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MARS AGROMETEOROLOGICAL Crop Monitoring in Europe

11th July to 10th September 2009

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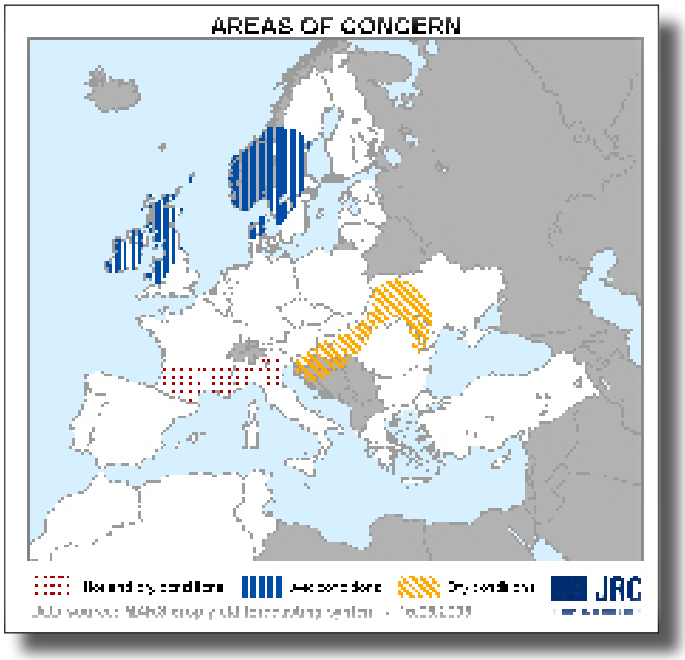
Good openings for harvesting winter crops, maize hit by dry, hot spell



Generally, typical summer conditions prevailed, but warmer in the Mediterranean areas, with some very hot days in the second half of July and mid-August.

The usual summer constellation was seen: rain was concentrated over northern latitudes and Alpine regions and practically non-existent in the Mediterranean region. Seasonal conditions prevailed in July: it was persistently dry in central Italy, Hungary and Ukraine. Frequent rain hampered harvesting in the northern EU but in general good openings for harvesting winter crops throughout Europe. Maize hit by dry, hot spell and consequently yields are downward revised for France and Romania as well as Italy and Bulgaria.

CROPS	EU27 yield forecast (t/ha) as of 15 September 2009				
	2008	2009	Average 5 years	% 2009/08	% 2009/ Average
TOTAL CEREALS	5.2	**5.0**	4.9	-4.6	+1.3
Soft wheat	6.0	**5.7**	5.6	-5.3	+1.3
Durum wheat	3.3	**3.1**	3.0	-4.3	+4.5
Total wheat	5.7	**5.4**	5.3	-5.0	+2.4
Spring barley	4.0	**3.6**	3.7	-8.3	-3.2
Winter barley	5.5	**5.3**	5.2	-2.4	+3.2
Total barley	4.5	**4.3**	4.3	-5.0	+0.2
Grain maize	7.1	**6.7**	6.7	-5.3	+0.7
Other cereals (1)	3.4	**3.2**	3.2	-5.0	+1.2
Rape seed	3.1	**3.0**	3.1	-1.4	-1.6
Sunflower	1.9	**1.7**	1.7	-11.9	-2.1
Potato	29.3	**29.3**	27.9	+0.0	+5.1
Sugar beet	66.2	**65.6**	61.8	-0.9	+6.1

Yields are forecasted for crops with more than 10000 ha per country; figures are rounded to 100 kg
(1) Sorghum, rye, maslin, oats, triticale, mixed grain other than maslin, millet, buckwheat
Sources:
2004-2008 data come from EUROSTAT CRONOS (last update: 01/09/2009) and EES (last update: 13/08/2009)
2009 yields come from MARS CROP YIELD FORECASTING SYSTEM (up to 31/08/2009)

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1. Crop yield forecasts

MARS crop yield forecasts at national level for EU27 as of 15 September 2009

Country	TOTAL WHEAT (t/ha)					SOFT WHEAT (t/ha)					DURUM WHEAT (t/ha)				
	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs
EU27	5.7	**5.4**	5.3	-5.0	+2.4	6.0	**5.7**	5.6	-5.3	+1.3	3.3	**3.1**	3.0	-4.3	+4.5
AT	5.7	**5.3**	5.3	-6.7	+0.9	5.7	**5.4**	5.3	-6.3	+1.1	5.1	**4.4**	4.5	-14.1	-2.2
BE	8.7	**8.5**	8.4	-2.2	+0.9	8.7	**8.5**	8.4	-2.2	+0.9	-	**-**	-	-	-
BG	4.2	**3.5**	3.3	-16.2	+4.8	4.2	**3.5**	3.3	-16.2	+4.8	-	**-**	-	-	-
CZ	5.8	**5.2**	5.2	-9.4	+0.5	5.8	**5.2**	5.2	-9.4	+0.5	-	**-**	-	-	-
DE	8.1	**8.0**	7.6	-1.1	+5.5	8.1	**8.0**	7.6	-1.1	+5.5	6.0	**5.5**	5.5	-6.8	+1.6
DK	7.9	**7.3**	7.2	-7.1	+2.4	7.9	**7.3**	7.2	-7.1	+2.4	-	**-**	-	-	-
EE	3.2	**2.9**	2.9	-7.0	+0.5	3.2	**2.9**	2.9	-7.0	+0.5	-	**-**	-	-	-
ES	3.2	**3.0**	2.9	-8.1	+1.6	3.6	**3.2**	3.2	-12.3	-2.0	2.2	**2.6**	2.3	+17.5	+9.0
FI	3.6	**3.7**	3.6	+3.8	+3.0	3.6	**3.7**	3.6	+3.8	+3.0	-	**-**	-	-	-
FR	7.1	**7.2**	6.9	+1.8	+4.3	7.3	**7.4**	7.1	+2.0	+4.4	4.9	**4.9**	4.8	-0.3	+2.6
GR	3.0	**2.8**	2.4	-5.0	+19.3	3.0	**2.9**	2.8	-2.5	+5.6	2.9	**2.8**	2.2	-5.7	+23.0
HU	5.0	**4.0**	4.5	-19.5	-9.3	5.0	**4.0**	4.5	-19.5	-9.3	4.3	**3.9**	4.2	-8.8	-7.0
IE	9.1	**9.1**	9.0	+0.3	+0.5	9.1	**9.1**	9.0	+0.3	+0.5	-	**-**	-	-	-
IT	3.9	**3.5**	3.7	-10.1	-4.9	5.4	**4.9**	5.3	-8.2	-7.0	3.2	**2.8**	3.0	-11.6	-4.9
LT	4.3	**3.9**	3.7	-7.9	+7.3	4.3	**3.9**	3.7	-7.9	+7.3	-	**-**	-	-	-
LU	6.7	**6.4**	6.2	-4.5	+2.4	6.7	**6.4**	6.2	-4.5	+2.4	-	**-**	-	-	-
LV	3.9	**3.5**	3.4	-8.9	+4.8	3.9	**3.5**	3.4	-8.9	+4.8	-	**-**	-	-	-
NL	8.7	**8.7**	8.4	-0.4	+3.6	8.7	**8.7**	8.4	-0.4	+3.6	-	**-**	-	-	-
PL	4.1	**4.0**	3.9	-1.4	+3.0	4.1	**4.0**	3.9	-1.4	+3.0	-	**-**	-	-	-
PT	2.3	**1.4**	1.8	-37.3	-18.7	2.3	**1.4**	1.8	-37.3	-18.7	-	**-**	-	-	-
RO	3.4	**2.6**	2.8	-22.4	-6.6	3.4	**2.6**	2.8	-22.4	-6.6	-	**-**	-	-	-
SE	6.1	**6.2**	6.0	+0.9	+2.2	6.1	**6.2**	6.0	+0.9	+2.2	-	**-**	-	-	-
SI	4.5	**4.3**	4.4	-4.9	-2.6	4.5	**4.3**	4.4	-4.9	-2.6	-	**-**	-	-	-
SK	4.9	**4.1**	4.3	-16.7	-6.0	4.9	**4.1**	4.3	-16.7	-6.0	-	**-**	-	-	-
UK	8.3	**7.9**	7.9	-4.4	+0.4	8.3	**7.9**	7.9	-4.4	+0.4	-	**-**	-	-	-

Country	TOTAL BARLEY (t/ha)					GRAIN MAIZE (t/ha)					RAPE SEED (t/ha)				
	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs
EU27	4.5	**4.3**	4.3	-5.0	+0.2	7.1	**6.7**	6.7	-5.3	+0.7	3.1	**3.0**	3.1	-1.4	-1.6
AT	5.2	**4.8**	4.7	-7.3	+1.9	11.1	**10.8**	10.0	-2.2	+8.7	3.1	**2.8**	3.1	-9.3	-10.1
BE	8.1	**8.4**	8.1	+4.8	+4.9	11.9	**10.9**	11.6	-8.6	-6.0	-	**-**	-	-	-
BG	3.9	**3.2**	3.0	-18.8	+5.4	4.2	**4.2**	4.2	-0.1	-1.1	2.6	**2.1**	2.0	-18.6	+6.0
CZ	4.6	**3.9**	4.2	-15.4	-7.2	7.5	**7.3**	6.9	-3.3	+6.0	2.9	**2.8**	3.1	-6.3	-11.0
DE	6.1	**6.3**	6.0	+3.9	+5.8	9.8	**9.5**	9.1	-3.1	+4.3	3.8	**3.9**	3.8	+4.4	+4.4
DK	4.7	**5.3**	5.0	+13.6	+6.7	-	**-**	-	-	-	3.7	**3.8**	3.5	+1.9	+8.4
EE	2.6	**2.4**	2.4	-7.4	-3.2	-	**-**	-	-	-	1.4	**1.6**	1.5	+10.3	+1.4
ES	3.3	**2.4**	2.8	-26.4	-16.0	9.9	**10.3**	9.9	+3.5	+3.6	2.0	**1.3**	1.6	-32.1	-17.1
FI	3.5	**3.5**	3.4	+2.1	+3.3	-	**-**	-	-	-	1.3	**1.3**	1.2	-3.6	+2.7
FR	6.8	**6.5**	6.4	-3.7	+2.8	9.1	**8.7**	8.9	-4.3	-1.9	3.3	**3.5**	3.3	+4.1	+5.4
GR	2.5	**2.5**	2.5	-2.1	+0.7	10.3	**9.8**	9.5	-5.3	+2.9	-	**-**	-	-	-
HU	4.4	**3.0**	3.9	-31.8	-21.4	7.5	**6.1**	6.5	-17.8	-5.8	2.6	**2.3**	2.5	-12.3	-6.5
IE	6.9	**6.4**	6.8	-7.1	-5.5	-	**-**	-	-	-	-	**-**	-	-	-
IT	3.8	**3.6**	3.8	-5.6	-4.6	9.6	**9.2**	9.3	-3.9	-1.3	2.3	**2.2**	1.9	-5.7	+12.9
LT	2.9	**2.6**	2.6	-11.2	-1.5	-	**-**	-	-	-	2.0	**1.9**	1.8	-6.8	+7.8
LV	2.2	**2.3**	2.3	+3.4	+2.8	-	**-**	-	-	-	2.4	**2.1**	2.0	-10.8	+8.0
NL	6.1	**6.4**	5.9	+5.2	+7.2	11.4	**11.8**	11.3	+3.6	+4.5	-	**-**	-	-	-
PL	3.0	**3.1**	3.1	+3.5	-0.3	5.8	**5.8**	5.6	-0.6	+3.3	2.7	**2.7**	2.7	-0.7	-1.1
PT	2.3	**1.5**	1.8	-34.5	-16.7	6.4	**6.0**	5.5	-6.1	+8.8	-	**-**	-	-	-
RO	3.0	**2.4**	2.5	-21.4	-3.4	3.2	**3.1**	3.4	-3.0	-7.0	1.8	**1.6**	1.6	-11.8	-0.8
SE	4.2	**4.6**	4.2	+9.6	+9.7	-	**-**	-	-	-	2.9	**2.8**	2.6	-4.4	+6.4
SI	4.0	**3.7**	3.8	-6.1	-2.1	7.3	**7.9**	7.6	+7.6	+4.0	-	**-**	-	-	-
SK	4.4	**3.7**	3.7	-16.3	-2.2	7.4	**6.1**	6.0	-17.7	+2.9	2.6	**2.4**	2.4	-8.6	+1.0
UK	6.0	**5.9**	5.9	-0.5	+1.0	-	**-**	-	-	-	3.3	**3.0**	3.2	-9.3	-6.3

Note: Yields are forecasted for crops with more than 10000 ha per country; figures are rounded to 100 kg
Sources: 2004-2008 data come from EUROSTAT CRONOS (last update: 01/09/2009) and EES (last update: 13/08/2009)
2009 yields come from MARS CROP YIELD FORECASTING SYSTEM (up to 31/08/2009)

MARS crop yield forecasts at national level for EU27 as of 15 September 2009

Country	SUNFLOWER (t/ha)					SUGAR BEET (t/ha)					POTATO (t/ha)				
	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs
EU27	1.9	**1.7**	1.7	-11.9	-2.1	66.2	**65.6**	61.8	-0.9	+6.1	29.3	**29.3**	27.9	+0.0	+5.1
AT	3.0	**2.6**	2.6	-12.4	-0.1	71.8	**68.6**	66.7	-4.5	+2.9	33.2	**31.2**	31.7	-6.0	-1.6
BE	-	**-**	-	-	-	73.3	**69.2**	70.4	-5.6	-1.7	46.1	**44.7**	44.6	-3.2	+0.2
BG	1.8	**1.5**	1.5	-17.3	-2.3	-	**-**	-	-	-	16.3	**17.7**	15.9	+8.6	+10.8
CZ	2.5	**2.3**	2.3	-6.7	+3.3	57.3	**56.5**	53.1	-1.3	+6.4	25.8	**25.6**	25.3	-0.9	+1.0
DE	2.0	**2.3**	2.2	+15.2	+0.5	61.9	**62.5**	60.8	+1.0	+2.8	43.8	**44.7**	41.8	+2.2	+7.0
DK	-	**-**	-	-	-	55.4	**55.0**	57.0	-0.7	-3.6	35.0	**38.8**	37.8	+10.8	+2.7
ES	1.1	**0.8**	1.0	-25.4	-18.2	76.3	**72.9**	71.5	-4.5	+2.0	27.8	**28.8**	27.6	+3.6	+4.5
FI	-	**-**	-	-	-	34.4	**38.4**	37.7	+11.6	+1.8	25.8	**26.9**	23.7	+4.0	+13.3
FR	2.6	**2.3**	2.4	-9.3	-3.4	86.5	**85.2**	82.4	-1.4	+3.5	43.2	**44.6**	43.3	+3.2	+3.1
GR	-	**-**	-	-	-	65.4	**62.0**	63.8	-5.3	-2.9	25.3	**25.6**	24.4	+0.9	+4.7
HU	2.7	**2.5**	2.3	-7.3	+8.3	59.2	**56.8**	52.4	-4.1	+8.3	25.7	**23.1**	24.9	-10.2	-7.2
IE	-	**-**	-	-	-	-	**-**	-	-	-	31.1	**31.8**	34.9	+2.1	-9.0
IT	2.2	**2.1**	2.2	-1.8	-2.1	62.3	**58.4**	54.0	-6.2	+8.1	25.6	**25.5**	25.2	-0.4	+1.1
LT	-	**-**	-	-	-	39.0	**41.8**	40.4	+7.1	+3.4	14.8	**13.2**	11.7	-10.9	+12.4
LV	-	**-**	-	-	-	-	**-**	-	-	-	17.8	**15.7**	14.6	-11.6	+7.6
NL	-	**-**	-	-	-	72.2	**73.1**	67.0	+1.2	+9.2	46.0	**45.6**	43.8	-1.0	+4.1
PL	-	**-**	-	-	-	46.5	**49.1**	45.2	+5.7	+8.7	19.8	**19.2**	18.7	-2.6	+2.8
PT	-	**-**	-	-	-	-	**-**	-	-	-	14.6	**14.7**	15.0	+1.0	-1.5
RO	1.4	**1.3**	1.3	-9.2	-1.5	38.3	**36.3**	30.9	-5.3	+17.5	14.3	**15.4**	14.3	+7.4	+7.2
SE	-	**-**	-	-	-	53.7	**53.2**	50.4	-0.8	+5.5	31.6	**28.9**	29.8	-8.6	-3.1
SK	2.6	**2.3**	2.2	-10.6	+4.6	61.1	**52.7**	50.6	-13.7	+4.0	17.2	**16.0**	15.7	-6.8	+2.1
UK	-	**-**	-	-	-	62.5	**62.2**	58.3	-0.5	+6.6	42.7	**43.4**	41.6	+1.5	+4.2

Note: Yields are forecasted for crops with more than 10000 ha per country; figures are rounded to 100 kg
Sources: 2004-2008 data come from EUROSTAT CRONOS (last update: 01/09/2009) and EES (last update: 13/08/2009)
2009 yields come from MARS CROP YIELD FORECASTING SYSTEM (up to 31/08/2009)

MARS crop yield forecasts at national level for Black Sea and Maghreb as of 15 September 2009

Country	WHEAT (t/ha)					BARLEY (t/ha)					GRAIN MAIZE (t/ha)				
	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs
DZ	-	**1.6**	1.4	-	+11.4	-	**1.7**	1.5	-	+16.1	-	**-**	-	-	-
MA	-	**2.1**	1.4	-	+51.7	-	**1.4**	0.8	-	+74.3	-	**1.1**	0.9	-	+24.6
TN	-	**1.9**	1.6	-	+18.6	-	**1.1**	0.9	-	+18.4	-	**-**	-	-	-
TR	-	**2.3**	2.3	-	-0.5	-	**2.5**	2.5	-	+0.8	-	**6.8**	6.6	-	+2.2
UA	-	**2.2**	2.7	-	-19.2	-	**1.7**	2.0	-	-17.8	-	**3.7**	3.8	-	-3.7

Country	RAPE SEED (t/ha)					SUNFLOWER (t/ha)				
	2008	2009	Avg 5yrs	%09/08	%09/5yrs	2008	2009	Avg 5yrs	%09/08	%09/5yrs
UA	-	**1.4**	1.4	-	+2.4	-	**1.0**	0.9	-	+7.5

Note: Yields are forecasted for crops with more than 10000 ha per country; figures are rounded to 100 kg
Sources: FAO statistical database - 2008 data not yet available, therefore the 5-yrs average is computed on 2004-2007
2009 yields come from MARS CROP YIELD FORECASTING SYSTEM (CGMS output up to 31/08/2009)

Abstract

The 5th 2009 printed MARS Bulletin (Vol. 17, No. 5) covers meteorological analysis and crop yield forecasts for the period 11 July to 10 September 2009.

Previous related analysis available:

—Forecast update, 11/07/2009 to 20/08/2009, (FU2009/2)

—Climatic update, 11/08/2009 to 10/09/2009, (CU2009/8)

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Vol. 17, No. 6: 01 - 31 October 2009 analysis and forecasts.

Contributions

The ***MARS technical report*** is an EC publication from JRC/IPSC MARS Unit-AGRI4CAST Action

Head of Unit: S. Kay.

Editor: B. Baruth.

Analysis and reports: M. Bettio, A. Bussay, M. Erlandsson Holsteyns, W. Kasperska-Wolowicz, F. Micale, G. Narciso, L. Nisini, A. Rosenmund, L. Seguini.

Reporting support: C. Aspinall.

Data production: P.A. Bianchi, I. Cerrani, D. Fanchini (JRC/IPSC/MARS); Alterra (Nl)/Vito (BE)/Meteoc-It (Nl) Consortium, Meteofrance (FR).

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MARS Agrometeorological web database is accessible at: http://www.marsop.info

MARS stands for Monitoring Agricultural Resources.

Technical note

The long-term average used within this bulletin as a reference is based on an archive of data covering 1975–2008.

The CNDVI is an unmixed normalised vegetation index on the base of Corine land cover 2000 for arable land or grassland.

Disclaimer

The geographic borders are purely a graphical representation and are only intended to be indicative. These boundaries do not necessarily reflect the official EC position.

Contact information

For any questions contact the editorial staff at: JRC — IPSC, T.P. 483, I-21027 Ispra (VA), Italy

E-mail: agri4cast@jrc.ec.europa.eu - Tel.: (39) 03 32 78 60 70 - Fax: (39) 03 32 78 30 33

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2. Agrometeorological overview

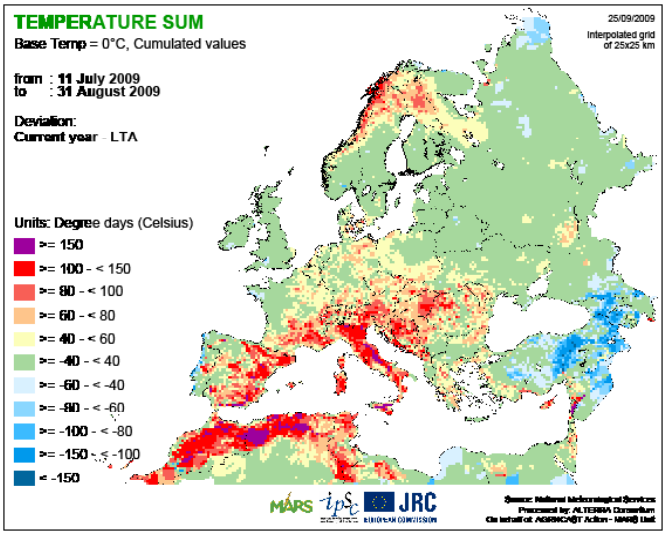
2.1 Temperature and evapotranspiration

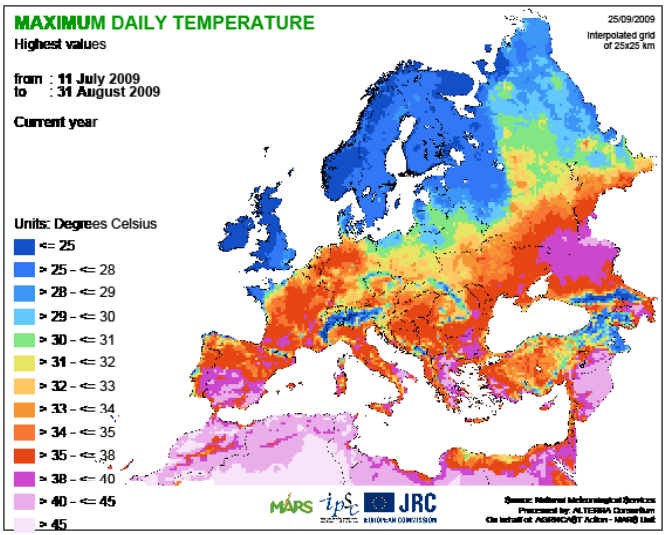
Large temperature fluctuation in July (with extremely high temperatures in the southern EU), more seasonal in August, except in the southern EU.

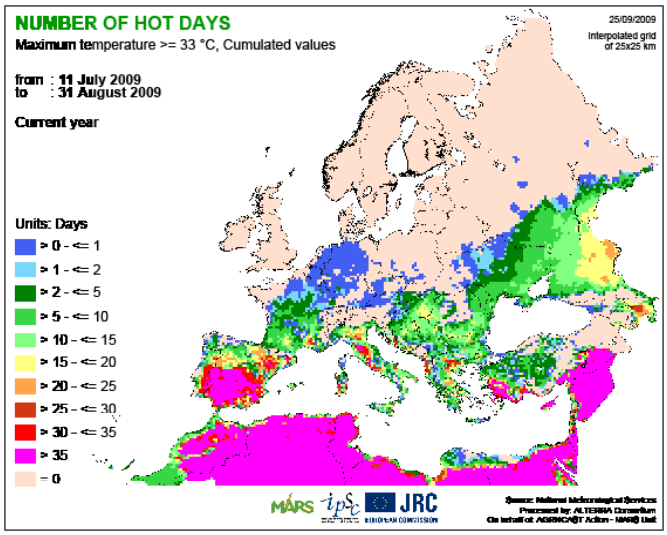
As a whole, with the exception of local and/or temporary stressing conditions, the summer weather followed a seasonal pattern. From June onwards, the Azorean anticyclone was stable and persistent throughout the period covered and influenced the weather, especially in the Mediterranean region. This is reflected in the very limited departures of the cumulated values of the active temperatures (Tbase = 0°C) from the long-term average (LTA). However, differences estimated at around 100 to 120 growing degree days (GDD), but perceptually very limited, appeared in EU areas close to the Mediterranean shores - Italy, southern France and southern and eastern Spain - and in the Maghreb countries and former Yugoslavia. Therefore, the thermal conditions were generally favourable for crops, except in the above-mentioned areas, where spring crops in particular, with a higher Tbase growing temperature, were slowly but steadily accelerated by the warmer conditions.

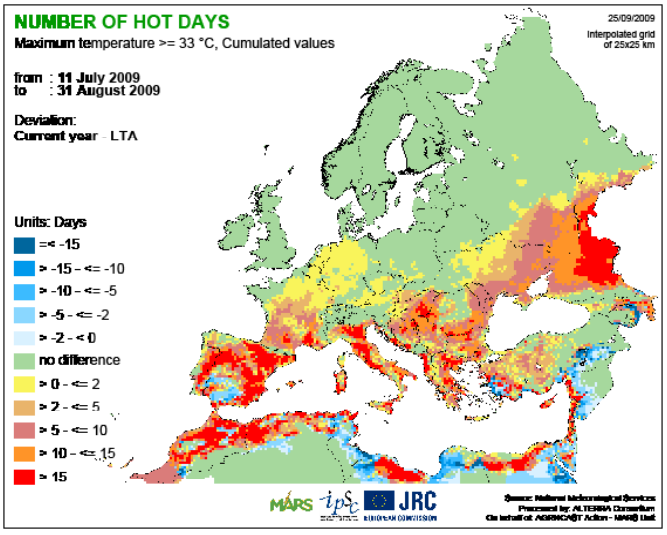
July was marked by large temperature fluctuations. At the beginning, as in June, seasonal temperatures were observed, but between 18 and 20 July the temperatures dropped by more than 10°C in France, Germany and eastern Europe before climbing to new peaks in the next few days. On 25 July (when an influx of hot air from Africa invaded the whole southern part of the EU), a sudden but temporary (in fact the number of 'hot days', with maximum temperatures above 33°C, was limited) temperature peak occurred: 45.8°C in Murcia, 45°C in Sicily, 43.5°C in central Greece, 42.5°C in Apulia, 41°C in central and southern Bulgaria, 42°C in Andalucia and Almeria, etc.

In August temperatures generally remained within the normal ranges of variation (+/- 2° standard deviation), with only a few significant outliers. In the southern EU in particular the maximum daily values fluctuated primarily around the upper end of that range, therefore pushing the cumulated values of the active temperatures (Tbase 0°C and 10°C) above the seasonal averages. Moreover, in mid-August temperatures above 38°C were recorded in Andalucia, Extremadura, Alentejo, south-western France and central Italy, but also above 35°C in northern Germany, central France, the Benelux countries and central and northern Italy. These high temperatures accelerated cereal desiccation, favouring harvesting in the northern latitudes,









but also created heat-stress conditions for the crops still growing (e.g. maize in France and Italy), blocking biomass accumulation and raising crop water requirements.

The **potential evapotranspiration** was influenced not only by the temperatures but also by the higher levels of solar radiation recorded. Therefore, in July large departures from the cumulated LTA values were seen along the eastern flank of the EU (mainly in the Czech Republic, Slovakia, Slovenia, southern Poland, eastern Romania and Bulgaria), mirrored in August in the northern areas (north-east Germany, the Benelux countries, northern France and the eastern UK).

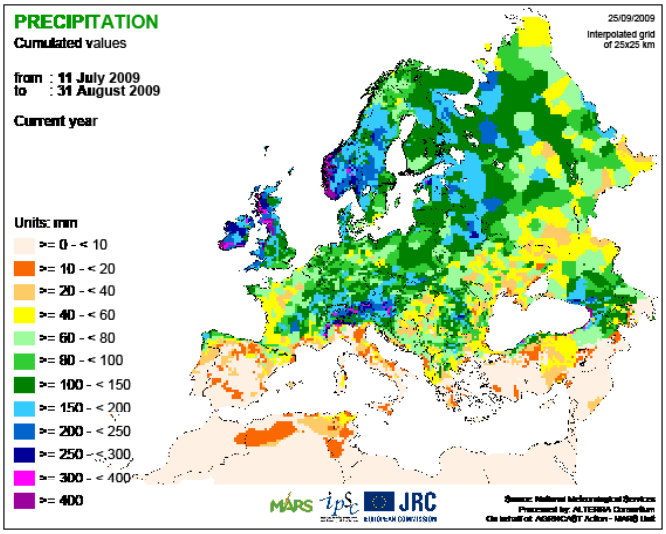
2.2 Rainfall and climatic water balance

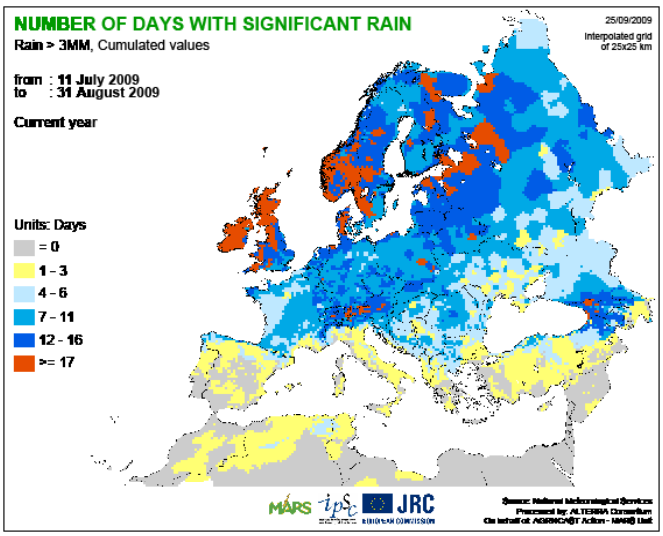
The usual summer constellation was seen: rain was concentrated over northern latitudes and Alpine regions and practically non-existent in the Mediterranean region. Seasonal conditions prevailed in July: it was persistently dry in central Italy, Hungary and Ukraine. Frequent rain hampered harvesting in the northern EU.

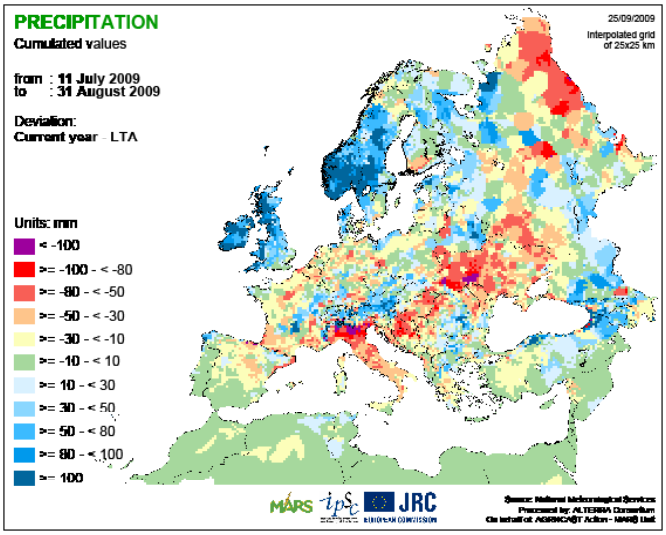
Similarly to temperatures, rainfall also followed a fairly seasonal pattern, although with exceptions over some areas. In general, quantitatively the rainfall was closer to the seasonal average in July than in August. Water shortages (50-80 mm) were recorded in northern Italy (the driest since 1975 and similar to 2003, when, however, the water deficit was due more to the higher evapotranspiration) and also in southern and northern Germany and Ukraine. However, the cumulated rainfall over the two months basically showed persistent water deficits in only northern Italy, which had been suffering since the beginning of May (almost 60 % deficit, equivalent to 150 to 200 mm), western Ukraine (40 % deficit in August) and, to a lesser extent, in Hungary.

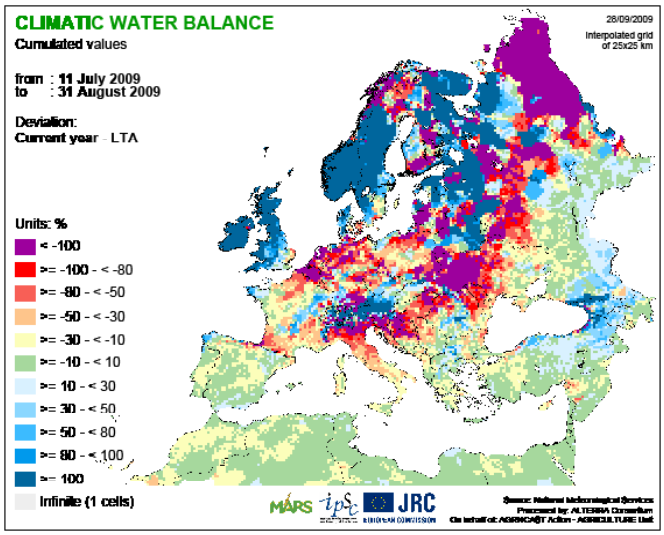
In **July** the Azorean anticyclone prevented the rain from reaching the Mediterranean region and the rain was more abundant and persistent in central and northern Europe, particularly in the British Isles (surpluses of 200 to 300 % in western and northern UK and 140 % in Ireland), Scandinavia, eastern France (80 % surplus in Alsace), the northern Czech Republic (70 %) and south-western Germany (80 % surplus in Baden-Wuerttemberg). In these areas the rain was spread over several rainy days, which hampered field operations (harvesting, drilling, field preparation, haymaking, etc.). By contrast, low amounts of rain were recorded in southern Hungary (80 % deficit), the Po valley (80 % deficit, equivalent to 30 mm of rain) and western Ukraine (90 %).

In **August** the rain was even more concentrated in the higher latitudes (Scotland, Ireland, Norway and Austria) but was again scarce in the Mediterranean region and also in the central EU and Ukraine. The worst-hit areas were









northern Italy (Po valley: 50 % deficit) and western Ukraine (80 %) again plus also northern Germany (70 % deficit). In these areas, by the end of August the climatic water balance showed very large deficits, making summer 2009 one of the driest since 1975. The opposite situation was recorded in Scotland, Wales and Ireland, where this summer was the one of the wettest in the time series considered.

3. Country-by-country analysis of the season

E U - 27

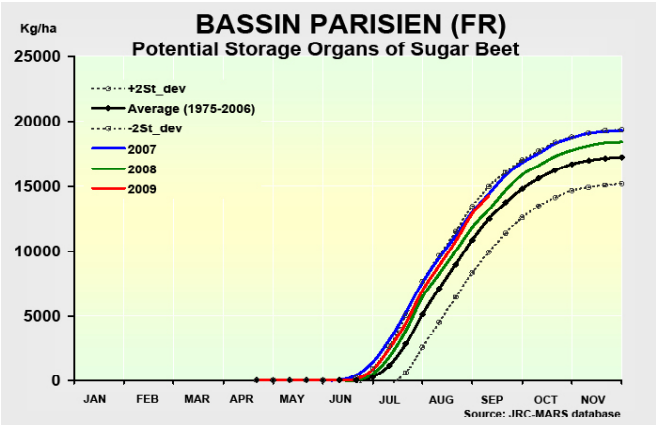
France: very high temperatures and persistent rain shortage reduced the good potential

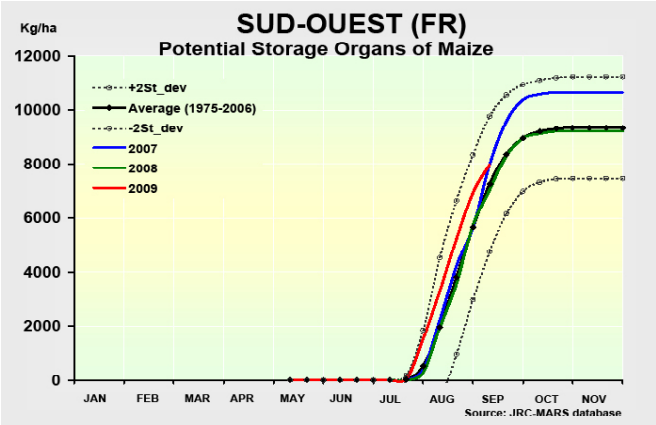
Summer crop yields have been revised downwards due to the very high temperatures recorded in July and August: **sugar beet** to 85.2 t/ha (down by 1.4 % compared with 2008, but still 3.5 % up on the five-year average), **grain maize** to 8.7 t/ha (down by 4.3 % on 2008 and even 1.9 % below the five-year average) and **potato** to 44.6 t/ha (up 3.2 % on 2008). **Sunflower** is forecast at 2.3 t/ha (down by 9.3 % on 2008 and by 3.4 % on the five-year average) and **soft wheat** at 7.4 t/ha, higher than the five-year average (by 4.4 %) and also than last year (by 2.0 %). The **durum wheat** yield is now put at 4.9 t/ha (equivalent to 2008 and 2.6 % above the five-year average). **Winter barley** yield is forecast at 6.7 t/ha (1.9 % down on 2008 but 2.3 % above average) and **rapeseed** at 3.5 t/ha, higher than both the average (by 5.4 %) and than in 2008 (by 4.1 %).

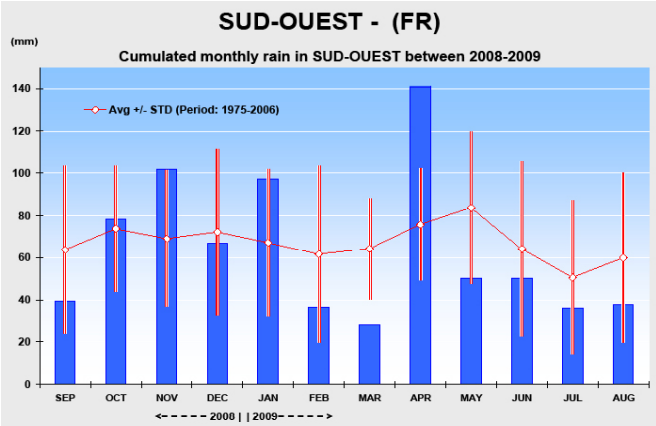
The period was marked mainly by large temperature fluctuations, with extremes and relatively scarce rain in August, especially in the south. Those conditions were not favourable for the crops still growing which suffered from heat stress and water scarcity. Therefore, some of the summer crop yields have been revised downwards. On the whole, despite the sudden high temperatures recorded (39.7°C in Midi-Pyrénées on 19 August, 38.5°C in Aquitaine on 21 July, etc.), the cumulated GDD was not significantly different from the LTA. This was mainly because of the large temperature fluctuations recorded. For example, in the south-west 34.1°C was recorded on 16 July and 19.6°C the next day: a drop of almost 15°C in one day.

In the north, the rain fell mainly in July (permitting appropriate soil-water refilling) and was very scarce in August favouring field operations. However, in August very low value cumulated rainfall was recorded (only 20 to 25 mm of rain, equivalent to 50 % of the LTA) and the high crop water requirements rapidly depleted the soil water content to quite low values. In any event, the heat stress was the factor which made the biggest impact.

In the southern areas the rain was more scattered and, for the fourth consecutive month, below the seasonal average: since May more than 80 mm of rain has been missing. At the same time, even the evapotranspiration was higher than normal. Where irrigation was unable to provide all the water required, a negative impact is possible, e.g. on maize.





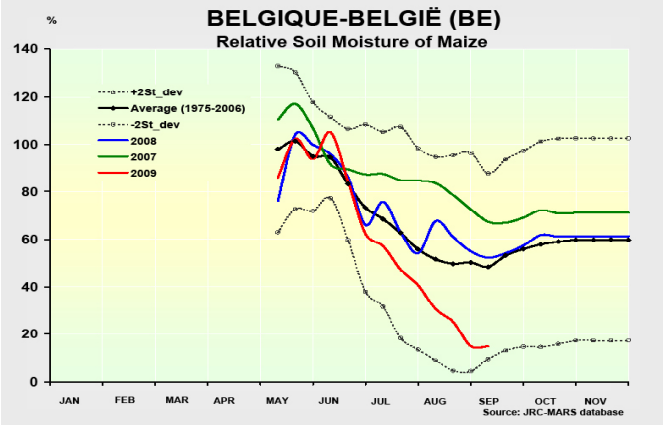


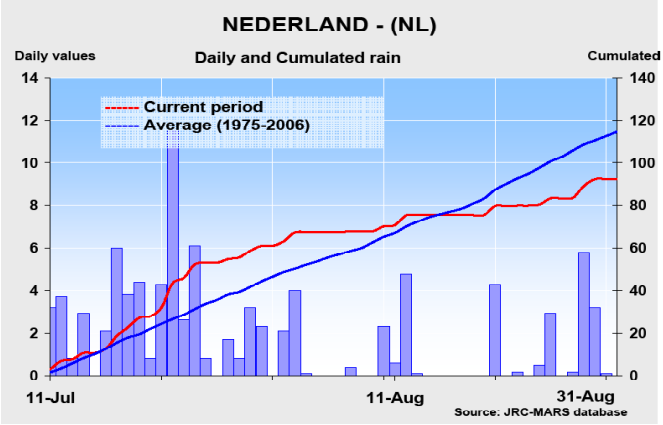
Belgium, the Netherlands and Luxembourg: dry August decreases expectations for grain maize and sugar beet

Soft wheat yield has been confirmed at 8.7 t/ha, 3.6 % above the five-year average, in the Netherlands and at 6.4 t/ha, 2.4 % above, in Luxembourg. Soft wheat yield in Belgium has been revised downwards slightly to 8.5 t/ha, in line with the long-term average. The winter barley forecast for Belgium has been confirmed at 8.4 t/ha, 5 % up on the five-year average. Spring barley yield in the Netherlands has been revised upwards to 6.4 t/ha, up 7.2 % on the five-year average. The sugar beet forecast has been revised downwards in both Belgium and the Netherlands and is estimated at 69.2 t/ha, slightly below the five-year average, in Belgium and 73.1 t/ha (9.2 % above the long-term average) in the Netherlands. The forecast for grain maize has also been revised downwards in Belgium to 10.9 t/ha (6 % down on the long-term average) and confirmed at 11.8 t/ha in the Netherlands (4.5 % up on the average).

In July and August total precipitation in the Netherlands was in line with the long-term average. However, most of the precipitation fell in July. August was very dry. The cumulated solar radiation was higher than normal. In Belgium the total rainfall in July and August was 28 % below the long-term average. There the precipitation in July was in line with an average year and August was very dry with cumulated rainfall 55 % lower than the long-term average. The cumulated active temperature was higher than normal but, due to the cloudy skies, the solar radiation measured was slightly below average.

The dry conditions in August provided good harvesting conditions for winter crops and spring cereals in all three countries. However, the crops harvested in September (grain maize and sugar beet) suffered from the lack of precipitation in August. Maize has a shallow root system and, since the beginning of the growing season was not especially dry, the roots were most probably not very deeply established in the soil. The models show low soil moisture levels and faster maturing. In **Belgium** the yield is forecast below the long-term average, but in **the Netherlands** the yield estimates show good potential thanks to the July rainfall which provided good soil moisture reserves. Sugar beet yield has also been revised downwards, but is still satisfactory, in line with the long-term average.





Germany: also a positive outlook for summer crops

In Germany the yield forecasts have been confirmed at a high level: 8.0 t/ha for soft wheat, very close to the high level of 2008; 6.7 t/ha for winter barley, thus above 2008 and the five-year average (by 4 %); 5.0 t/ha for spring barley (up 4 % on 2008 and down 5 % on the five-year average); and 3.9 t/ha for rapeseed, above 2008 and the five-year average. Maize is forecast at 9.5 t/ha (down by 3 % on 2008). Sunflower yield is set for 2.3 t/ha (up by 15 % on 2008). Sugar beet and potato show high yield potential: 62.5 t/ha (3 % above the five-year average) and 44.7 t/ha (7 % above the five-year average) respectively.

The accumulated temperature sum (TSUM) in the second half of July was within the LTA, whereas the TSUM in August was 5 to 10 % higher than the LTA (and up to 20 % higher in southern Germany). Average temperatures in absolute terms were 1 to 2 degrees higher than the LTA. 20 August was the hottest day of the summer with temperatures above 36 degrees in the northern part of Germany and between 30 °C and 34 °C in the rest of the country causing heat stress to the remaining summer crops, especially maize. Accumulated temperatures for September so far are 10 to 20 % above the LTA in the north- eastern part of the country.

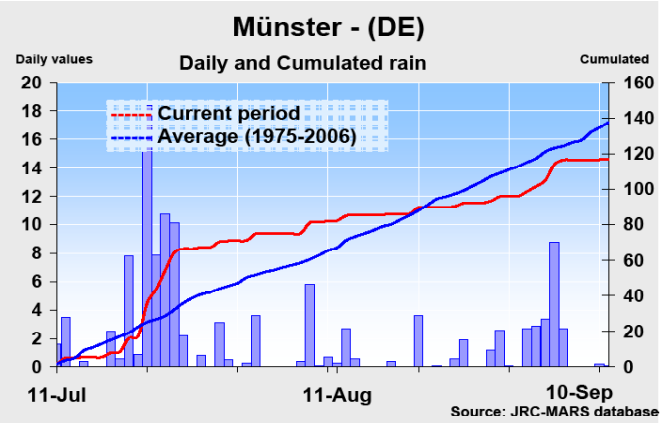
As usual, throughout the summer precipitation was scattered and unevenly distributed. Nevertheless July can be classified as a wet month with a precipitation surplus of around 40 mm (but also some dry spots) in Nordrhein-Westfalen and more than 120 mm above the LTA in parts of the region around Freiburg (Baden-Wuerttemberg). This was coupled with a high number of rainy days (between 7 and 16) across the country, which had a negative impact on harvesting.

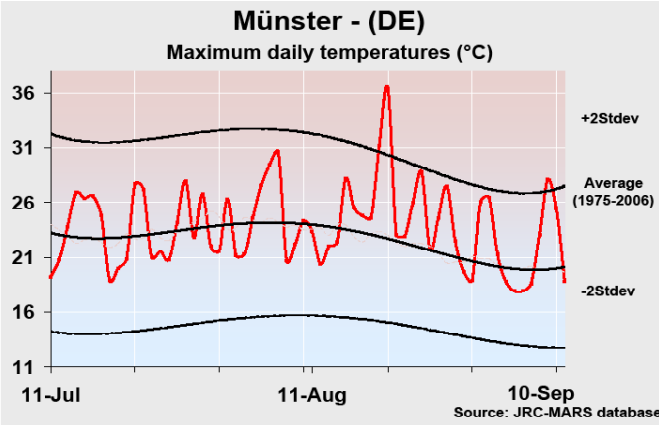
By contrast, August was drier than usual allowing undisturbed harvesting. The rainfall was around 50 mm below the LTA in north-western and southern Germany, with only a few rainy days (not more than three in most of the country). Precipitation conditions in September so far have been close to the average. Global radiation was slightly positive for the whole period, with a clear surplus (20 %) in

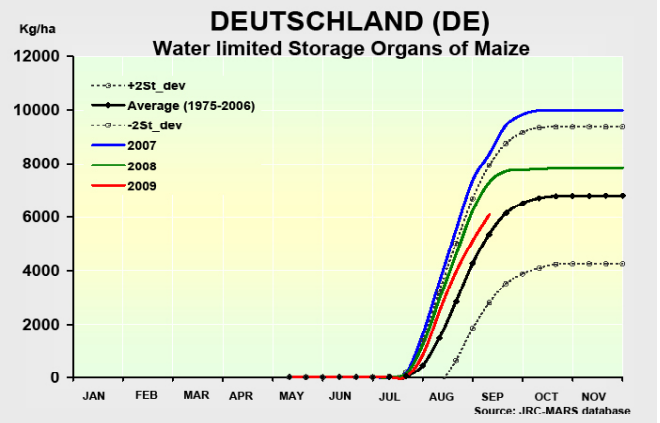
Sachsen-Anhalt and Brandenburg.

Thanks to the dry spell in August, winter cereals were harvested under good conditions and the good yield expectations have been confirmed by the latest forecast, as the simulated crop growth indicators continue to show good potential.

The wet and not too hot weather in July was beneficial for maize, but the dry, warm spell in August did accelerate maturing. Sugar beet development is considered satisfactory, with July being beneficial and August too dry, as relative soil moisture values decreased significantly (below 20 % in Magdeburg). Even so, forecast yields are at a high level.







UK and Republic of Ireland: excellent crop potential depleted by very wet July, especially in Ireland

In the **UK** some yield forecasts have been revised downwards due to the excessive rain in July, notably 7.9 t/ha for **soft wheat** (0.4 % below the five-year average), 3.0 t/ha for **rapeseed** (6.3 % below) and 5.5 t/ha for **spring barley** (1.4 % above). Other crops continued to show good potential: 6.8 t/ha for **winter barley** (4.0 % above the five-year average), 43.4 t/ha for **potato** (4.2 % above) and 62.2 t/ha for **sugar beet** (6.6 % above).

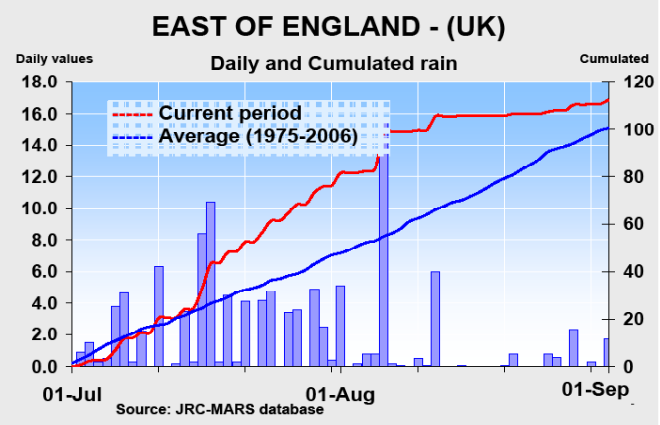
In **Ireland** the yield forecasts put **soft wheat** at 9.1 t/ha (0.5 % above the five-year average), **winter barley** at 7.5 t/ha (5.2 % below), **spring barley** at 6.3 t/ha (5.0 % below) and **potato** at 31.8 t/ha (9.0 % below).

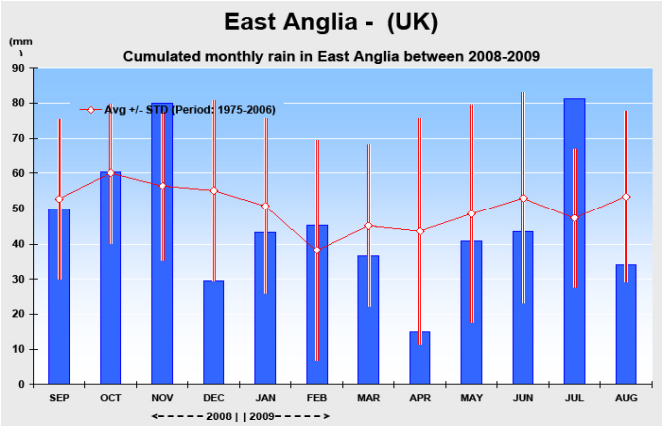
A very promising season (despite the water shortage) up to June led to forecasts of very good yields, but this was followed by an exceptionally wet July, with negative effects both on final yields and on grain quality.

In fact, during the second and third ten-day periods of July the **rain** was practically persistent (more than 13 rainy days out of 20) and particularly abundant in Ireland and in north and west Britain, where the highest cumulated values since 1975 were recorded (110 to 130 mm). Luckily, on the eastern side of Britain the rain was less insistent and abundant. It was enough to hamper the field work but probably had a lighter impact on crop yields.

From the second ten-day period in August onwards, the synoptic circulation pattern changed and quite dry conditions were established: the rain was very limited (around 10 mm in 20 days), permitting completion of harvesting and field preparation for the next season.

During this period, the **cumulated active temperatures** were very close to the seasonal average even though very





large fluctuations in the daily temperatures were recorded, particularly in August. Good levels of **solar radiation** were recorded, which favoured the spring crops still growing (sugar beet and potato) allowing the relative yields to be revised upwards.

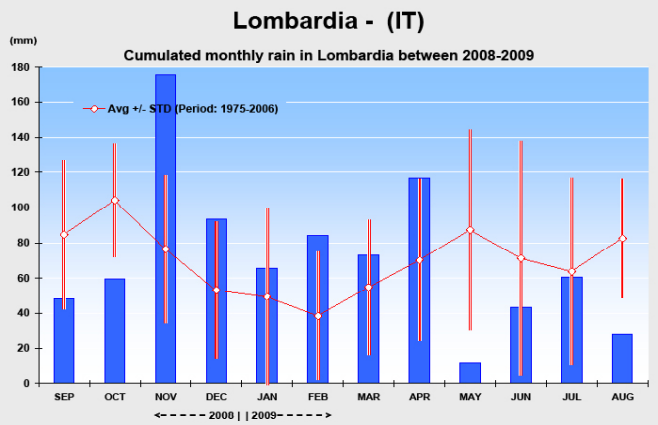
Italy: typical summer conditions, but hotter and drier than normal

Some of the summer crop yields have been revised downwards slightly: grain maize is put at 9.2 t/ha (1.3 % below the five-year average and 3.9 % down on 2008), sunflower at 2.1 t/ha (1.8 % down on 2008), potato at 25.5 t/ha (down by 0.4 %) and sugar beet at 58.4 t/ha (8.1 % more than the five-year average). The forecasts for the other crops are as follows: durum wheat is estimated at 2.8 t/ha (down by 11.6 % compared with 2008 and by 4.9 % on the five-year average), soft wheat at 4.9 t/ha (down by 8.2 % on the five-year average and by 7.0 % on last year), barley at 3.6 t/ha (4.6 % below the average and 5.6 % down on last year) and turnip (rape) at 2.2 t/ha (12.9 % up on the five-year average).

The persistent influence, both in July and in August, of the Azorean anticyclone ensured typical summer agrometeorological conditions: limited rain and high temperatures.

However, particularly in the main plain area (the Po valley), this was the fourth consecutive summer with a significant shortage of water supplies and, since 1975, the second hottest summer after 2003 (based on the average of the maximum temperatures), even though the number of extremely hot days (Tmax > 33°C) was much smaller than in 2003. The temperatures showed large fluctuations but generally remained above the seasonal values: the mean daily temperatures across the period were 2.5 to 3°C above the average for the period. This phenomenon was particularly marked in August, when the active temperature accumulation started to depart from the LTA. Consequently, crop development was accelerated, reducing their potential. Also the evapotranspiration in August showed significant differences, with higher values than normal.

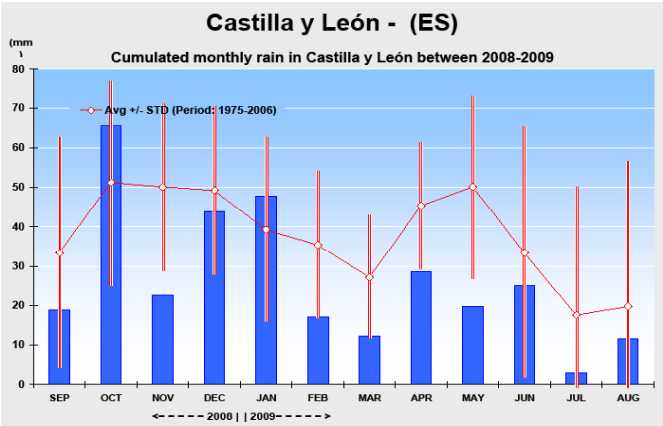
The rainfall showed an unusual distribution and was scarcer in the north than in the south. The Po valley received only a limited amount of rain (around 20 mm) during the two months and the irrigation volumes required by summer crops (sugar beet, maize and potato) were even higher than in 2003. However, appropriate irrigation is likely to have been able to compensate for the water and heat stress conditions which occurred. In any event, due to the above consideration, summer crop yields were also revised downwards.



Spain: persistent drought and temperature fluctuations further hit rain-fed crops; better conditions in the extreme north

The yield forecasts put durum wheat at 2.6 t/ha (9.0 % above the five-year average), soft wheat at 3.2 t/ha (2.0 % below the five-year average and 12.3 % down on last year), winter barley at 2.6 t/ha (3.5 % below the five-year average), oil-seed rape at 1.3 t/ha (17.1 % below the five-year average and 32.1 % down on 2008) and spring barley at 2.4 t/ha (30.0 % on 2008 and 18.8 % below the five-year average). Grain maize and potato forecasts were revised upwards to 10.3 t/ha (3.6 % above the five-year average) and 28.8 t/ha (4.5 % above). By contrast, sunflower and sugar beet were revised downwards to 0.8 t/ha (18.2 % below the five-year average) and 72.9 t/ha (2.0 % above the five-year average).

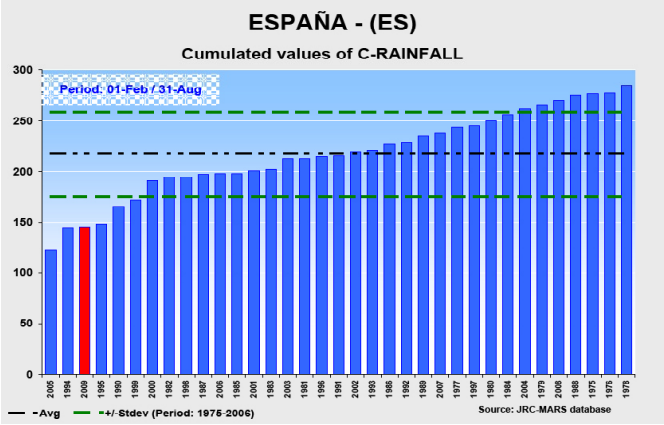
In the final analysis, the season was marked by a persistent drought. Practically since February the cumulated rain values were constantly below the seasonal average except in the south (Andalucia). Again in **July** and **August** the rain was concentrated solely in the extreme north (mainly

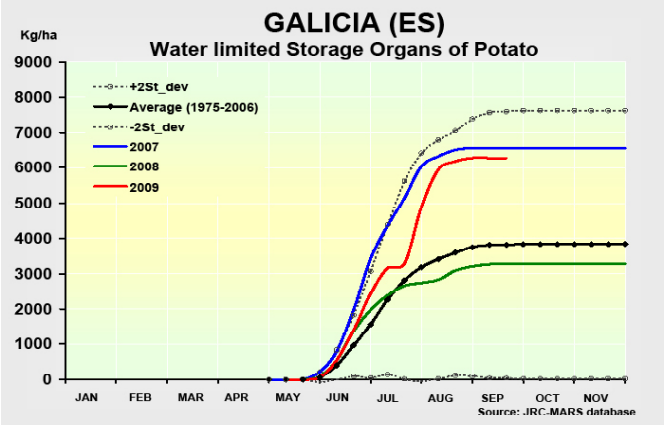


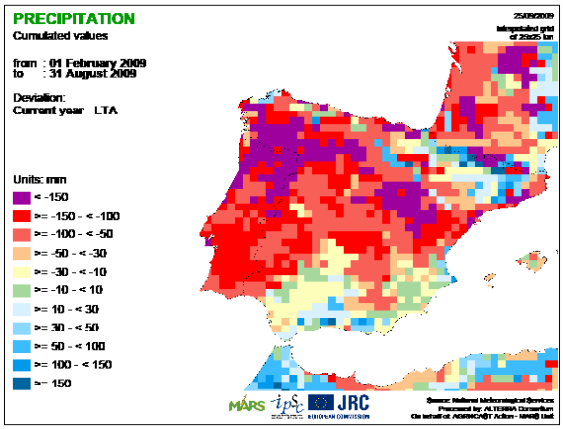
Galicia and Asturias, where 80 to 150 mm of cumulated rain was recorded) and was very limited or non-existent in most of the country: 60 % below average in Castilla y León and Extremadura and 80 % below in Castilla La Mancha. Therefore, conditions were unfavourable for rain-fed crops, except potato (cultivated mainly in Galicia) and, consequently, the yield forecasts for sugar beet and sunflower have been revised downwards even further.

During the period, the temperatures were very close to the norm and the cumulated active temperatures showed very limited deviation from the seasonal values. However, extremely high temperatures (> 38°C) were recorded for a few days in mid-July in Murcia and Valencia and in the second half of August in the central and southern parts of the country. More than 45°C was recorded in Murcia alone on 23 July.

Considering the long rain shortage, the unavailability of irrigation water is likely to have had a negative impact on all the irrigated crops (mainly maize). However, the potential impact of those conditions has not been taken into consideration for lack of specific information.







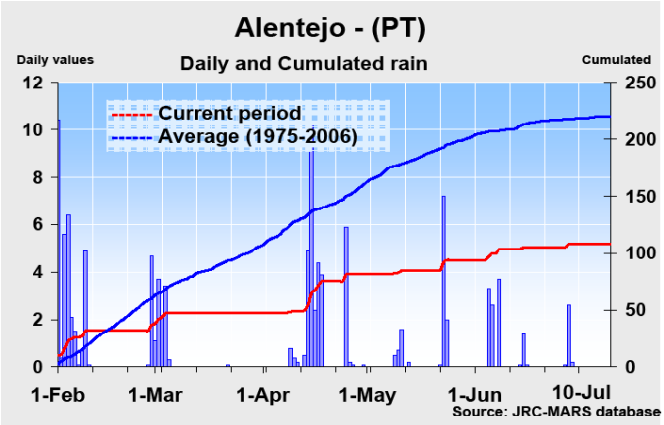
Portugal: seasonal temperatures and persistent drought again

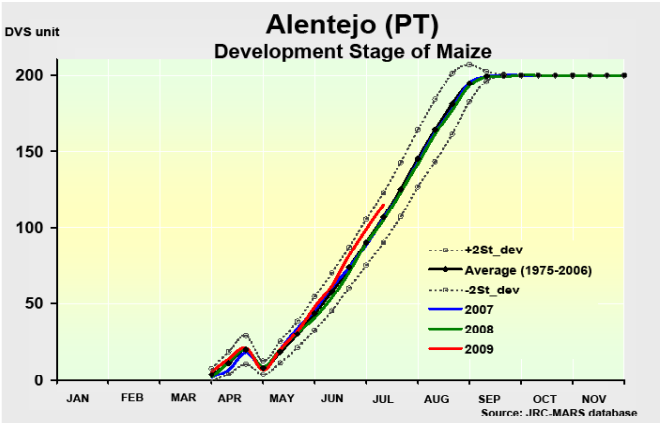
Due to the persistent drought, the yield forecasts are lower both than last year and than the five-year average: soft wheat is estimated at 1.4 t/ha (37.3 % lower than last year and 18.7 % down on the five-year average) and winter barley at 1.5 t/ha (34.5 % lower than last year and 16.7 % lower than the five-year average). Grain maize is forecast at 6.0 t/ha (6.1 % down on last year, but still 8.8 % more than the five-year average) and potato at 14.7 t/ha (1.0 % more than last year and 1.5 % below the five-year average).

As in Spain, the 2008/2009 season was quite favourable in terms of temperatures, but the water shortage definitely had an impact on all crops.

In July and August the temperatures again remained generally within the seasonal ranges of variation (except at the end of August, when the maximum values reached 37°C for a few days) and the cumulated active temperatures showed very negligible departures from the LTA. Crop development was therefore regular and followed the seasonal course. In the case of water availability, the season appeared promising. However, from February onwards the low rainfall predominated the agrometeorological conditions and the expected yields were reduced by the limited water supply.

In the north of the country, where potatoes and maize are largely cultivated, conditions were better. Therefore, for these crops average levels of productivity are forecast.

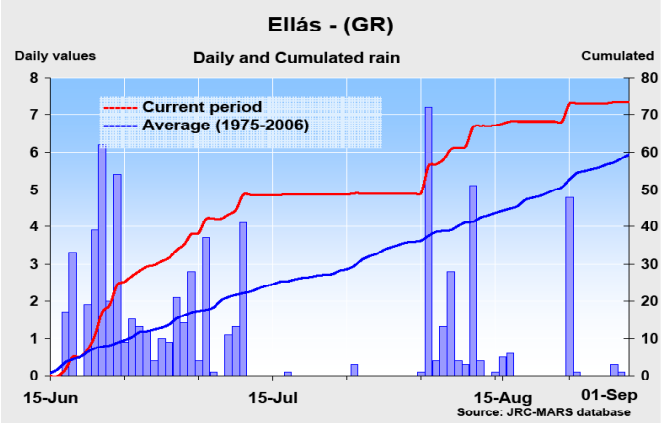


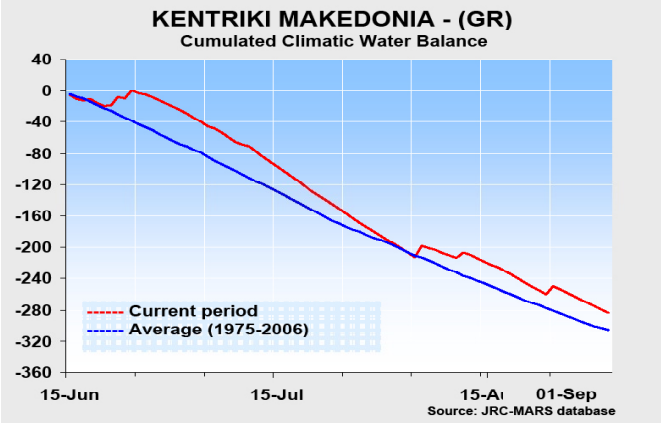


Greece: relatively dry weather in July only marginally affected the yield of spring crops

The cycle of winter crops ended in July. Yield estimates have confirmed the previous forecasts and can all be considered in line with the five-year average. The summer weather did not particularly affect the yield of spring crops: grain maize is forecast at 9.8 t/ha, slightly down on the 2008 level (5 %) but 3 % up on the five-year average of 9.5 t/ha. Potatoes ended their cycle in mid-July in conditions providing a good soil moisture supply; their yield is estimated at 25.6 t/ha, in line with 2008 and a 5 % improvement on the five-year average (24.4 t/ha). Sugar beet is still half way through its yield formation cycle and could have been affected by the July weather. The latest estimate is 62 t/ha, 5 % down on 2008 (65.4 t/ha) and 3 % below the five-year average (63.8 t/ha).

The summer brought no particular climatic anomaly, with generally average and stable weather. Dry conditions from late July to early August affected the entire country, with a north-south gradient, but the deficit was not enough to cause any significant reduction in the soil moisture supply for most summer crops. In any case, these benefit from widespread irrigation schemes in Greece. Potatoes, grown in the more humid areas in the north of the country and in limited upland areas in Peloponnesus, were the crop that made the best of the climate trend, as their cycle ended in mid-July.

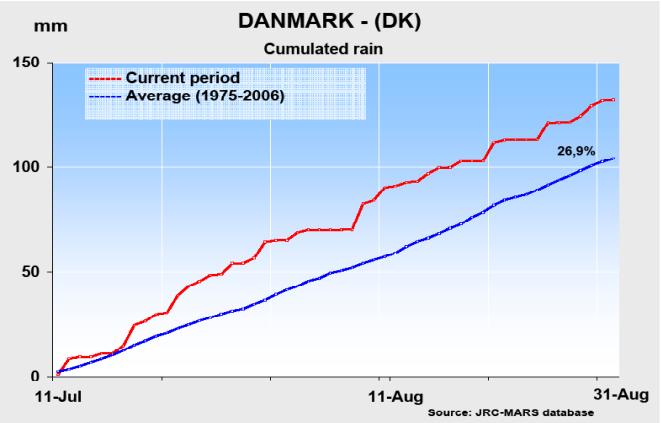


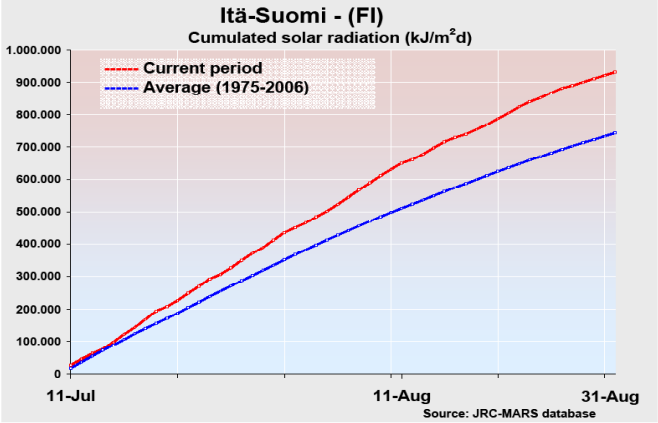


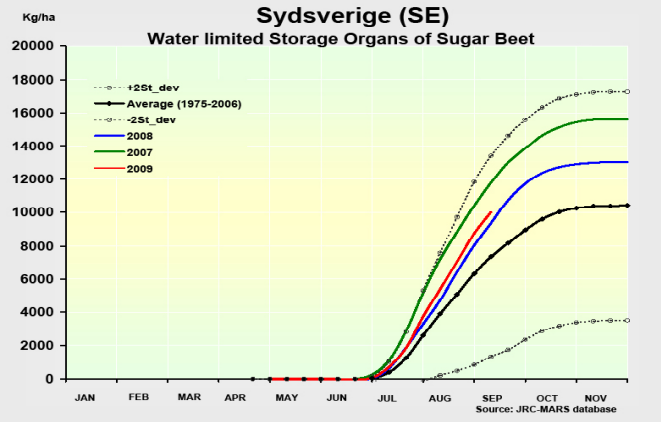
Denmark, Sweden and Finland: good year for spring crops

Denmark: yield forecasts have been confirmed at 7.3 t/ha for soft wheat (2.4 % above the five-year average), 3.8 t/ha for rapeseed (8.4 % above) and 5.7 t/ha for winter barley (0.2 % above). The forecast for spring barley has been revised upwards to 5.2 t/ha (17.6 % up on the previous year and 8.6 % above the long-term average). Sugar beet yields are forecast at 55 t/ha (3.6 % below the long-term average).

Sweden: yield forecasts have been increased slightly to 2.8 t/ha for rapeseed (6.4 % above the long-term average) and 5.7 t/ha for winter barley (5.7 % above). The forecast for soft wheat has been confirmed at 6.2 t/ha (2.2 % above) and spring barley has been increased again to 4.5 t/ha (8.9 % above the long-term average). Sugar beet has been revised upwards slightly to 53.2 t/ha (5.5 % above).







Finland: all yield forecasts have been increased slightly: 3.7 t/ha for soft wheat (3.0 % above the long-term average), 1.3 t/ha for rapeseed (2.7 % above), 3.5 t/ha for spring barley (3.3 % above) and 38.4 t/ha for sugar beet (1.8 % higher).

July was wet in **Denmark** with precipitation 48 % above the long-term average and the largest deviation observed in the second half of the month. The cumulated solar radiation for July and August was slightly higher than average. In **Sweden** too July was wetter than average, with most of the precipitation falling in the second half of the month. Precipitation in August, like the cumulated solar radiation over the summer months, was in line with the long-term average. Average precipitation levels in August provided a good opening for harvesting winter and spring crops in both these countries. Simulations of final yields of spring barley and turnips have come up with values significantly above the long-term average in both Denmark and Sweden. The rain in July replenished the soil moisture reserves for sugar beet. The crops still growing (potato and sugar beet) are slightly ahead of the normal stage of development and show good potential.

In **Finland**, conditions have been favourable and therefore all yield forecasts have been increased since the last bulletin. The cumulated solar radiation for July and August was 20 % higher than the average year and 2009 as a whole has seen 15 % more total solar radiation than a normal year. Precipitation in July and August was slightly above average with the rainfall evenly distributed over the summer months. The conditions for the crops still growing (sugar beet and potato) are very favourable, with harvesting expected to start during the second half of this month.

Estonia, Latvia and Lithuania: yields higher than average

The yield forecasts for the Baltic countries have been revised upwards slightly since the last bulletin. The yields are estimated to be lower than in 2008 but significantly higher than the five-year average:

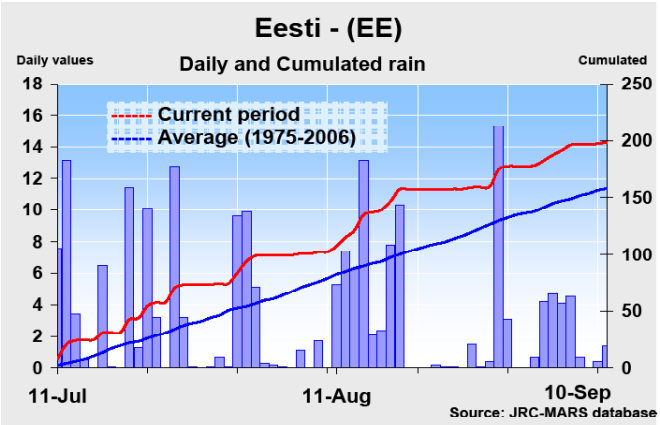
Estonia: soft wheat 2.9 t/ha (in line with the five-year average), spring barley 2.4 t/ha (3.2 % below) and rapeseed 1.6 t/ha (1.4 % above).

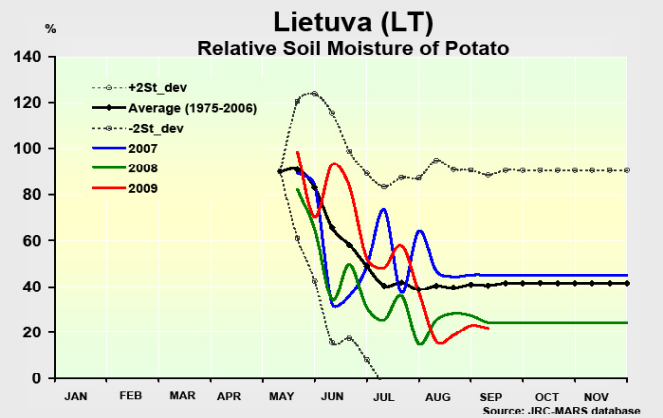
Latvia: soft wheat 3.5 t/ha (4.8 % higher than the five-year average), spring barley 2.3 t/ha (2.8 % above), rapeseed 2.1 t/ha (8.0 % above) and potato 15.7 t/ha (7.6 % above).

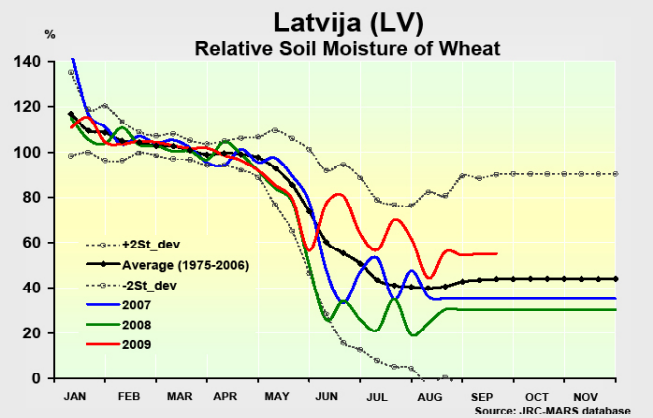
Lithuania: soft wheat 3.9 t/ha (7.3 % up on the five-year average), winter barley 3.6 t/ha (9.1 % above), spring barley 2.5 t/ha (4.4 % below), rapeseed 1.9 t/ha (7.8 % above), sugar beet 41.8 t/ha (3.4 % above) and potato 13.2 t/ha (12.4 % above).

From 11 July onwards the cumulated rainfall showed a spatial gradient distribution. In Estonia it was 25 % higher than normal, in Latvia 6 % higher and in Lithuania 5 % lower than average. Rainfall exceeded the average values, especially in July. In August precipitation was close to the long-term average. Cumulated active temperatures were average in all three countries in July and slightly below average in August. Solar radiation was higher than normal in Latvia and Lithuania and at LTA level in Estonia. Maximum and minimum temperatures were in the normal seasonal range, with the exception of 21 August, when the minimum temperatures in Baltic countries were below the -2° standard deviation. The distribution of the climatic water balance values is the same as the rainfall distribution, with the water deficit increasing in a southward direction. Soil moisture under all crops in June and July was above the long-term average. Before harvesting it was also higher than normal. At the beginning of August abundant rain was recorded, especially in Estonia, hampering harvesting. Soil moisture under tuber crops has been decreasing significantly since the beginning of August and good yields are therefore expected.

Winter crops and cereals have now been harvested in all the Baltic countries. According to the model estimates, sugar beet is at the same stage of development and potato at a slightly more advanced stage than indicated by the LTA. Both are completing their yield formation cycle.







Poland: seasonal rainfall and higher than normal thermal conditions; above-average yields expected

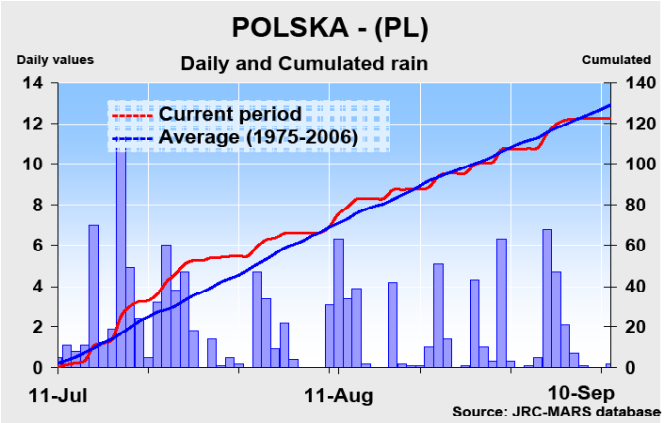
The revised yield for Poland is expected to be slightly higher than the values suggested in the last bulletin and than the five-year average. The soft wheat yield forecast is set at 4.0 t/ha (3.0 % above the five-year average), winter barley at 3.8 t/ha (1.6 % above), spring barley at 2.9 t/ha (2.6 % below), rapeseed at 2.7 t/ha (1.1 % below), grain maize at 5.8 t/ha (3.3 % above), potato at 19.2 t/ha (2.8 % up on the five-year average) and sugar beet at 49.1 t/ha (8.7 % above).

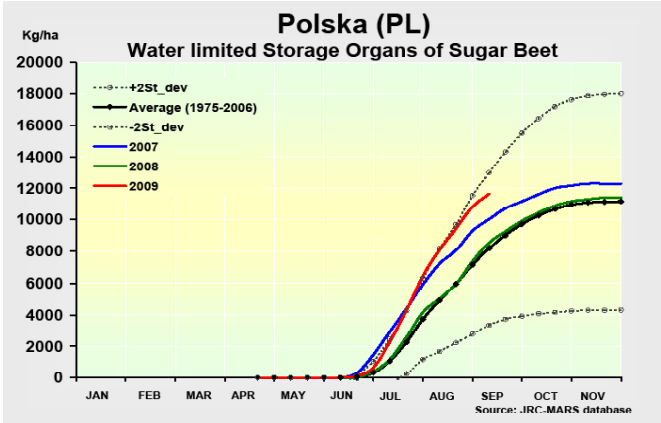
In July cumulated rainfall was generally higher than the long-term average (> 30 %), excluding south-eastern Poland, where it was close to the LTA. After a wet June and July, precipitation in August was below the average, especially in the western, northern and southern parts of Poland. Here the cumulated rainfall was 35 % below the LTA. In the period since 11 July, the lowest precipitation was recorded in the Lubelskie region (less than 80 mm), whereas the Małopolskie region received more than 140 mm.

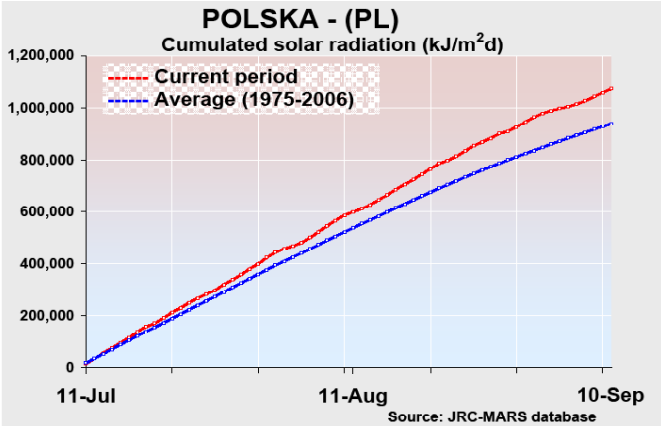
Recorded temperatures were higher than normal. The average temperature in the west and south of Poland was 1 to 2oC higher than the LTA and only slightly higher in central Poland. Absolute maximum temperatures did not exceed 35oC and absolute minimum temperatures were not lower than 18oC. Total solar radiation was also higher than normal. Meteorological conditions over the period were beneficial for crop yield formation, but at the same time the combination of wet and hot conditions favours the spread of plant diseases.

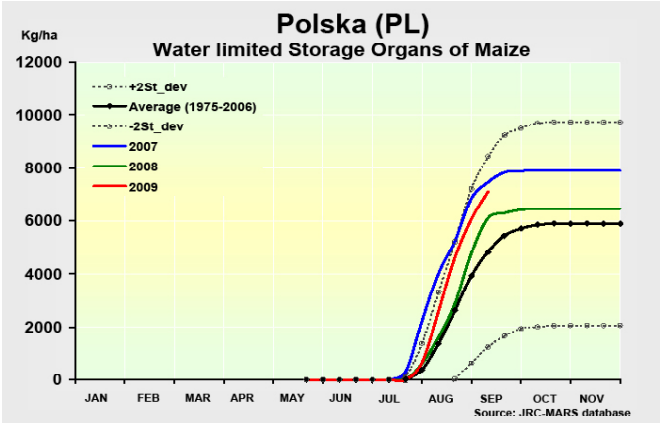
Since the end of June soil moisture depletion has been noticeable, but soil water reserves are still above normal. Soil moisture under grain maize is still very high, but has been falling systematically since the last ten days in July. In August it reached values close to the LTA. Relative soil moisture under sugar beet in Wielkopolskie has been decreasing significantly since the end of July. The same is true for the other regions of Poland.

In Poland harvesting of winter crops and cereals has been completed. Crops still growing are at a slightly premature stage of development because of the recent low precipitation and high temperatures. The potential for tuber crops is good. Current weather and soil moisture conditions allow fields to be prepared for sowing.









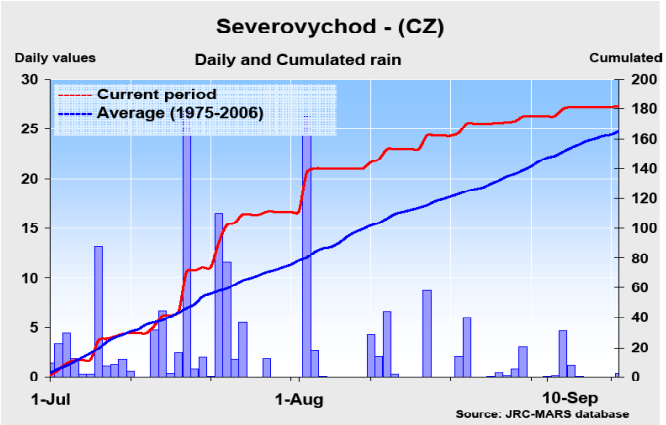
Czech Republic and Slovakia: soil moisture values back to average, avoiding problems with harvesting

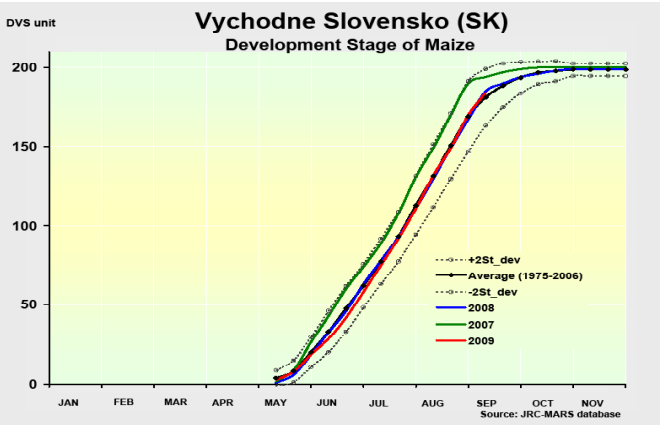
In the end, the yield of winter crops was affected by the heavy rains in July less than expected. The forecasts for the Czech Republic and Slovakia are 5.2 t/ha and 4.1 t/ha respectively for soft wheat (up by 0.5 % and down by 6.0 % on the five-year average), 4.5 t/ha and 3.3 t/ha for winter barley (down by 1.1 % and 12 %), 2.8 t/ha and 2.4 t/ha for rapeseed (down by 11 % and 1.0 %) and 3.7 t/ha in both countries for spring barley (down by 10.7 % and 1.2 %). Even better conditions are reported for summer crops; the yield forecasts for the Czech Republic are: sunflower

2.3 t/ha (up by 3.3 %), potato 25.6 t/ha (up by 1.0 %), sugar beet 56.5 t/ha (up by 6.4 %) and grain maize 7.3 t/ha (up by 6.0 %). The forecasts for Slovakia are: sunflower 2.3 t/ha (up by 4.6 %), potato 16.0 t/ha (up by 2.1 %), sugar beet 52.7 t/ha (up by 4.0 %) and grain maize 6.1 t/ha (up by 2.9 %).

After a wetter period in July which looked like endangering harvesting of winter and spring crops in the Czech Republic, weather conditions improved in August allowing access to the fields only slightly behind schedule. This does not seem to have put any significant constraints on yields. In Slovakia, despite the low number of spells of precipitation, the cumulated values are slightly above the long-term average, showing a significant east-west trend. Temperatures have been consistently higher than average, especially in the Czech Republic, leading to a sudden advance in development of summer crops. This was not seen in Slovakia until the last ten days of August. Irradiance levels improved all over the Czech Republic. This, in conjunction with average soil moisture values, might ensure an optimum development and maturing phase for summer crops.

An improvement in simulated biomass production values and grain-filling is forecast for maize, especially in the Czech Republic, whereas constant conditions are reported in Slovakia. On the whole, good development is forecast over this second part of the season. Therefore between satisfactory and optimum yield might be expected.



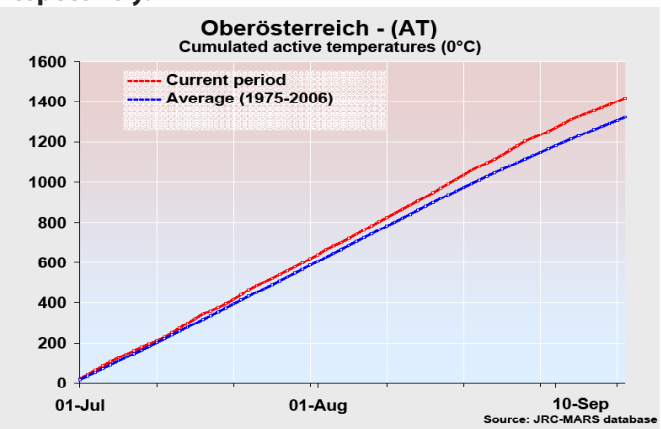


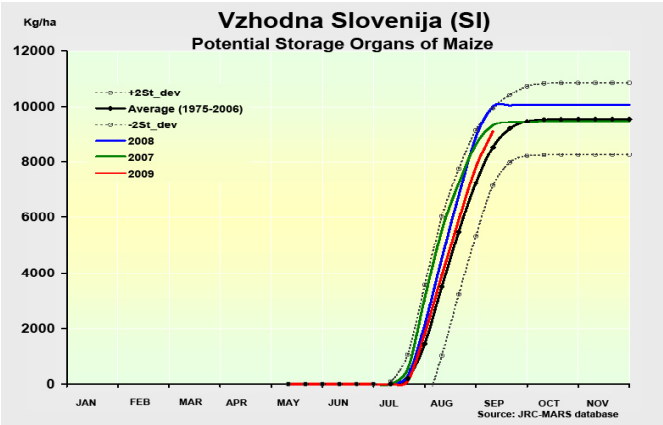
Austria and Slovenia: conditions still wet, but no significant constraints on production

The previous forecasts have been confirmed for all crops except grain maize which is showing optimum development in both Slovenia and Austria, with yield potential of 7.9 t/ha and 10.8 t/ha respectively (4 % and 8.7 % above the five-year average).

In Austria forecasts remain lower than in 2008: 5.4 t/ha for soft wheat (down by 6.3 %), 4.4 t/ha for durum wheat (down by 14.1 %), 5.50 t/ha for winter barley (down by 4.9 %), 2.8 t/ha for rapeseed (down by 9.3 %), 4.2 t/ha for spring barley (down by 11.0 %), 31.2 t/ha for potato (down by 6.0 %), 68.6 t/ha for sugar beet (down by 4.5 %) and 2.60 t/ha for sunflower (down by 12.4 %). In Slovenia the forecasts for soft wheat and barley are 4.3 t/ha (down by 4.9 %) and 3.7 t/ha (down by 6.1 %) respectively.

In both countries wet and warm conditions persisted during August. Austria reported well distributed rainfall which was less intense in the eastern part of the country, while Slovenia experienced some isolated heavy precipitation (on 3 and 4 August 39.4 and 40.6 mm respectively were recorded in the west) which pushed the cumulated values significantly above the long-term average. Despite this rainy summer, which had already delayed harvesting of winter crops, the good crop yield potential has been confirmed. Moreover, summer crops such as maize, sugar beet and sunflower have benefited from the positive soil moisture conditions during the vegetative and flowering phases. However, as a consequence of the above-average thermal conditions and high irradiance levels, crop development moved constantly further ahead of schedule during the





last three ten-day periods and if these conditions were to persist a negative effect on ripening might be expected. This is especially evident for sunflower crops in western regions, where the sudden advance in development has led to a drop in biomass accumulation and to a worsening of the simulated values for storage organs (up to 20 or 30 % less than the long-term average is forecast). By contrast, exceptional conditions are expected for this last stage of grain maize development, both in Austria and in Slovenia, and the simulated accumulation values are significantly higher than the LTA.

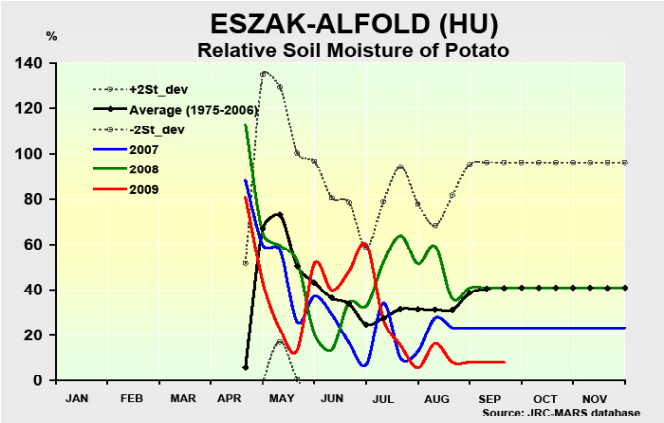
Hungary: dry conditions expected to lower summer crop yields

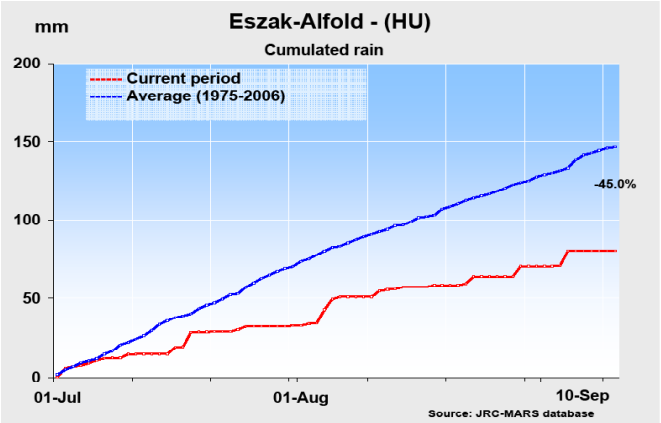
Yields are forecast to be lower both than the five-year average and than those recorded in 2008 because of the drought in eastern regions: 4.0 t/ha for soft wheat (19.5 % down on last year), 3.9 t/ha for durum wheat (down by 8.8 %), 3.3 t/ha for winter barley (down by 30.9 %), 2.3 t/ha for rapeseed (down by 12.3 %), 2.6 t/ha for spring barley (down by 33.7 %) and 6.1 t/ha for grain maize (down by 17.8 %). Instead, summer crops show good potential: 56.8 t/ha for sugar beet (8.3 % above the five-year average), 2.5 t/ha for sunflower (8.3 % above) and 23.1 t/ha for potato (7.2 % below).

Since the end of July weather conditions have become very hot and dry, with a significant negative impact on crop development .

July's precipitation was not enough to replenish water reserves and to cover the high evapotranspiration demand (in some areas 20 % higher than the LTA) caused by the high temperatures (on 28 August the daily maximum temperature soared to over twice the standard deviation) and irradiance values.

The water balance shows a pronounced deficit in eastern regions (Del-Alfold, Eszak-Alfold and Eszak-Magyarorszag). Since most crops are not irrigated this will lead to significant water stress. The drought has even been aggravated by the sudden advance in development observed over the last ten-day periods. Winter and spring crops have not suffered too much because of the drought, but a sudden drop in simulated total biomass production and storage organs accumulation has been shown for summer crops. However, even though a reduction in yield can be expected, conditions do not seem to be dramatic because, especially for maize, sufficient water was present during flowering and because of the probability that the crops will have developed a deep root system induced by the dry conditions at the beginning of the season.



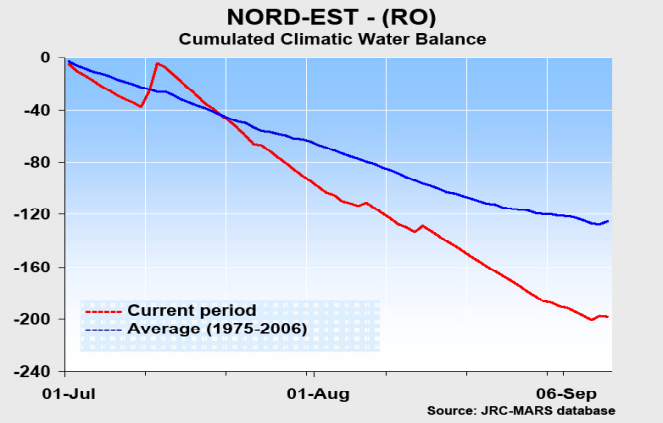


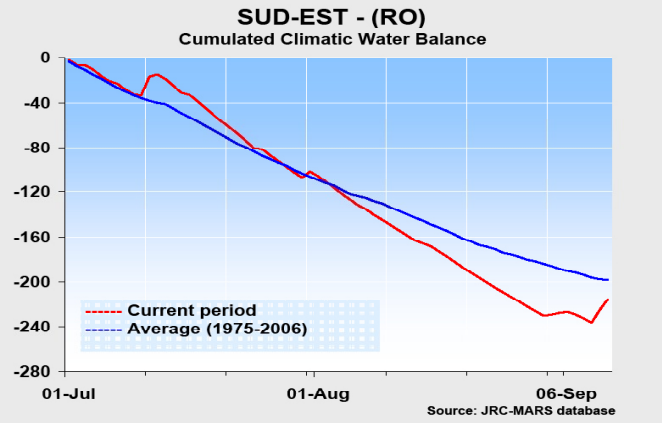
Romania: dry conditions started in mid-July and continued for all of August affecting the yield estimates for most spring crops, especially maize

The climatic water balance in south and south-east Romania fell into deficit in early August, coinciding with flowering and grain-filling of maize and sunflower. Winter crops have completed their cycle and the yield estimates for them have been confirmed, while the impact on spring crops has been significant compared with earlier expectations but not that significant if compared with the average trend. The yield estimate for grain maize has been updated to 3.1 t/ha, down by 14 % on the August estimate of 3.6 t/ha but by only 7 % on the five-year average (3.4 t/ha). The impact on sunflower crops had already been established and the forecast yield is 1.3 t/ha (1.5 % down on the five-year average). For potato the estimate has also been confirmed at 15.4 t/ha, 7.2 % on the five-year average. The sugar beet yield forecast is lower than the 2008 levels (by 5 %) but still shows a significant improvement on the long-term average (31 t/ha) which is depressed by the 2007 results.

This summer the dry season started earlier than average and affected the north-west parts of the country first, before gradually moving southward and eastward. Thanks to the abundant precipitation in June and early July, however, no significant depletion of the soil moisture was felt until around mid-August in the areas cultivating spring crops in south and south-east Romania. Grain maize had, for the most part, achieved full vegetative development by late July and was in the very sensitive grain-filling phase, consequently amplifying the effects of the drought on yield. Sunflower was affected earlier due to its relatively

more advanced stage of development. In the case of grain maize there could be an upward adjustment due to recent precipitation, but an improvement for sunflower is less likely. Potato, more widespread in the north-west and the centre of the country, completed its cycle in early July. The dry summer therefore had no significant impact on yield. Sugar beet is still in the yield establishment phases. Although it was probably damaged by the climate trend, it could possibly benefit from the late August rain in the final stages of development.

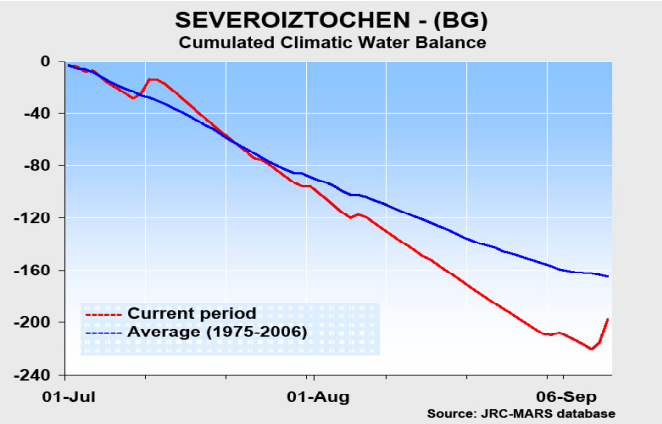


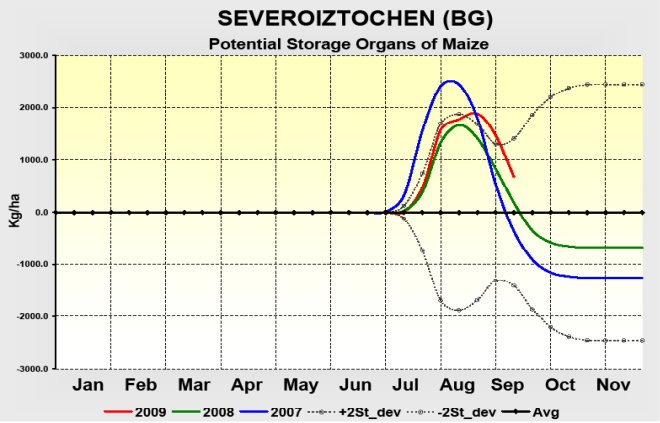


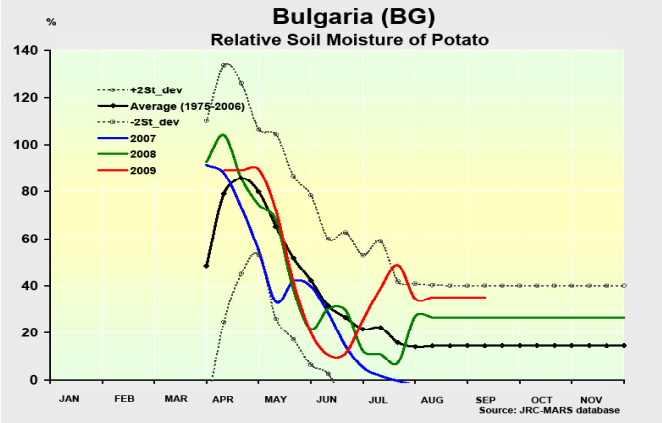
Bulgaria: abundant rain in early July followed by dry weather in August have reduced the expected yields of spring crops, but they are still at average levels

The August rain deficit has reduced the expected yields of spring crops from the previous estimates without, however, any major deviation from average. The estimates for winter crops, which had completed their cycle by mid-July, have been confirmed. The forecast for maize has been updated to 4.2 t/ha, the same level as in 2008 and slightly below the five-year average, which, however, is strongly affected by the exceptional yield in 2006. Yield expectations for sunflower have been updated to 1.5 t/ha, the same level as the five-year average. After abundant rain in July, potato ended its cycle in the first half of August. The forecast had been quite uncertain up to the last bulletin but can now be fairly reliably put at the same level as in 2008 and slightly below the five-year average. The yield estimate is 17.7 t/ha (16.3 t/ha in 2008, with a five-year average of 15.9 t/ha).

Rains in early July maintained the soil moisture supply and created a positive environment for the sensitive phenological phases of spring crops, with grain maize completing vegetative development and sunflower starting flowering. Dry weather started in late July and lasted for the whole of August affecting both crops in the successive crucial phases of full flowering and grain-filling. The rather mild temperatures over this period, especially as regards the maximum levels, combined with the soil moisture levels which did not begin dropping until towards the end of the month, partly mitigated the impact of the dry weather. Soil moisture has also recovered further, thanks to recent precipitation. Potato benefited from the July rains during the final filling of the tubers, while in August sugar beet was still at the yield formation stage and could suffer some impact, even though recent precipitation could make up for the August deficit.







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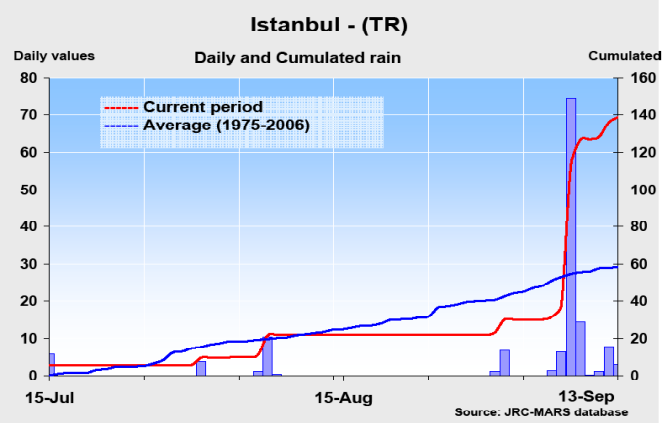
Turkey: dry conditions for most of the summer, but with limited effects on irrigated summer crops

Winter cereals completed their cycle in early July and the yield estimates from the previous analysis have been confirmed. Grain maize suffered from the dry conditions across the summer and the yield estimate is 6.8 t/ha.

Grain maize in Turkey is cultivated essentially in the west of the country, in the Black Sea, Marmara and Aegean regions, and in some areas of the south. In general, it benefits from irrigation. This is reflected in the relative stability of yields across the time series, regardless of the climate trends. This summer was particularly dry, with only a few sparse spells of precipitation in the north-west (Black Sea and Marmara) at the end of July. These were reflected in an upturn in soil moisture availability for maize in the area, coinciding with the final maturing phases. This came too late to guarantee an average season but was sufficient to avoid a major drop in yield. Otherwise, temperatures remained stable around average levels.



Ukraine: the southern and eastern regions of the country were affected by a return of dry weather during August causing a significant reduction in expected grain maize yields

Following some precipitation in late July, August was marked by a dry spell affecting most of the country. The impact of the drought on the climatic water balance was, however, felt less in the west and north-west, partly mitigating the overall effects on the yields of spring and summer crops in those areas. Most winter crops have completed their cycle and the yield estimates have been confirmed. Grain maize is probably the crop worst hit, as the drought struck its main growing regions in the south. The promising yield forecast made in July (4.2 t/ha) has been updated to 3.7 t/ha, which, however, is just 4 % below the five-year average. The forecast for sunflower yield takes into account the wider distribution of the crop and the relatively more advanced development stage; the yield estimate has been confirmed at 1 t/ha.

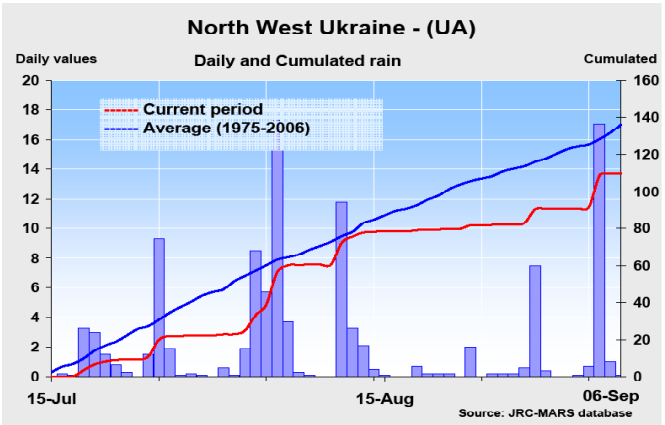
The western and south-central regions of Ukraine recorded some precipitation during the second half of July, while dry conditions were already affecting the extreme east of the country. Temperatures remained exceptionally high during most of the summer. In August the drought extended westward and southward. It was continuing at the time of writing. The decrease in soil moisture availability in the main growing areas in southern, south-eastern and central Ukraine affected grain maize in its most sensitive phenological phases (flowering and grain-filling). This has reduced the production potential of the crop, even under conditions which should ensure overall maintenance of biomass levels due to the combined effect of the July precipitation and the relatively high photosynthetically active radiation.

Leaf area indices and potential biomass levels linked to the vegetative conditions of the crop showed no particular decreases until late August, when early senescence started to be reported.

The effect of the climate conditions was, however, more marked on the production model as the water-limited yield potential already showed a decrease of over 30 % by mid-August.

A similar, though less sharp (10-20 %), drop started to be reported ten days later in the agricultural regions in the west too. The overall impact of the dry conditions should, however, be more limited in these areas as the crops were in a more advanced phase of development and the yield levels had been largely established.

Sunflower yield estimates were affected less by the dry and hot conditions in August as the crop was at a generally more advanced stage of development and harvesting was already starting in the growing areas in southern and central Ukraine.



EASTERN COUNTRIES

Belarus: conditions favourable for good crop yields

The expected yields have been revised upwards slightly, to put wheat and barley at 2.9 t/ha, rapeseed at 1.2 t/ha and grain maize at 3.9 t/ha.

In Belarus the cumulated rain was equal to the long-term average. After a slightly warmer than normal but wet July, with the cumulated rain exceeding the seasonal value by more than 35 %, a rather dry August followed (30 % below the LTA). The cumulated active temperature and solar radiation were average, while the climatic water balance was above the LTA and below zero. These agro-meteorological conditions were favourable for crop development, but also posed a high risk of plant diseases. According to the simulations by the Crop Growth Monitoring System (CGMS), the relative soil moisture under wheat and rapeseed has continuously been much higher than normal (since the end of May). The values of this parameter for grain maize, even higher than normal, have decreased significantly since mid-June.

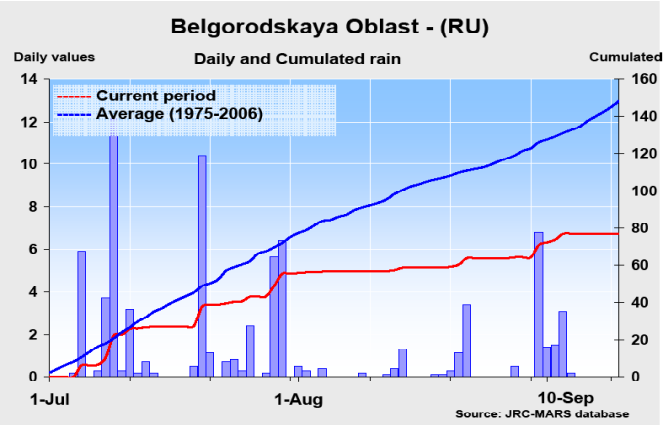
Winter crops have been harvested. The simulation shows excellent potential but water-limited yields for grain maize, which is at a slightly more advanced stage of development than expected from the LTA.

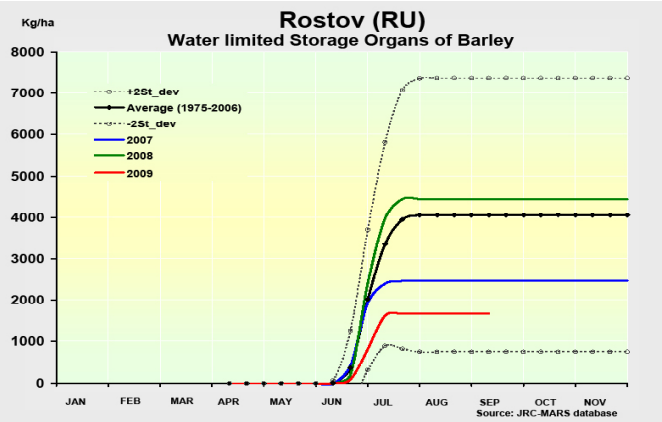
Russia: further worsening in the course of the growing season

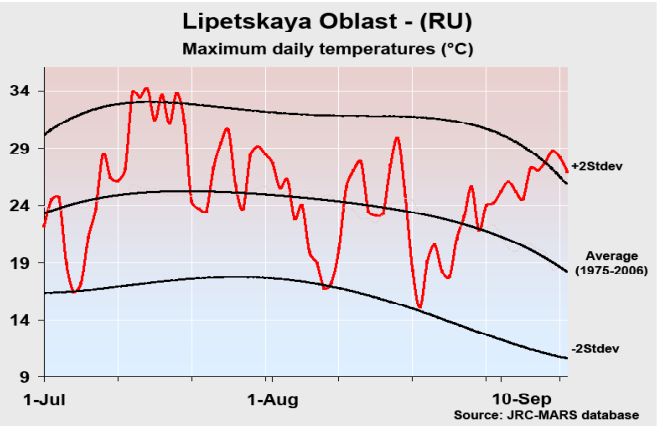
Winter wheat and spring barley reached maturity in almost the whole country, making up the previous lost ground. In most regions they showed an advance in development over the last ten-day period which significantly shortened the grain-filling period. This reduced the already low yield expectations, especially in the central regions where the conditions were satisfactory. In fact, with the exception of a brief drop in temperatures on 10 August in both the Lipetskaya and Tambovskaya Oblast regions, the surplus GDD built up by the end of the 25th ten-day period explains the sudden shortening of development observed in these regions. Suboptimum conditions and very low yield are still forecast for the South and Volga regions.

Grain maize is completing the grain-filling stage in the north, while in the south ripening has been completed and the crop has reached maturity. Despite the average development in the early stages of the season, grain maize has been suffering from early canopy senescence because of the warm dry conditions which have prevailed in most of the corn-growing regions since the beginning of August. In most maize-growing regions, precipitation has been sparse and the soil water content has dropped significantly below the long-term average (even more than 30 % lower). Moreover, the humid conditions at the beginning of the season led to sub-optimum root expansion which might be the cause of the current higher water stress.

Crop growth indicators depict a situation even more unfavourable than during the period analysed in the previous bulletin. Cluster maps of the relative difference between the normalised difference vegetation index (NDVI) and the LTA show that, starting from the second half of July, all profiles have dropped below average and that in every region of Russia the cumulated NDVI values rank significantly low amongst all the years on record.



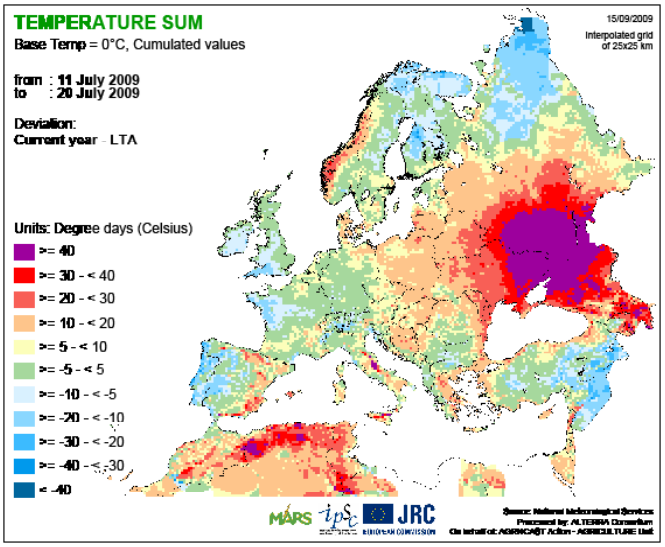


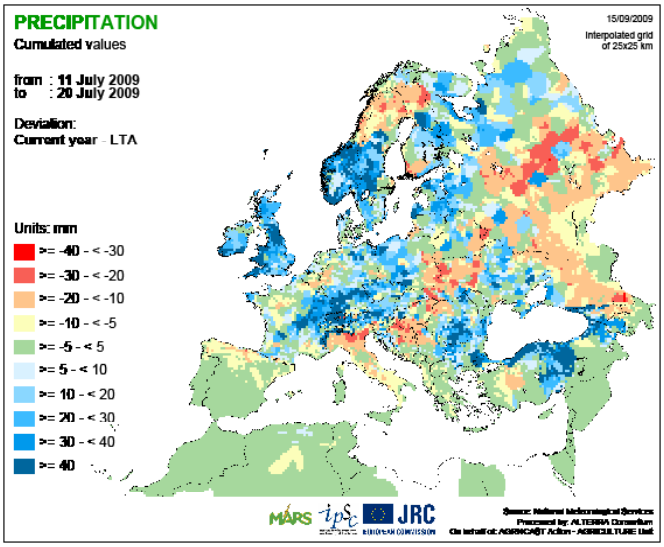


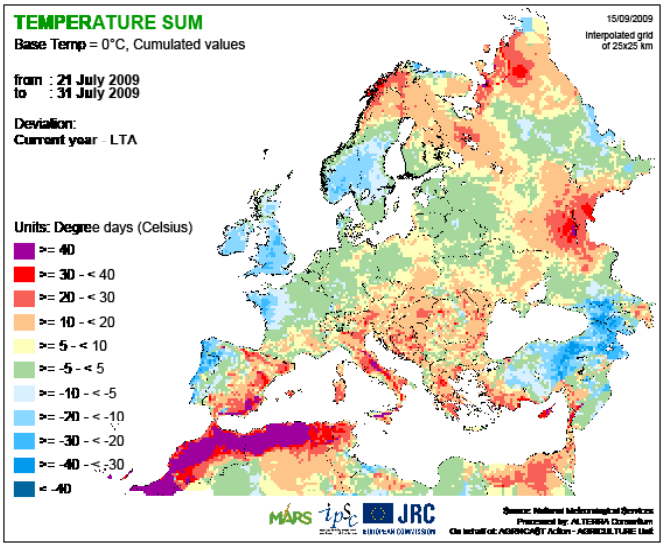
4. Map analysis

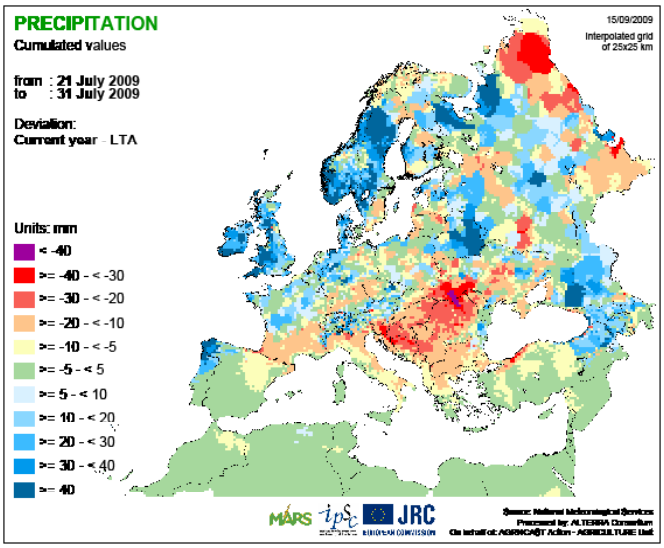
4.1 Temperatures and precipitation - 2009 compared with Long Term Average -

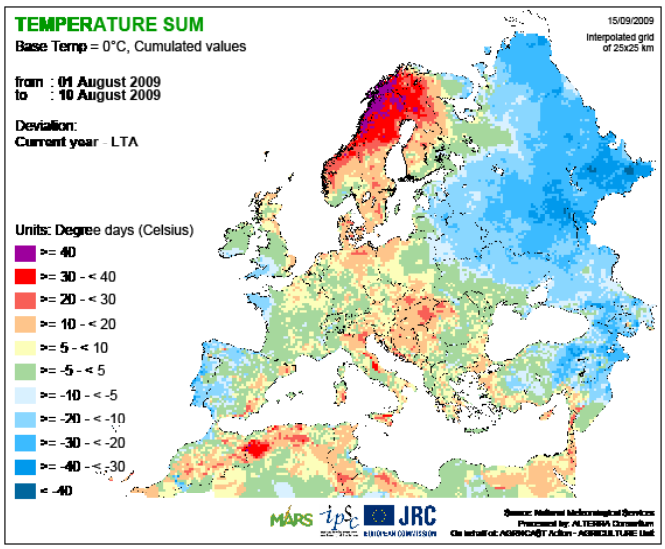
11 July - 10 September (10 days)

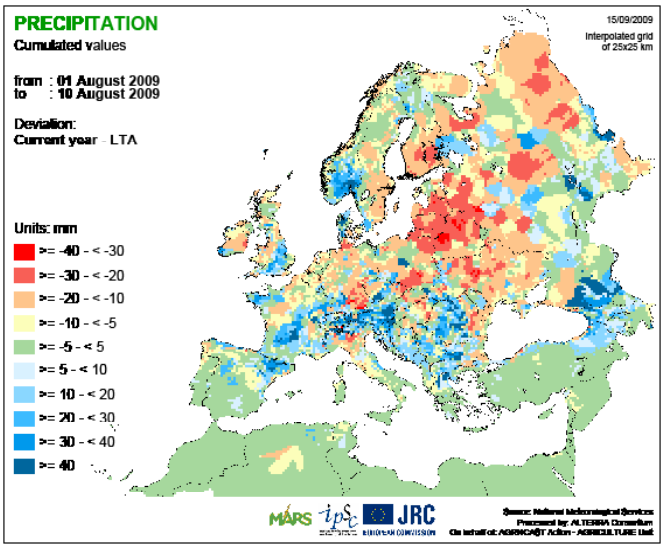


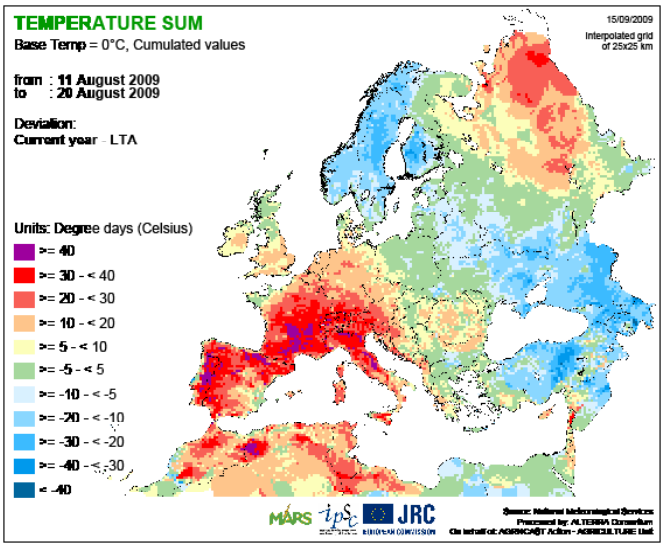


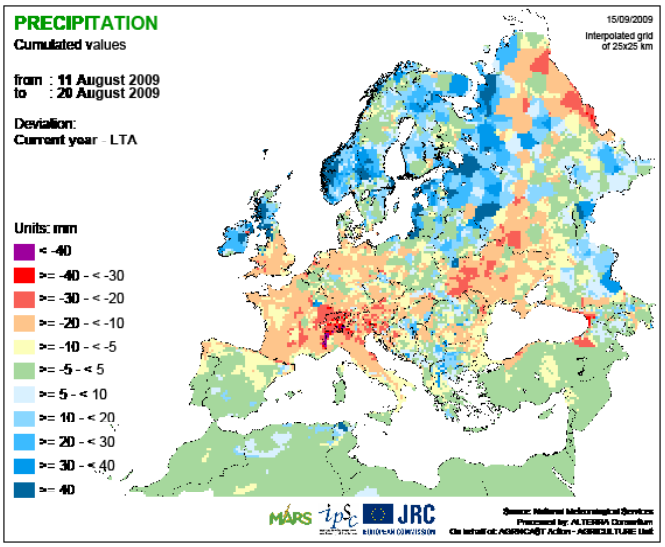


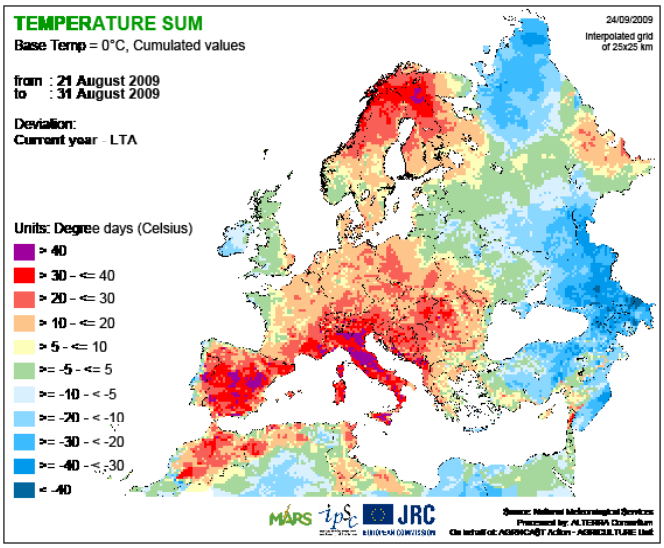







TEMPERATURE SUM
Base Temp = 0°C, Cumulated values
from : 11 August 2009
to : 20 August 2009
Deviation:
Current year - LTA
Units: Degree days (Celsius)
>= 40
>= 30 - < 40
>= 20 - < 30
>= 10 - < 20
>= 5 - < 10
>= -5 - < 5
>= -10 - < -5
>= -20 - < -10
>= -30 - < -20
>= -40 - < -30
< -40
15/09/2009
Interpolated grid of 25x25 km
MARS
JRC


PRECIPITATION
Cumulated values
from : 11 August 2009
to : 20 August 2009
Deviation:
Current year - LTA
Units: mm
< -40
>= -40 - < -30
>= -30 - < -20
>= -20 - < -10
>= -10 - < -5
>= -5 - < 5
>= 5 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40
15/09/2009
Interpolated grid of 25x25 km
MARS
JRC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Deviation:
Current year - LTA
Units: Degree days (Celsius)
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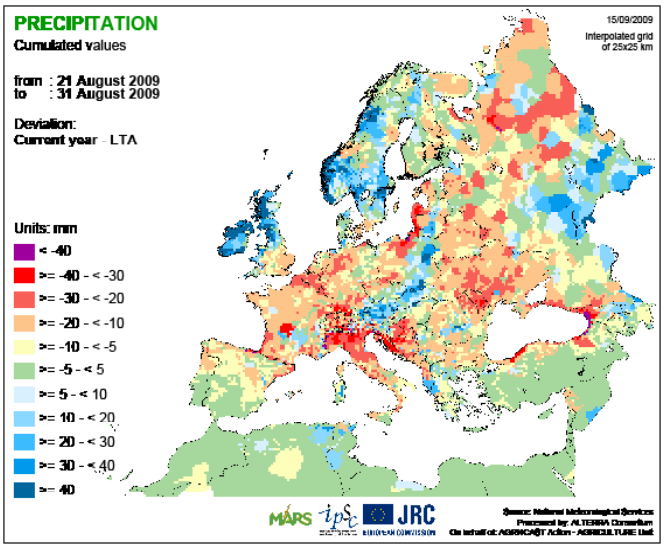
> 30 - <= 40
> 20 - <= 30
> 10 - <= 20
> 5 - <= 10
>= -5 - <= 5
>= -10 - < -5
>= -20 - < -10
>= -30 - < -20
>= -40 - < -30
< -40
24/09/2009
Interpolated grid of 25x25 km
MARS
JRC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Cumulated values
from : 21 August 2009
to : 31 August 2009
Deviation:
Current year - LTA
Units: mm
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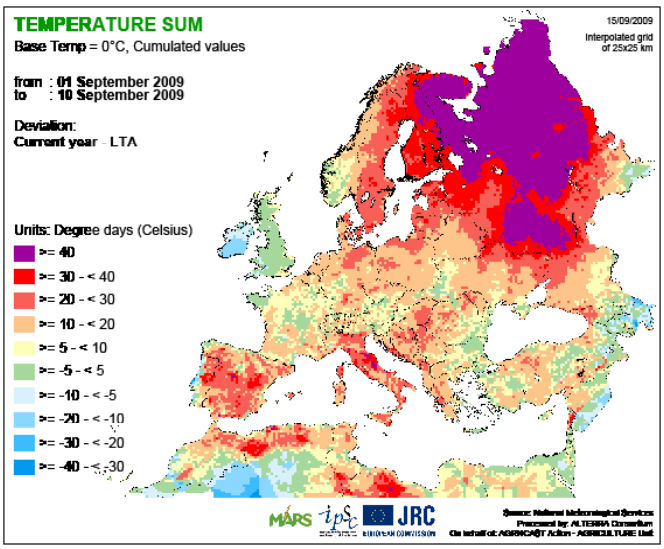
>= -30 - < -20
>= -20 - < -10
>= -10 - < -5
>= -5 - < 5
>= 5 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40
15/09/2009
Interpolated grid of 25x25 km
MARS
JRC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to : 10 September 2009
Deviation:
Current year - LTA
Units: Degree days (Celsius)
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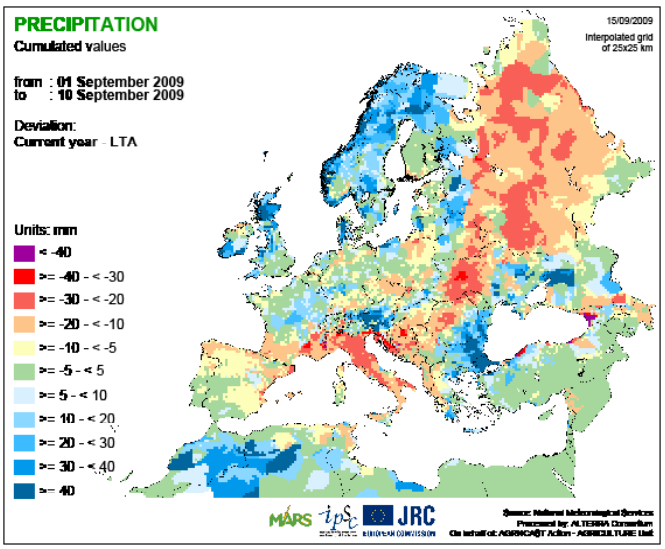
>= 30 - < 40
>= 20 - < 30
>= 10 - < 20
>= 5 - < 10
>= -5 - < 5
>= -10 - < -5
>= -20 - < -10
>= -30 - < -20
>= -40 - < -30
15/09/2009
Interpolated grid of 25x25 km
MARS
JRC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Cumulated values
from : 01 September 2009
to : 10 September 2009
Deviation:
Current year - LTA
Units: mm
< -40
>= -40 - < -30
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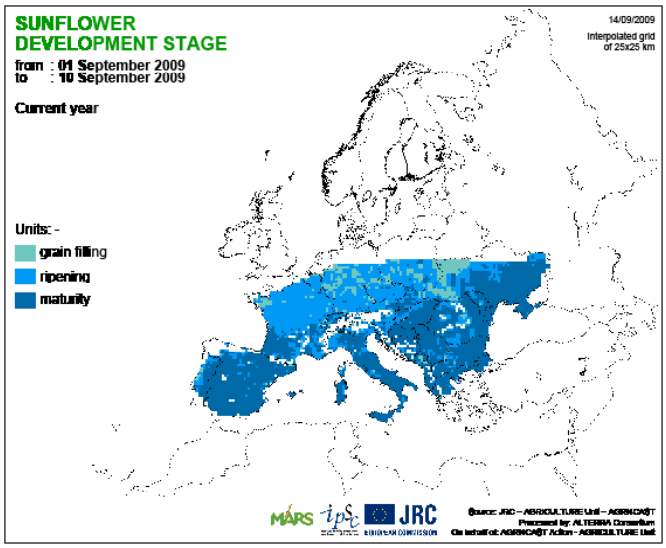
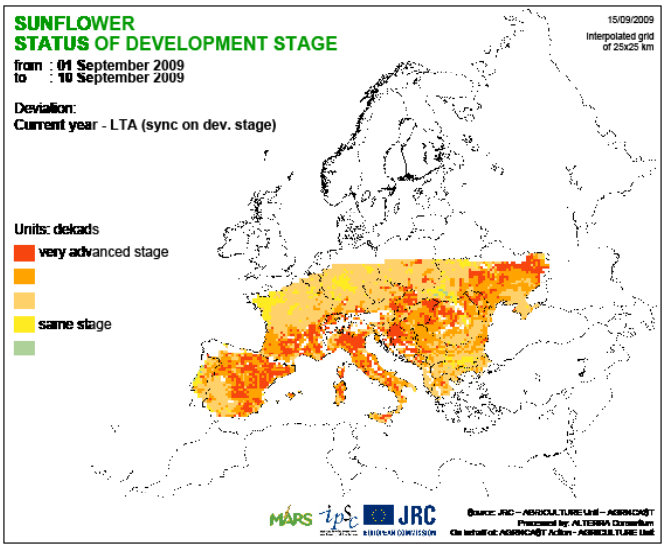
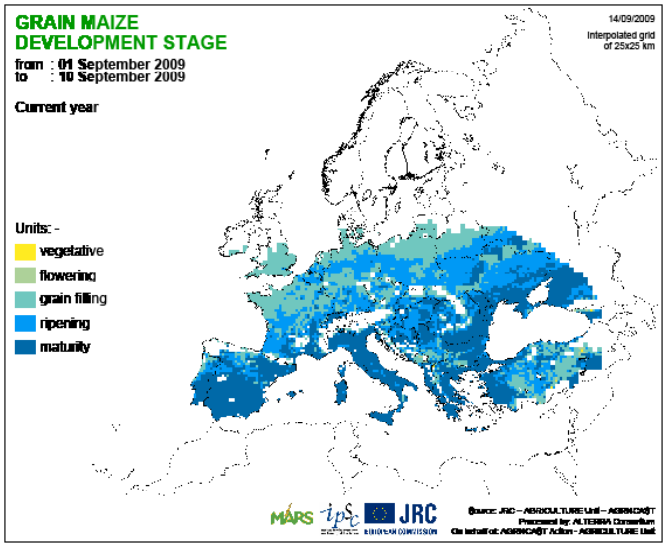
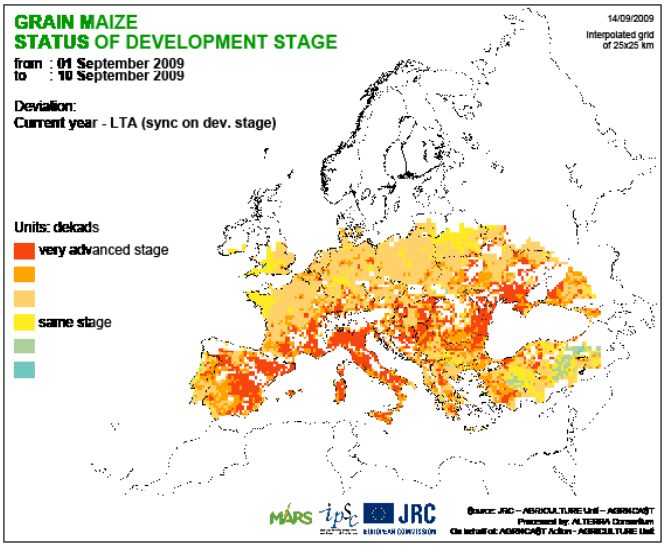
>= -20 - < -10
>= -10 - < -5
>= -5 - < 5
>= 5 - < 10
>= 10 - < 20
>= 20 - < 30
>= 30 - < 40
>= 40
15/09/2009
Interpolated grid of 25x25 km
MARS
JRC

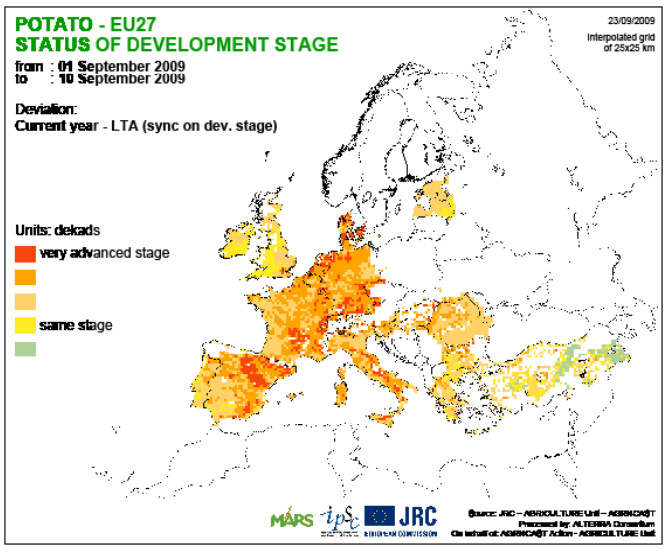
4.2 Crop development stage

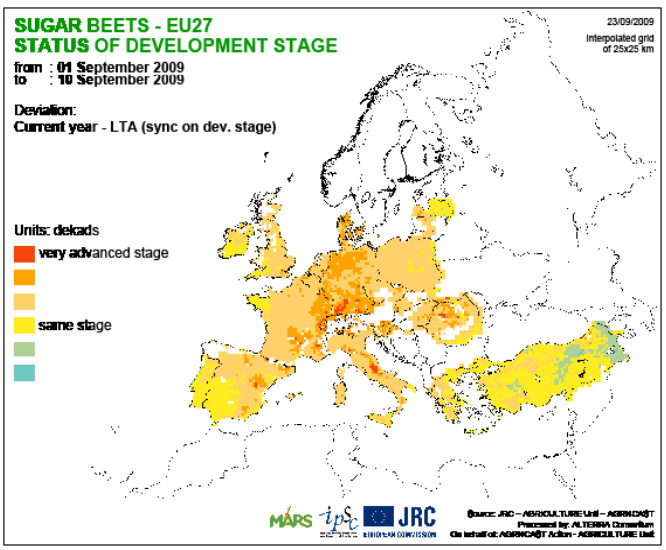




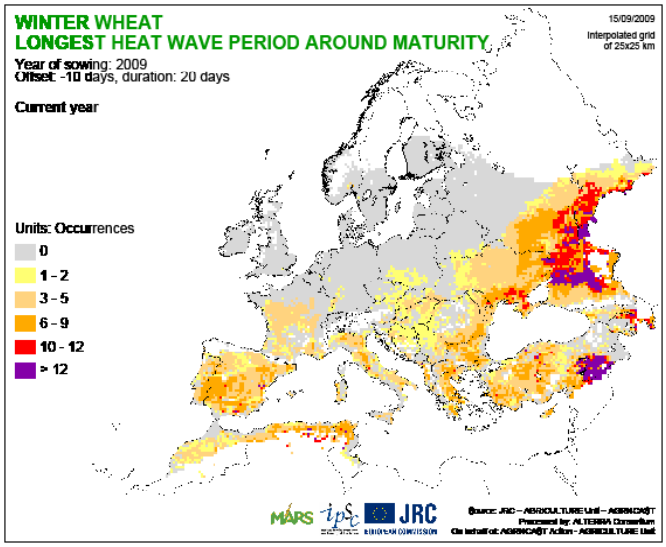


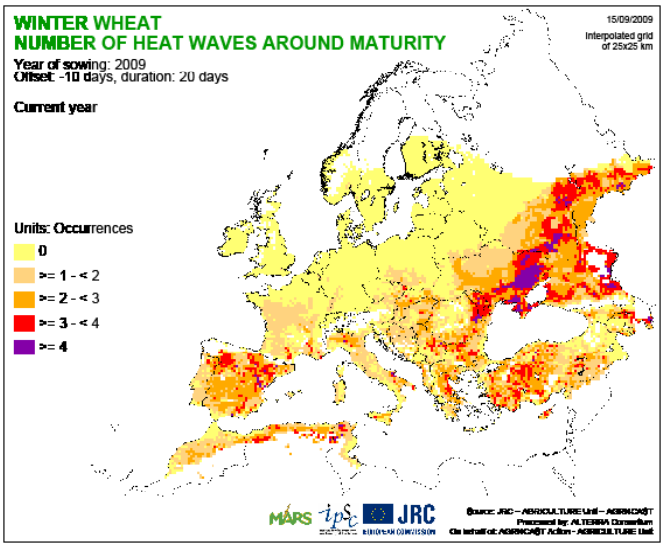


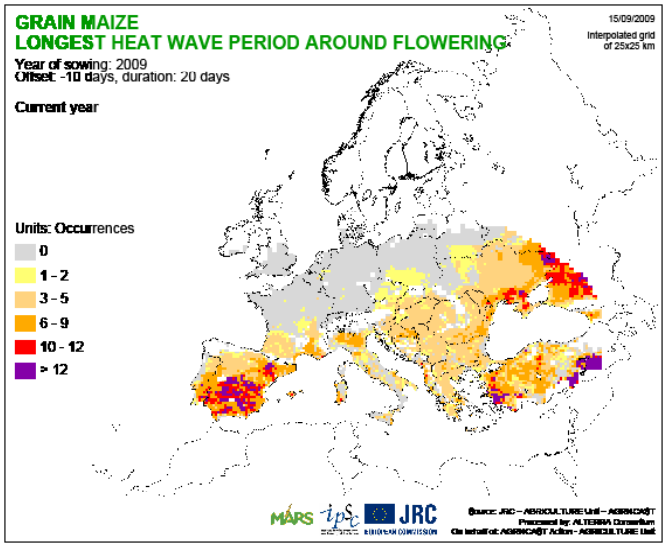


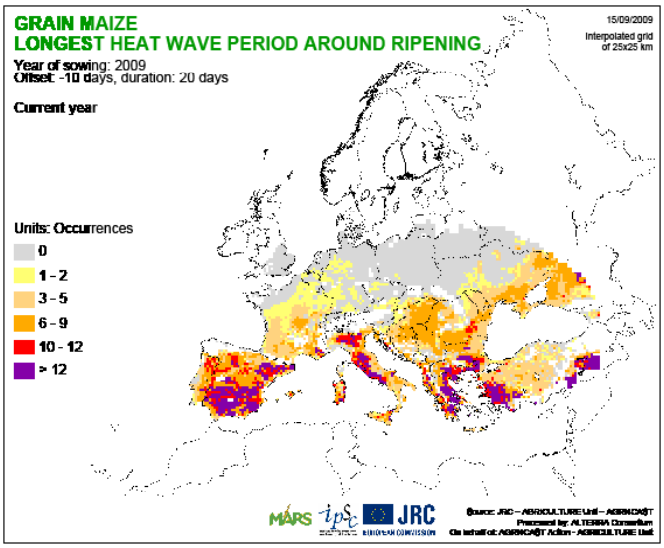


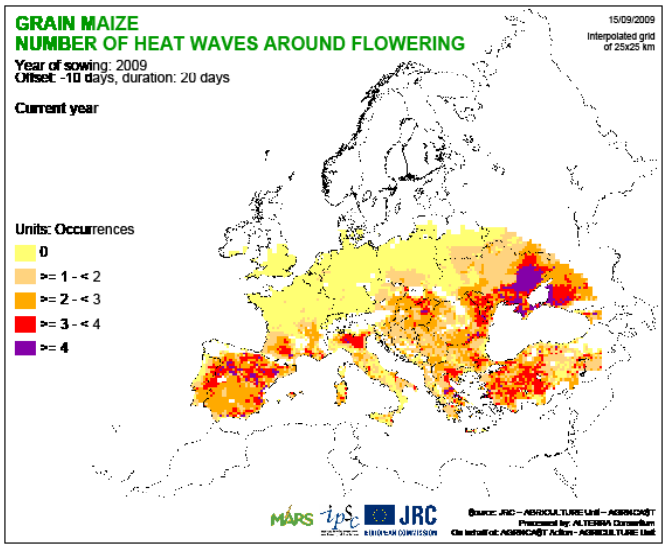
4.3 Heat wave during wheat and maize development

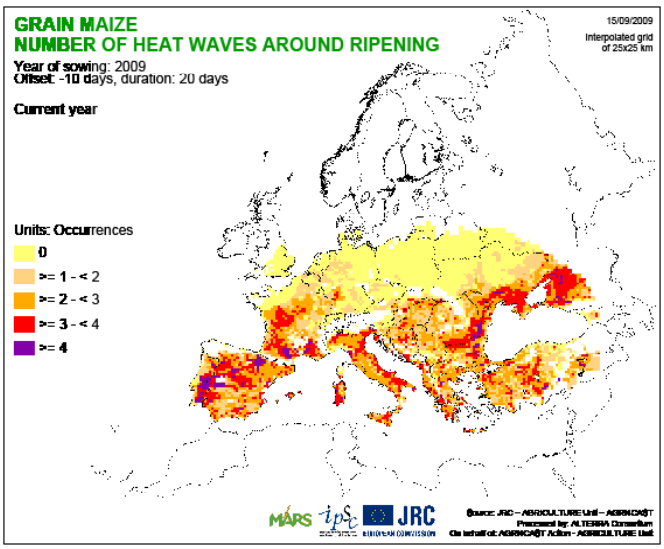




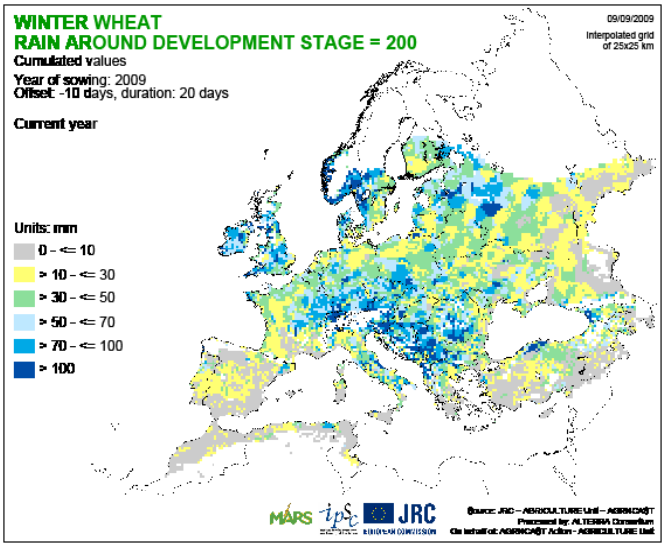


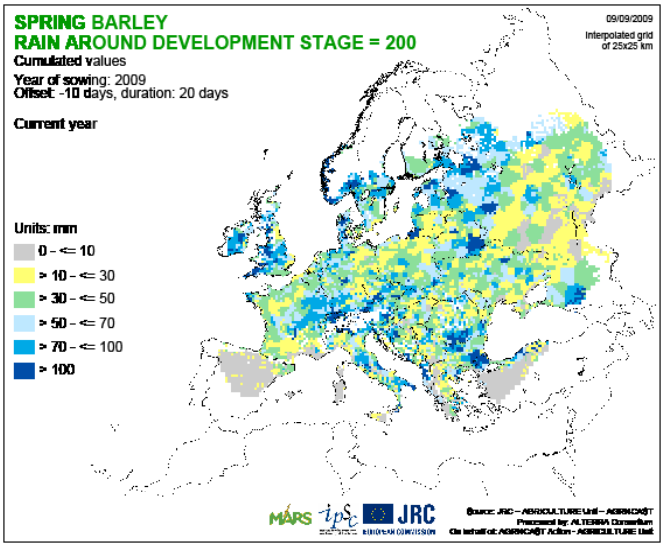


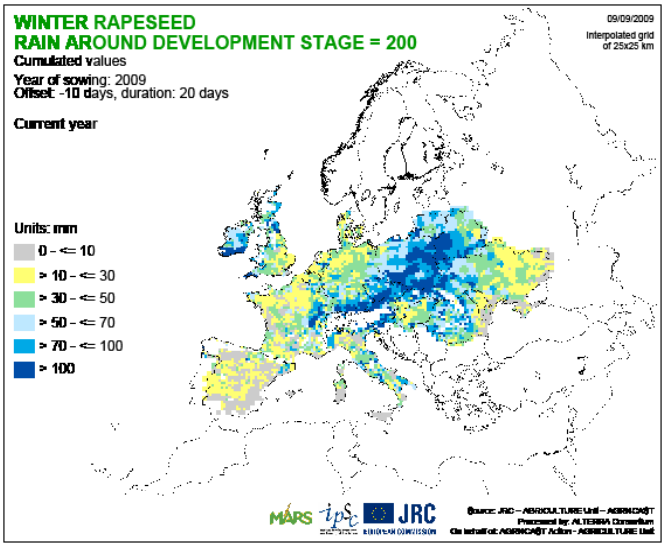


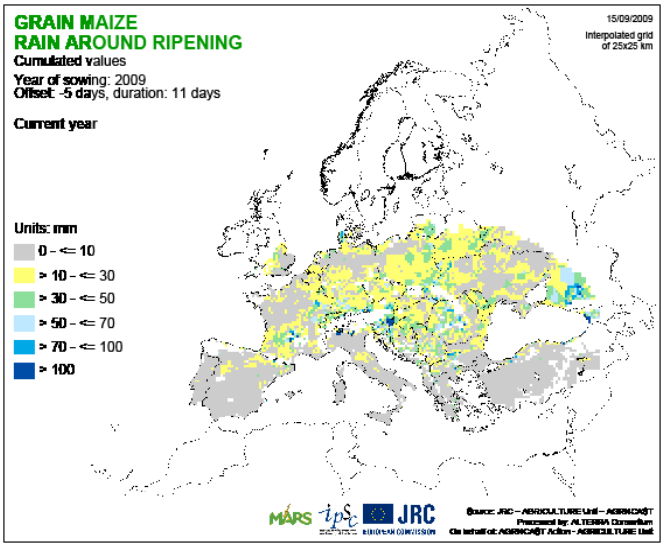


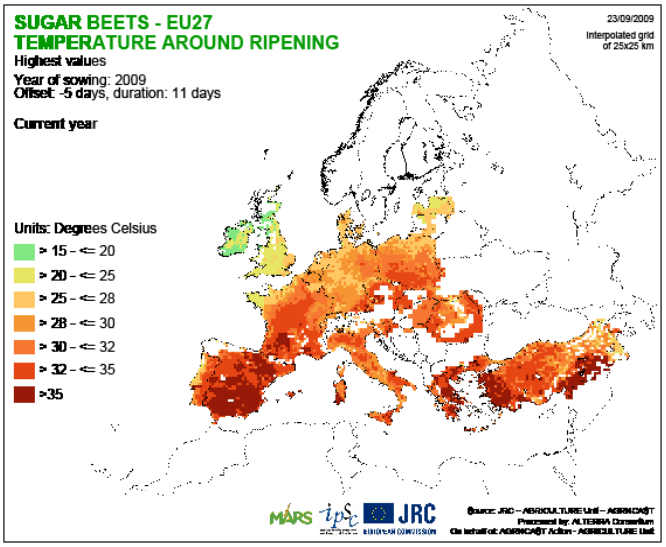
4.4 Crop versus weather conditions

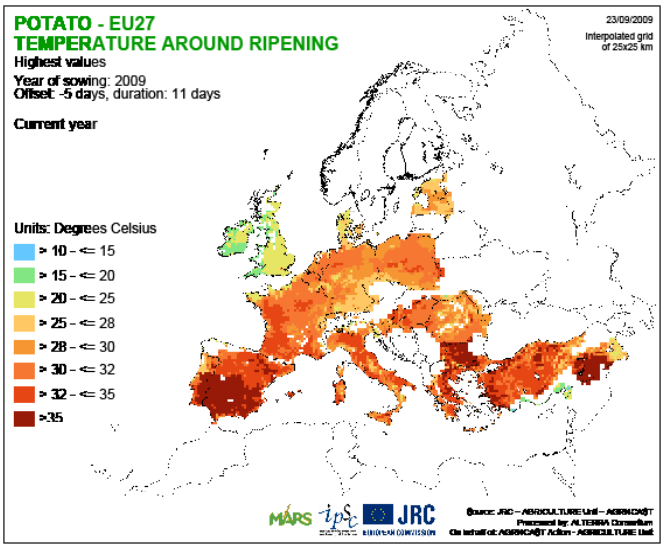






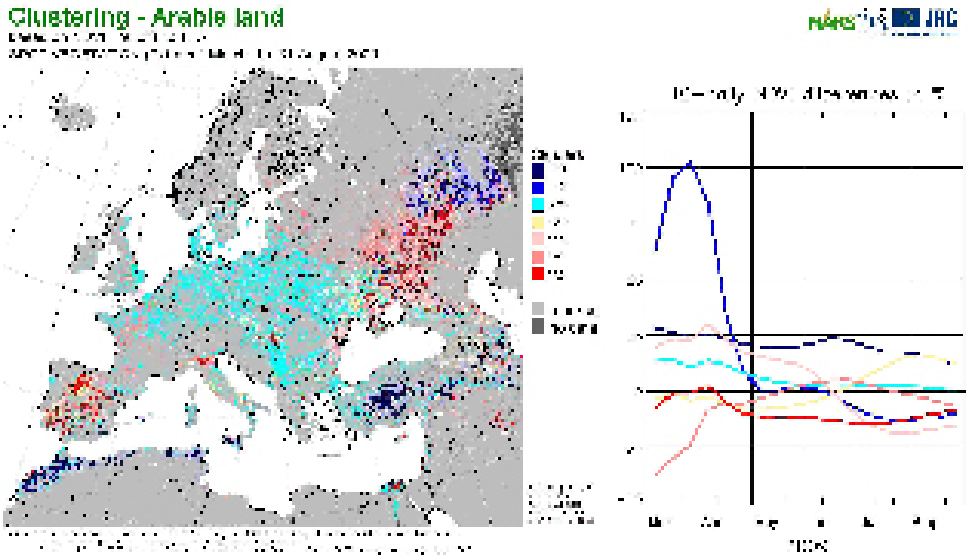






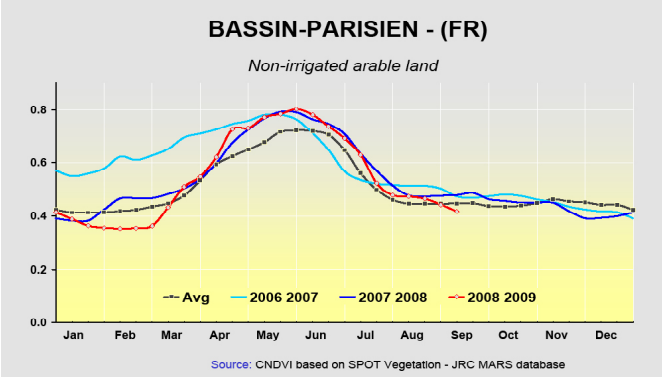
5. Satellite analysis - SPOT Vegetation

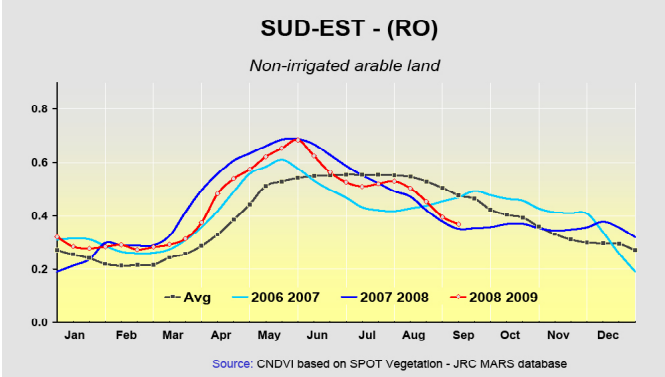
Average season across Europe. Hot spots with bad conditions in Spain, northern Italy and the north-west Black Sea coast



The cluster map displays the NDVI behaviour throughout the season from March until the end of August compared with the values calculated for the long-term average year (1998–2008). The red profile represents regions with vegetation development below the long-term average for the whole season. These are mainly regions where drought conditions persisted from at least June onwards: the *Po valley*, *central and northern Spain* and *eastern Hungary*. In *Russia* too negative canopy conditions are shown: the delay at the beginning of the season did not allow full development of the green biomass and the warm, dry conditions shortened the phenological cycle. The dark pink curve represents NDVI values slightly below the average that climbed to seasonal values in late June, coinciding with the biomass peak. The subsequent dip below the average is related to clouds and wet conditions in *northern France* and the central *United Kingdom*, whereas in *northern Italy* and *southern France* the NDVI values dropped because of the long dry spell. Light pink areas (mainly the *north-eastern Black Sea coast*) stand for good development of the vegetation and of winter and spring crops, although the water deficit affected summer crops. The yellow profile depicts NDVI values ranging around the average in spring time, but rising from late June onwards: probably the water shortage triggered irrigation operations. The light blue profile, covering more than 35 % of non-irrigated arable land, indicates a good season, almost at the end of the cycle: the NDVI values were higher than average in the spring and are moving towards the average in the senescence phase. The dark blue profile visible in large parts of the Mediterranean regions indicates very high NDVI values. Unrealistically high percentage differences were detected in a minority of pixels in Russia (see the blue curve). They are related to very early development in the growing season. Since the NDVI is usually quite low at that time, above-average NDVI values have a stronger impact on the calculated percentage difference. To conclude this year's phenological cycle, profiles of the main agricultural areas have been identified.

The main agricultural areas of the **United Kingdom** and large regions of **France** (see *Bassin Parisien*) enjoyed a good season. The NDVI values were high for the whole growing period and did not slip back to average until the end of the phenological cycle. The worst conditions were observed in **Romania** (see *Sud Est* NDVI graph): after good biomass development in the growing period, encouraged by the warm temperatures, a dry period followed in July and is still continuing. These conditions affected part of the summer crops canopy, causing early senescence and NDVI values lower than average. Similar conditions are seen in **Ukraine**, where the water shortage did not affect vegetation development but had a greater impact on the flowering and grain-filling phases.





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