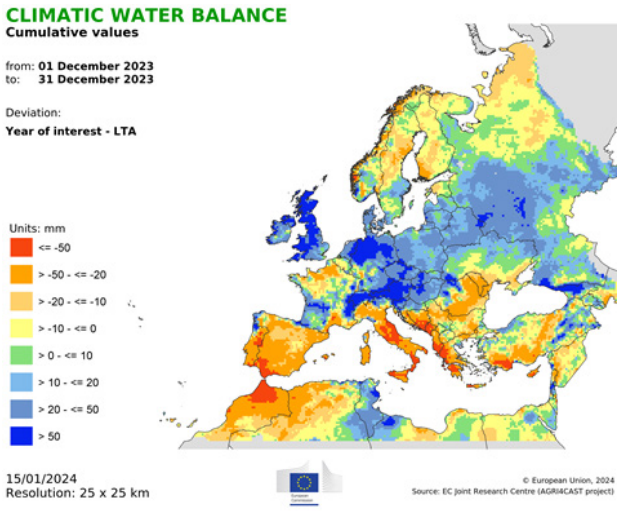
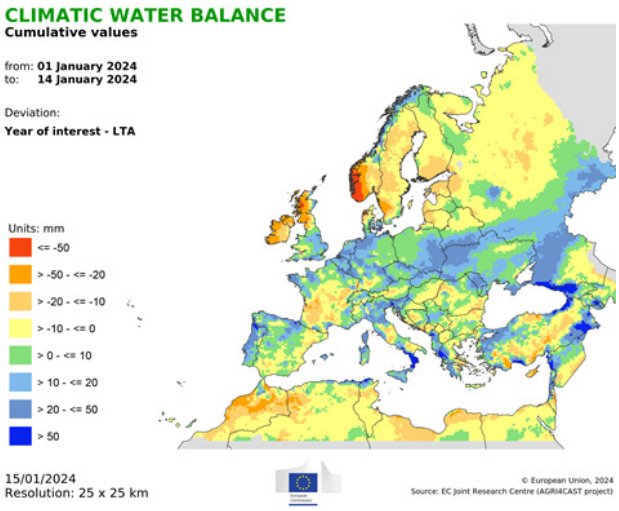
Source: EC Joint Research Centre (AGRI4CAST project)


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from: 01 December 2023
to: 31 December 2023
Deviation:
Year of interest - LTA
Rain (mm) > 5
Units: days
11 - 15
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
-10 - -6
15/01/2024
Resolution: 25 x 25 km
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)


NUMBER OF DAYS WITH SIGNIFICANT RAINFALL
from: 01 January 2024
to: 14 January 2024
Deviation:
Year of interest - LTA
Rain (mm) > 5
Units: days
6 - 10
3 - 5
1 - 2
no difference
-2 - -1
-5 - -3
-10 - -6
15/01/2024
Resolution: 25 x 25 km
© European Union, 2024
Source: EC Joint Research Centre (AGRI4CAST project)

Climatic water balance





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
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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.

Mission statement
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