# RICE BULLETIN

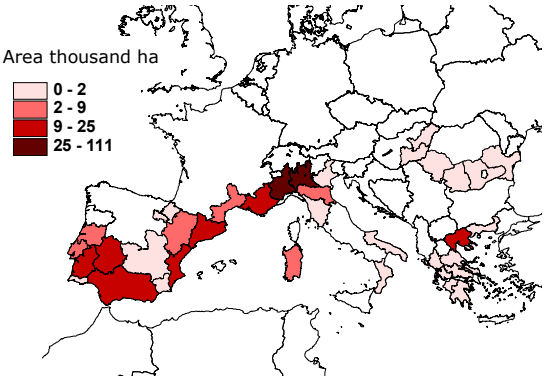
Situation between rice sowings and 29 July 2005

**Date:** 29/07/2005
**Number:** 0

## Number zero of the MARS bulletin for RICE

### PRESENTATION

The intention of this pilot bulletin for rice is to inform interested people and to ask for comments and advice for a future systematic production of this informative tool. The number one rice bulletin will be published at the end of September and, for the next seasons, two or three per year are expected.

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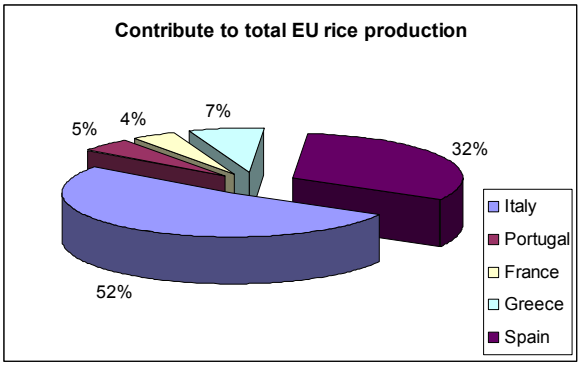
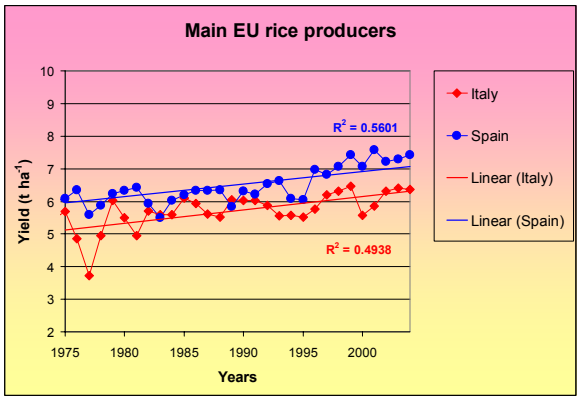
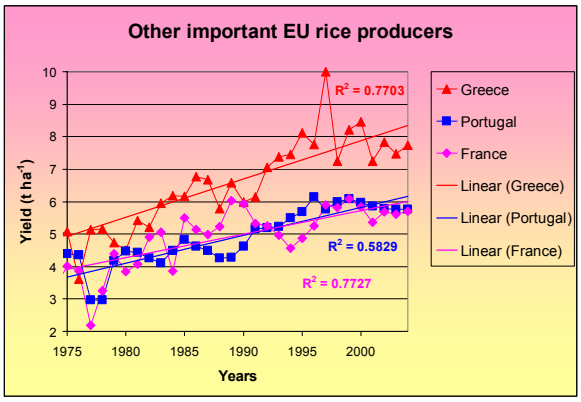



### RICE IN EUROPE

EU is the 17th world producer of rough rice, whereas, EU consumption ranks 19th. Although rice is produced in France, Greece, Italy, Portugal, Spain, Hungary and Romania, Italy represents alone almost 55% of the total EU area of rice cultivation and Spain about 30% (EUROSTAT, New CRONOS Database). Yield historical trends show a more rapid increase in Greece, France and Portugal than in Italy and Spain.



## METHODOLOGIES AND APPROACHES

Analysis and forecasts are based on the components of the Mars Crop Yield Forecasting System (MCYFS) (http://agrifish.jrc.it/marsstat/Crop%5FYield%5FForecasting/METAMP/): climatic, crop modelling, remote sensing and statistical tools.

### CROP GROWTH SIMULATION MODELS USED

**CGMS – WOFOST -** WOFOST (Van Keulen and Wolf, 1986; Boogaard et al., 1998) is a generic crop model and it is traditionally used as CGMS simulation engine for MARS forecasts. Main model outputs are potential and water limited biomass and yield, development stage, potential and limited leaf area index.

**CGMS – WARM -** WARM (Confalonieri et al., 2005) is a rice-specific rice model and it is used in CGMS for the simulation of the peculiarities of rice, not simulated by WOFOST, with significant impacts on yields. At the moment, WARM is mainly used for the computation of the yield losses caused by cold air irruptions during the period between *panicle initiation* and *heading* stages of development. The impact of these phenomena on yields is strongly dependent on the variety susceptibility and the sowing date (sowing advances or delays can shift the crop critical period and lead it far from the irruption days). Anyway, the threshold temperature below which sterility occurs is 13 or 14°C according to the different varieties' sensitivity. The frequency of these irruptions (cold air coming down from the arctic regions) is about once every 5/6 years, with yield losses ranging, in Italy, between 10 and 40% in the most severe cases.

### REMOTE SENSING ANALYSIS

The remote sensing analysis is mainly based on derived vegetation indicators. Currently medium and low resolution satellite sensors are used (SPOT-Vegetation and NOAA-AVHR; 1 km resolution).

The vegetation indicators are un-mixed by land cover based on the Corine Land Cover data. In the specific case, the "C" class rice is defined in Corine Land Cover only in the pixels where rice occupies more than 60% of the pixel area (Genovese et al., 2001). Therefore the developed vegetation indicators are called CNDVI and CDMP, where C stands for "coverage-based".

**CNDVI -** NDVI (Normalized Difference Vegetation Index) is obtained by dividing the difference and the sum of the reflectance in the red and in the near-infrared channels.

The NDVI is directly related to the status of the vegetation and therefore the data time series analysis allows identification of the stresses to which the vegetation is subject.

**CDMP -** This indicator is obtained by solving the equation for aboveground biomass accumulation based on the radiation use efficiency approach (Monteith, 1977) and on the fraction of the solar radiation really absorbed by the vegetation (FAPAR). While CNDVI can highlight periods of water stress, the CDMP uses only temperatures as limiting factor. This indicator derives FAPAR directly from remote sensing.

## ANALYSIS AND FORECASTS

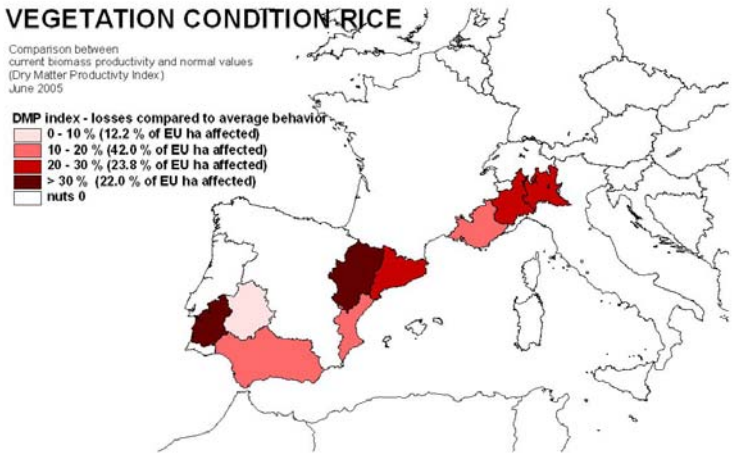
| Country | Yield (t/ha) | | | | |
|---|---|---|---|---|---|
| | 2004* | MARS 2005 forecasts | Avg 5yrs | %05/04 | %05/5yrs |
| Spain | 7.42 | 7.3 | 7.31 | -1.6 | -0.1 |
| France | 5.71 | 5.8 | 5.64 | 1.6 | 2.8 |
| Greece | 7.74 | 8.28 | 7.75 | 7.0 | 6.4 |
| Italy | 6.58 | 6.01 | 6.15 | -8.7 | -2.3 |
| Portugal | 5.76 | 5.57 | 5.83 | -3.3 | -4.7 |

The figure shows the impact of 2005 drought on rice at the end of June.

In Italy, July precipitations are partially bringing back the condition of rice to values close to the average.

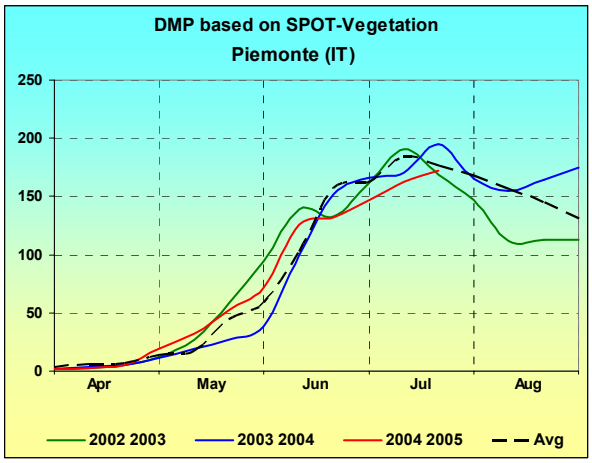
On the contrary, the scarcity of water is still threatening yield in Spain, in particular in Andalusia, while the Portuguese situation should be compromised, above all in the South – Western part of the Country (Alentejo region).

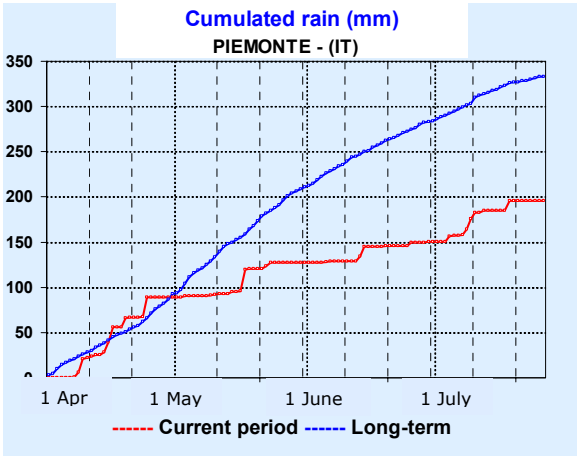
Moreover, the shortage of water could have increased soil organic nitrogen mineralization (more oxygen available). This leads to high nitrogen availability and, combined with high temperatures, increases the risk for blast disease.



## ITALY: not enough water for flooding

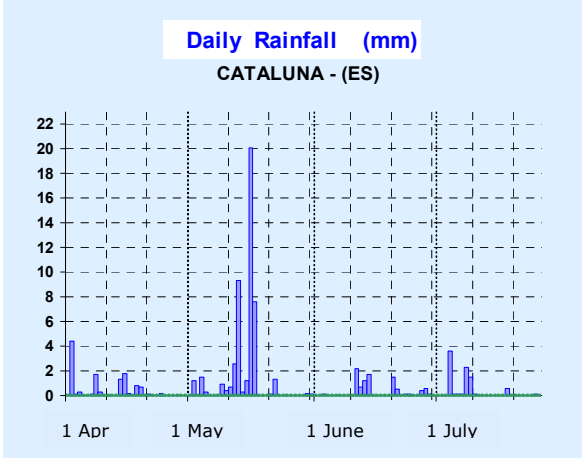
The crop is reaching the mid heading with only a slight advance, due to temperatures higher than the long term average. In North-Western Italy (Piedmont) scarce rainfall may have caused insufficient water supply for regular fields flooding, although no severe water stresses should have been verified, as confirmed by CNDVI.

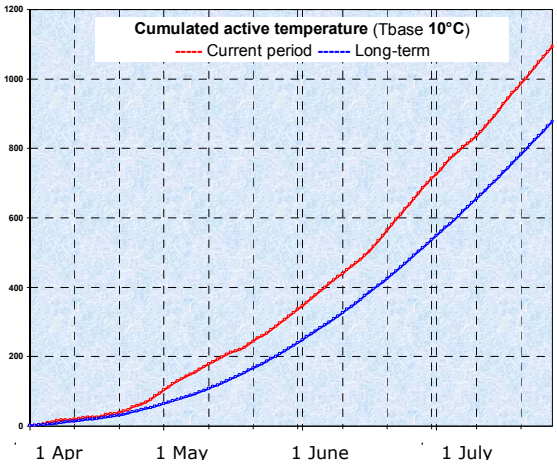



## SPAIN: hard season for rice

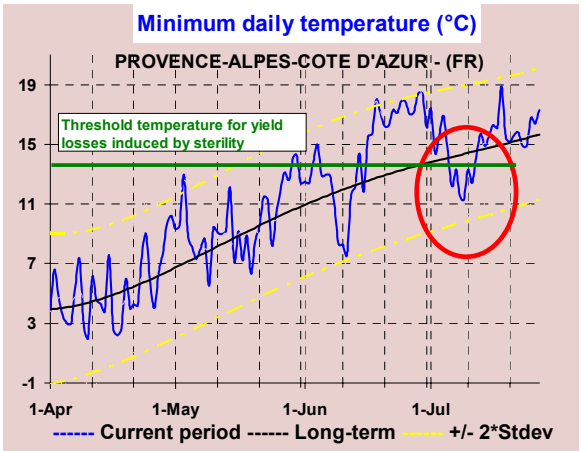
Drought except in the second decade of May with consequent insufficient water availability for flooding. Contrary to Italy, the crop could have suffered from water stresses, especially in Aragon and Andalusia. An advance in crop development (the crop is currently ending the heading stage) should have lead the late-seeded rice to be exposed to the cold air irruption of 5-11 July with consequent yield losses due to spikelet sterility. The lack of water may have prevented the crop from getting benefits from the mitigating effect of floodwater on temperatures.




## FRANCE: possible losses due to a cold irruption (spikelet sterility)

Yield losses will probably be caused by the cold irruption of 5-11 July (11°C reached during the night, lower than the ones observed for Italy and Spain). The slight advance in crop development (completing the heading stage) should have accentuated the problem. No water stresses are expected.

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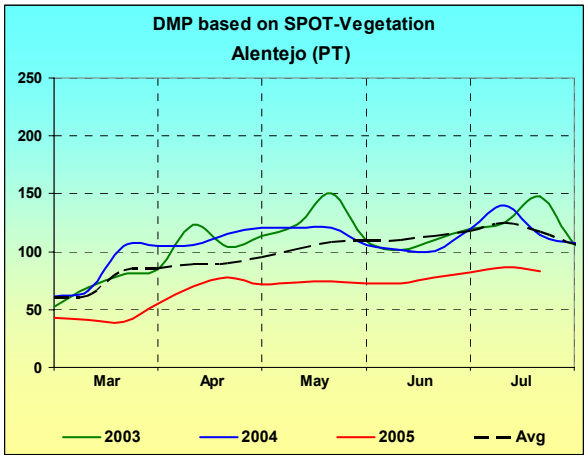
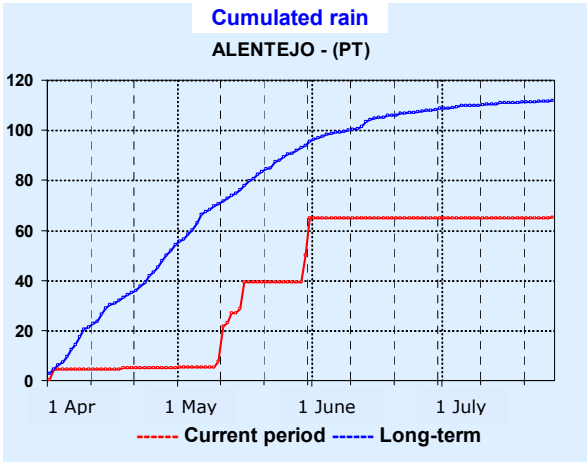
**Data production**: AGRIFISH Unit – MARS STAT Action /JRC and Alterra (NL), Meteoconsult (NL), MeteoFrance (Fr).

## PORTUGAL: critical conditions in the South

A particularly dry season accompanied by relatively high temperatures has probably lead the crop to anticipate the end of the vegetative phase (actually mid heading). The scarcity of water is probably the reason for the vegetation indices values observed especially in the Alentejo region, consistently lower both than the last 5-year average and 2004.



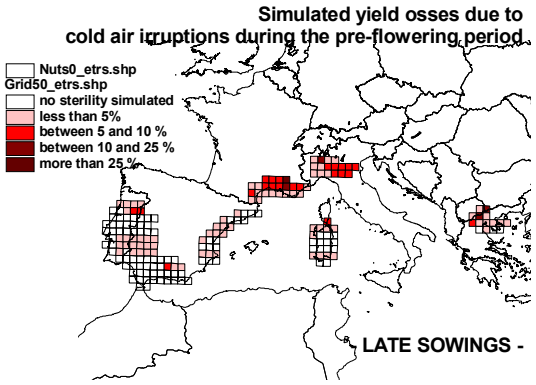



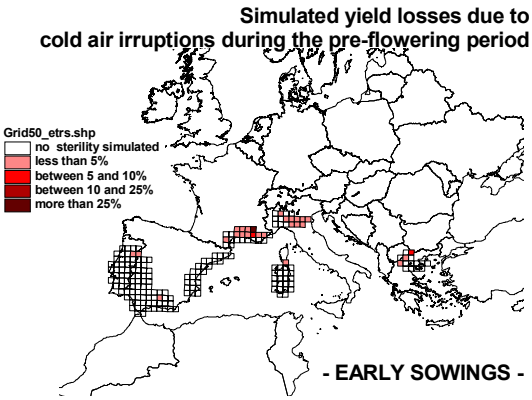

## GREECE: normal conditions

Possible problems related to yield losses due to the cold irruption at the beginning of the second decade of June (12°C reached).

## STERILITY INDEX

The cold air irruption occurred between the first and the second decade of July should have caused yield losses because of spikelet sterility. The phenomenon has been evaluated separately for early and late sowings. The latter case is the most relevant because, for early sowings, the critical period for the crop should occur before the irruption. Anyway, losses should be considerable only in France and in some small Italian districts in the North of the country.

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