



PRESENTATION OF CROP YIELD FORECAST FOR MOROCCO WITH CGMS WITH HIGHLIGHT ON OPERATIONAL ASPECTS AND IMPROVEMENTS FORESEEN



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Data transfer and expertise exchange between INRA and JRC (collaborative agreement N°252701)

□ Database transfer from JRC to INRA

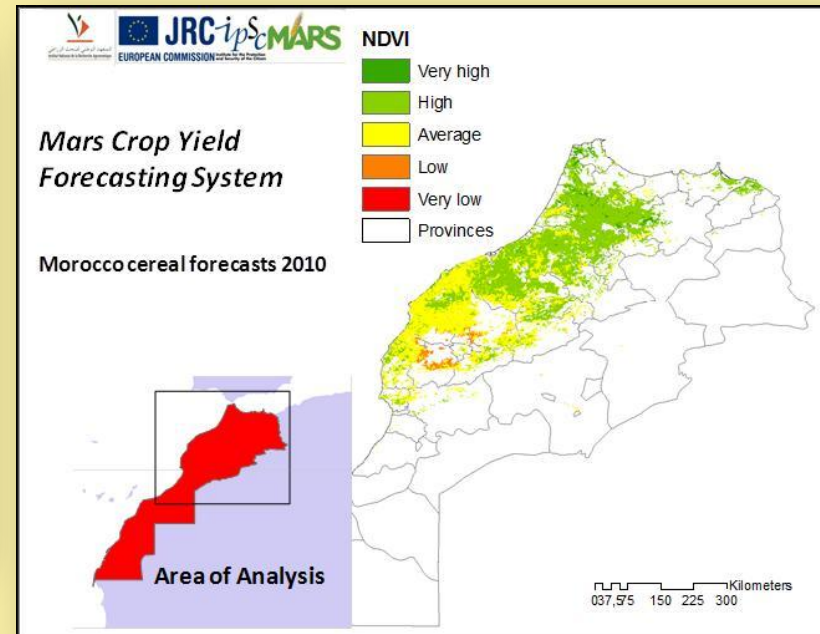
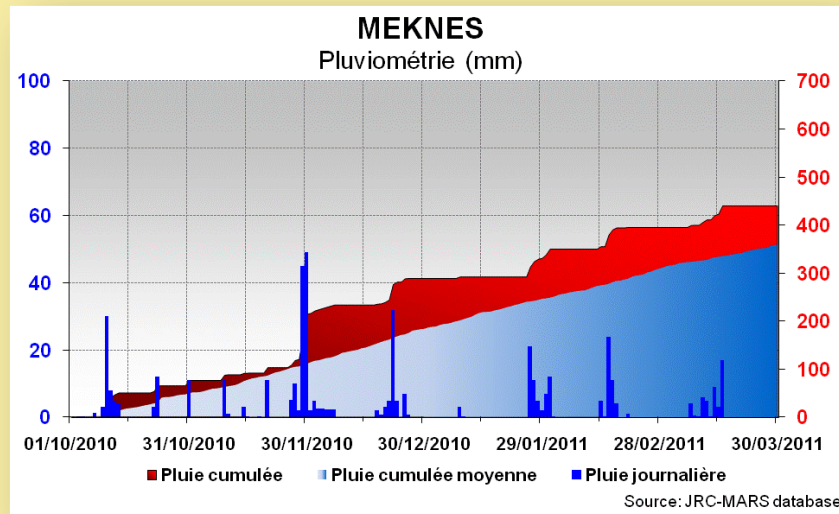
- Transfer of the climatic database from JRC to INRA :
 - Installation of the Oracle software (version 10) at Settat Regional Center of INRA
 - Transfer of climatic updates to INRA (interpolated grid at 25x25 km pixel size).
- Transfer of NDVI images (Agri4cast) from JRC to INRA :
Real time access to NDVI images through Agri4cast server.

□ Knowledge transfer from INRA to JRC

- Improvement of CGMS through the transfer of crop phenology ;
- Improvement of the delimitation of the administrative units that were used by JRC ;
- Improvement of the NDVI land cover mask previously used by JRC in order to better represent agricultural areas of Morocco ;
- Improvement of the crop statistical database (soft wheat, durum wheat, barley and maize production and areas by province sent to JRC, thanks to DSS cooperation) ;
- Improvement of the national cereal (soft wheat, durum wheat, barley and maize) forecasts based on INRA's empirical modelling (NDVI and Rainfall).

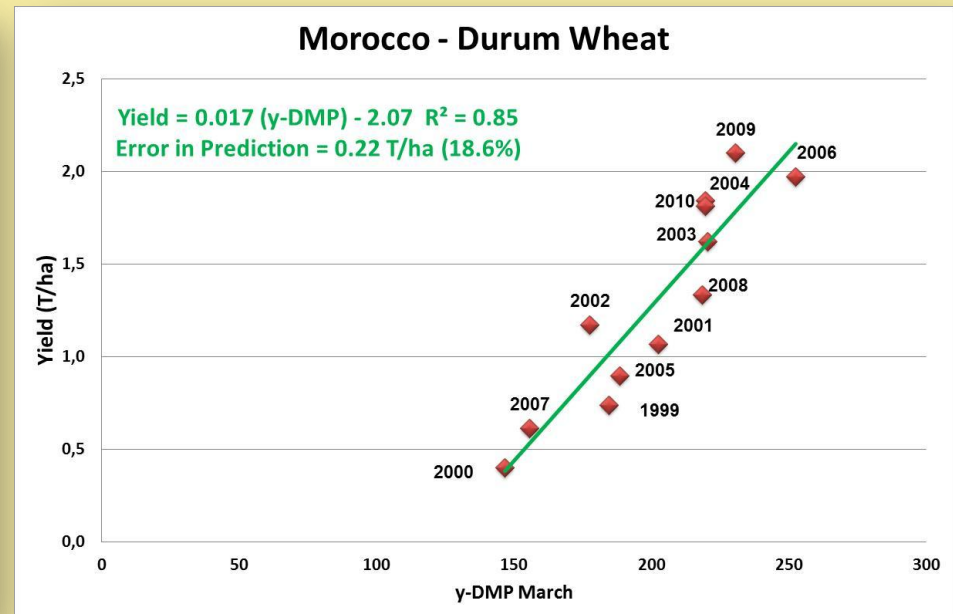
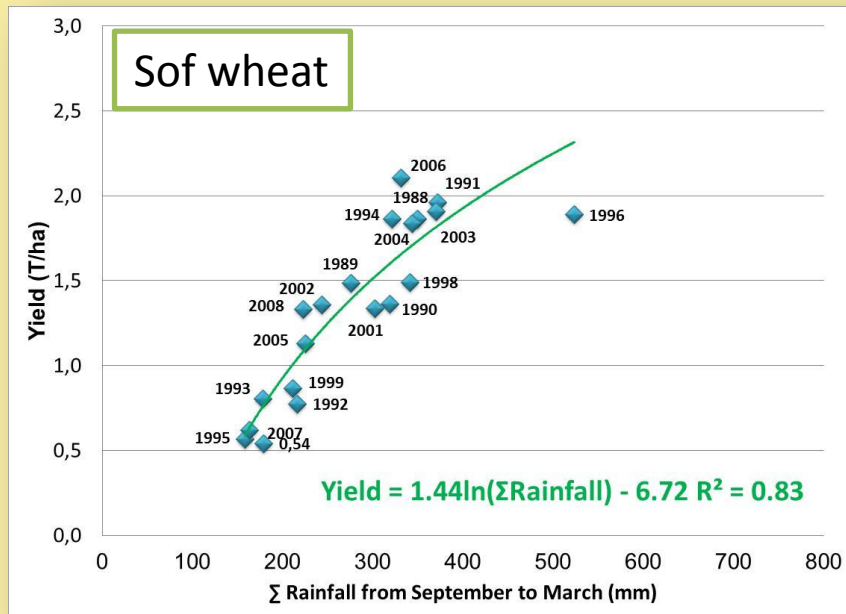
Crop forecasts in Morocco using CGMS, NDVI and Rainfall

- Common (JRC and INRA) analysis is done for the aspects related to agrometeorology and crop development ;
- Remote sensing analysis is done by INRA and JRC with support of VITO ;
- Pest and disease analysis is done by INRA based on field surveys ;
- Yield forecast analysis is done by INRA and AGRI4CAST.



Crop forecasts in Morocco using CGMS, NDVI and Rainfall

- Forecasts are based on CGMS and empirical models, using correlations between NDVI, Rainfall and Cereal yields (soft wheat, durum wheat and barley) ;
- NDVI is provided by JRC with support of VITO ;
- Rainfall estimates and observations are provided respectively by JRC and DMN ;
- Observed cereal areas are provided by DSS.



CGMS overview

Level 1

Weather

± 2000 stations

Daily values 1975-today

Level 2

Crop, soil, land use

AEZ zone (combination of agro climatic zones and soil mapping units)

Level 3

Official harvested yields

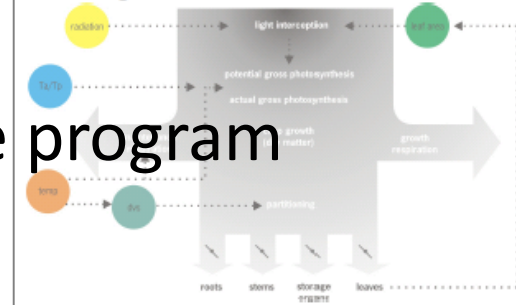
Administrative regions

1975-last year

Data quality checking
and interpolation to agro
climatic zones

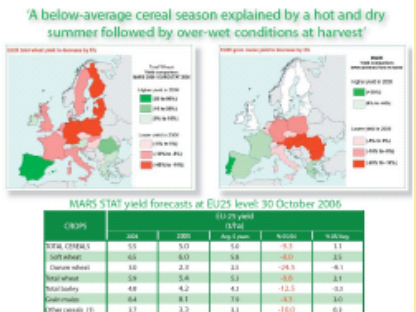
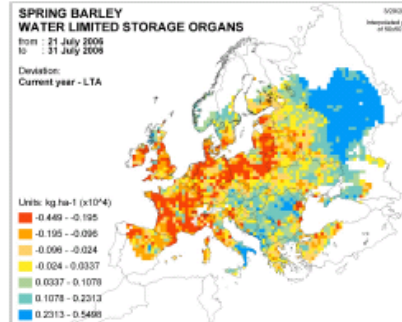
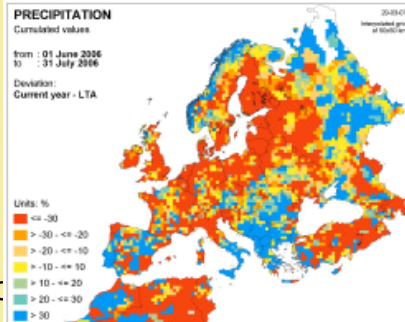
CGMS.exe program

Crop growth simulation per AEZ zone



Estimate
current year's crop yield
based on regression
analysis of historic
simulated indicators and
yield statistics

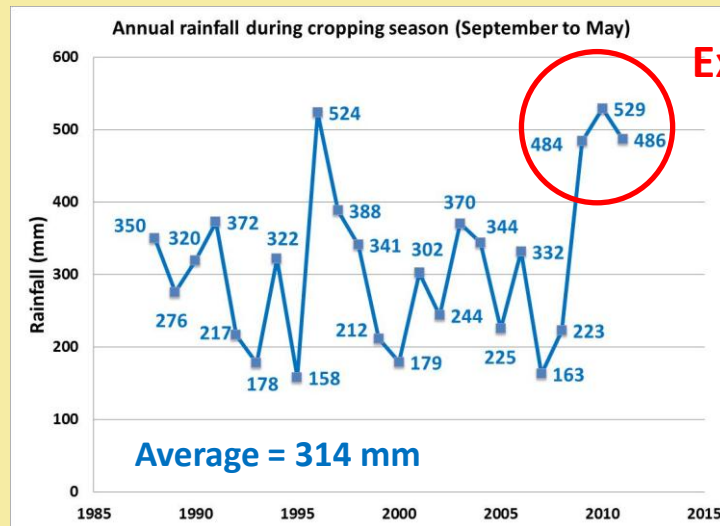
$\text{stat_yield} = \text{trend} + f(\text{sim_yield})$



Crop forecasts in Morocco using CGMS, NDVI and Rainfall

Cropping season	CGMS (JRC)	NDVI	Rainfall	Official
2008-2009	10.6	8.5	9.6	10.2
2009-2010	7.8	7.2	9.3	7.5
2010-2011	8.7	9.0	9.6	8.4

Cereal production in Morocco (Million Tons)



Exceptional years !

Joint INRA - JRC publications : 3 crop forecasting bulletins



INRA / JRC - IPSC-AGRI4CAST
BULLETIN COMMUN POUR LE MAROC 2009

Rapport n.1 / 2009 - 01/05/2009
Septembre 2008 - Mai 2009

DES PRÉCIPITATIONS PROLONGÉES ET SUPÉRIEURES À LA NORMALE ONT PERMIS UNE CAMPAGNE AGRICOLE EXCEPTIONNELLE

La campagne agricole 2008-2009 a été caractérisée par d'abondantes précipitations, bien réparties sur toute la saison. Il est prévu que cette campagne soit l'une des meilleures que le Maroc ait connues sur les 20 dernières années tant en termes de rendement que de production.

2009 YIELD OF WINTER CEREALS

Cette carte représente le NEMO décennale moyen, de février à mars 2009 (voir la note méthodologique), selon 5 classes qui correspondent à 5 niveaux de probabilité des rendements céréaliers au Maroc. Les zones non agricoles ont été masquées en utilisant le masque "Global and Cover 2000 for Africa" (GLC2000 version 5.0, Mayaux et al., 2004).

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Prévision des Rendements Céréaliers à l'échelle Nationale pour 2009

	2009	2008	Moy.	%
CULTURE				
Bât tendre	2.13	1.46	1.24	+68.3%
Bât dur	2.03	1.28	1.30	+55.8%
Orge	1.41	1.13	1.08	+31.3%

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2009 - 2010 WINTER CEREALS SEASON
NEAR-AVERAGE YIELDS FOR WINTER CROPS DUE TO DELAYED SOWING AND HISTORICALLY WARM APRIL

HIGHLIGHT

Cereal production in the 2009/2010 agricultural season was characterized by above-average precipitation. The outcome could have been better if rain had been better distributed. The poor distribution of rain led to different results than were observed in regions to another, and even more so in the south. The poor distribution of rain led to different results than were observed in regions to another, and even more so in the south. The poor distribution of rain led to different results than were observed in regions to another, and even more so in the south.

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- Overview of the season
- Agro-meteorological overview
- Pests and diseases
- Yields at 100% level
- Yield maps
- Remote sensing

JRC Publications
The Joint European Commission and JRC Publications are published in French, English, and Arabic. The JRC Publications are published in French, English, and Arabic. The JRC Publications are published in French, English, and Arabic.

CROP MONITORING IN MOROCCO
رصد المحاصيل الزراعية في المغرب

MARS Bulletin Vol.19 - 2011
Special Issue

Period of analysis: 1st October 2010 - 31st March 2011
Issue date: 12 April 2011
Issue 1

Promising 2010-2011 crop season for winter cereals

Highlight

Meteorological conditions during the sowing period were favourable in general over all the country, but particularly in the main provinces where winter cereals are produced (from Tanger to Sali along the Atlantic coast, to Nador in the east along the Mediterranean sea and to Meknes/Fez in the Centre).

Weather conditions during December and January were better than usual in the Centre, Centre-Nord and Nord-Ouest. In the other regions, the amount of rain was below the average but still above the lower limit of the seasonal variation. Generally, temperatures during the period were higher than the seasonal values.

The weather conditions in February and March, with good water supply and temperatures relatively low allowed a positive growth of the crops with a slight extension of the vegetative cycle in most provinces where winter cereals grow.

Winter cereals development is at the grain filling stage in most regions of Morocco, the weather conditions in April will be therefore crucial to confirm the current yield forecast. The production for total cereals (barley and wheat) is estimated at 8.7 M/t/ha.

		Yield t/ha (04/04/2011)				
MOROCCO	2010*	MARS 2011 forecast*	Avg 5yrs	%1910	%110yrs	
Bât	Wheat	1.7	1.9	1.6	+8.0	+17.6
Orge	Barley	1.3	1.6	1.1	+20.1	+52.0

* From DSS and INRA-Morocco
* As 04/04/2011 using the MARS Crop Yield Forecast System - COMS

Centre - (MA)
Daily and Cumulated rain



Further improvements

- ❑ **Level 1 :** Improve CGMS, based on NDVI and Rainfall which is adapted to the semi-arid environment of Morocco ;
- ❑ **Level 2 :** Improve scenarios through seasonal weather forecasts (North Atlantic Oscillation) ;
- ❑ **Level 3 :** Improve CGMS, through a combination of mechanistic modelling and statistical modelling ;
- ❑ **Level 4 :** Improve forecasts based on Bioma (include diseases lost) ;
- ❑ **Level 5 :** Improve climatic data based on DMN interpolation method ;
- ❑ **Level 6 :** Autonomous use of the system in Morocco (E-AGRI project), in INRA, DSS and DMN through a collaborative agreement between the three institutions ;
- ❑ **Level 7 :** Extension of INRA – JRC collaborative agreement and include DMN and DSS.



شكرا
謝謝您
Thank you

