

# Agrometeorological approaches to crop yield forecasting

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Weather data

Remote sensing data

Agricultural statistics

Soil and other maps

Crop data

Crop models



Statistical methods

Crop yield forecasts

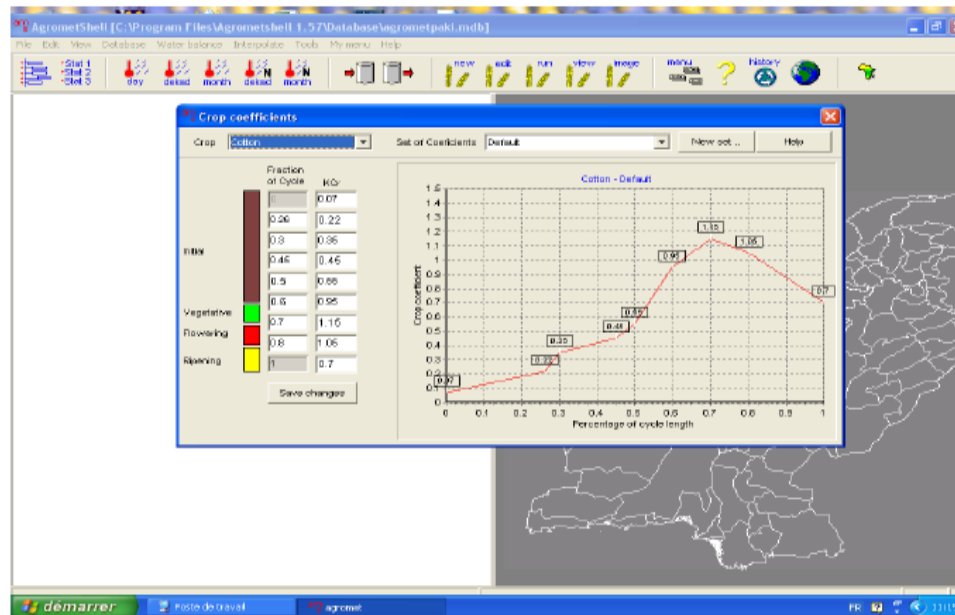
# Crop models

- AgroMetShell
- Aquacrop
- For specific crops: WARM, ORYZA for rice, etc
- EPIC, APSIM, WOFOST, CropSyst, DSSAT, etc



# AgroMetShell

- A collection of tools for agrometeorological crop monitoring and forecasting.
- Database on weather and crop data
- Crop specific soil water balance model



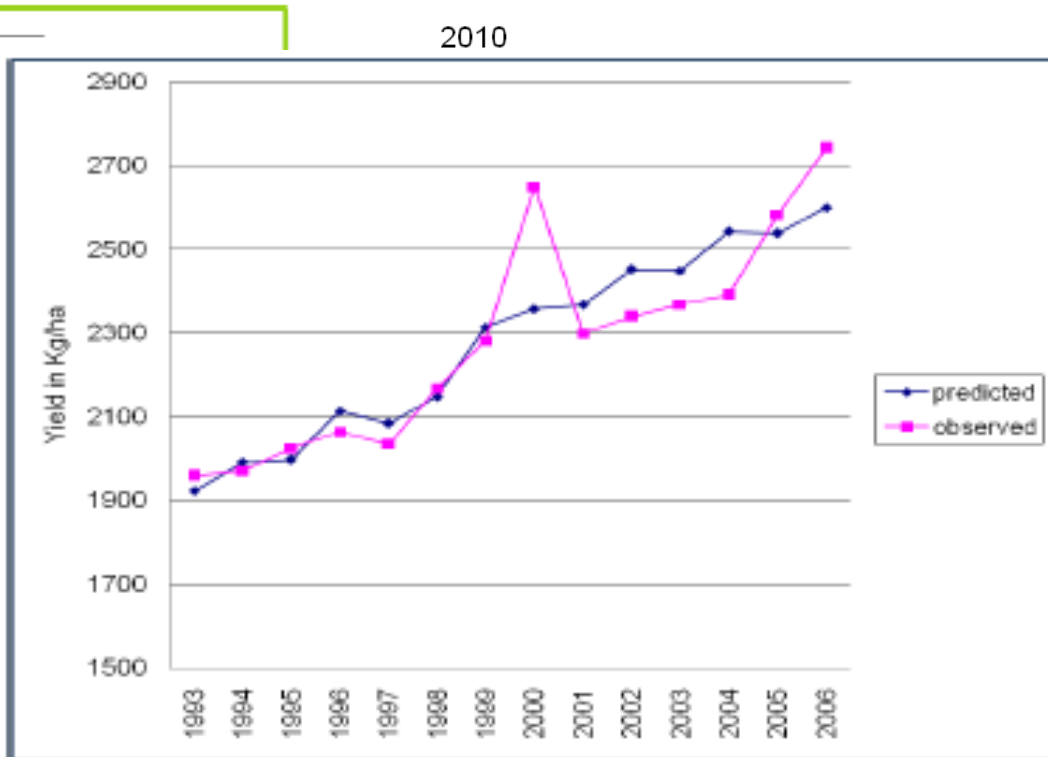
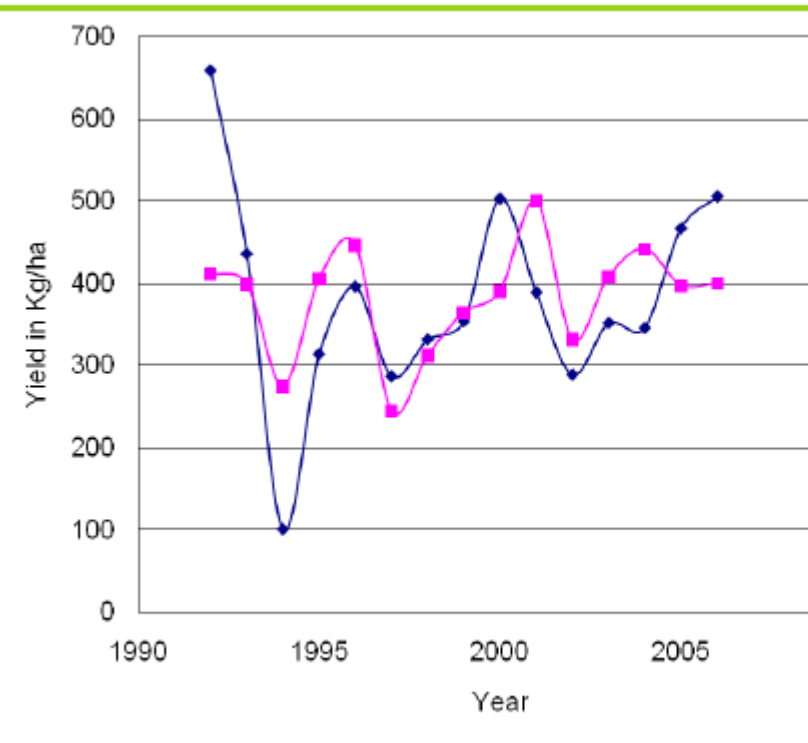
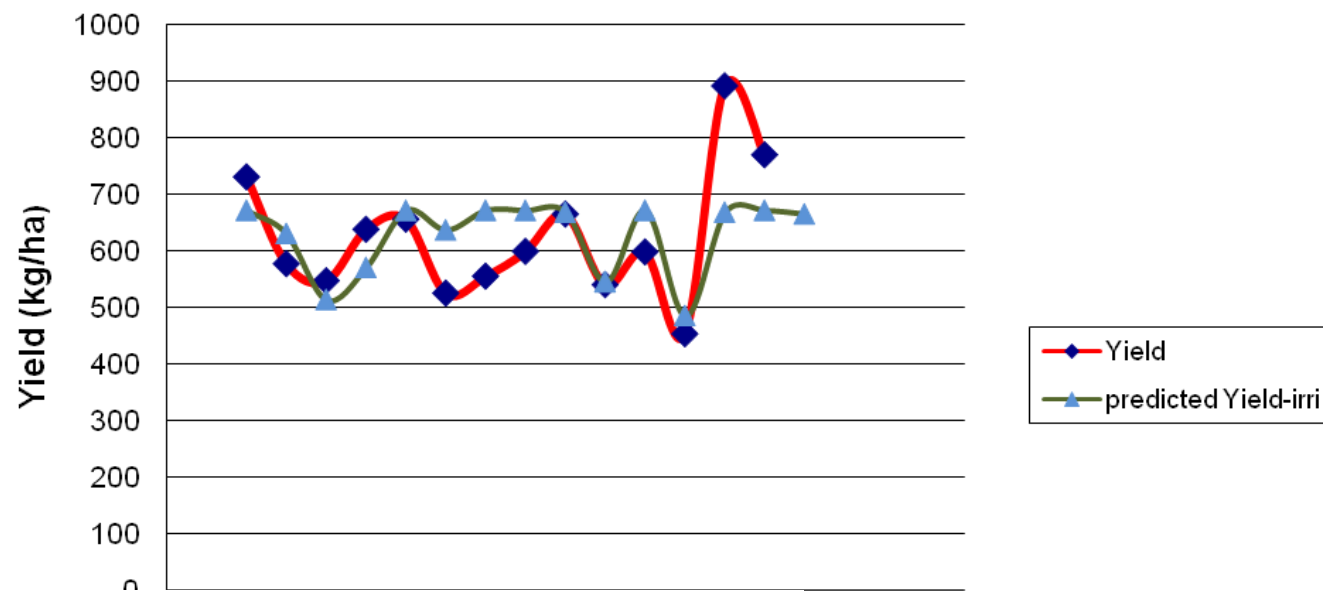
# Yield functions

- Outputs from AgroMetShell
    - Harvest indices
    - Water in Excess/Deficit at specific crop development stage
    - Total crop water requirement
    - Evapotranspiration at specific crop stage
  - Weather variables such as rainfall, temperature
  - NDVI
  - And other possible explanatory variables
- Regression model (yield function) calibrated to predict observed yield

# Example

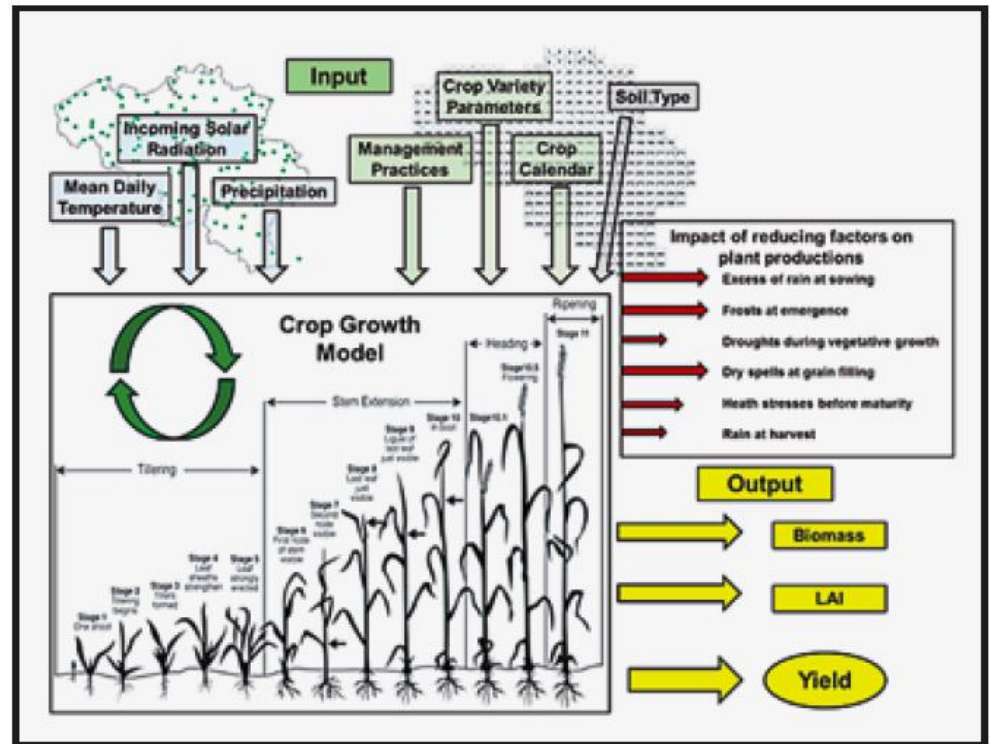
Districts	Crop	Yield Models
Faisalabad	Cotton	$292,138 + (\text{Cummulative Rainfall from last decade of May to second Decade of August} * 1,647 - (\text{Cummulative Rainfall from last decade of May to last Decade of August} * 1,009)$
Rahim Yar Khan	Cotton	$812.068 - (\text{ETA at Ripening} * 2.981)$
Sialkot	Wheat	$78252.50 - (\text{YEAR} * 40.389) + (-581.0304 * \text{April 3}^{\text{rd}} \text{decade NDVI})$

# Yield Forecast Model for Cotton in Rahim Yar Khan



# Belgium

- Six main crops (winter wheat, winter barley, fodder maize, potatoes, sugar beet and winter rape)
- CGMS (WOFOST crop model):
  - Biomass
  - Yield
  - LAI
  - Evapotranspiration
  - Soil water balance





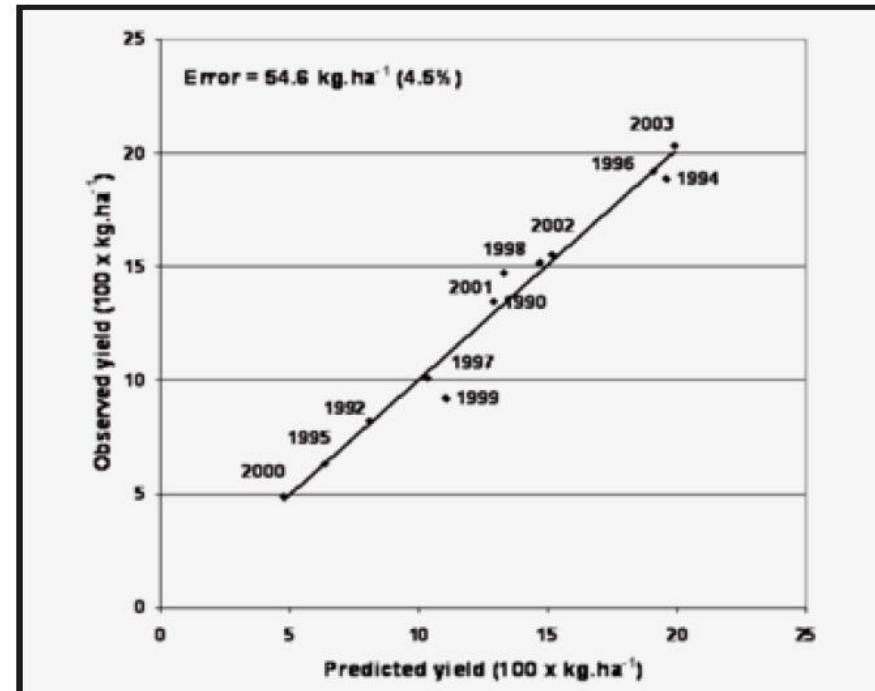
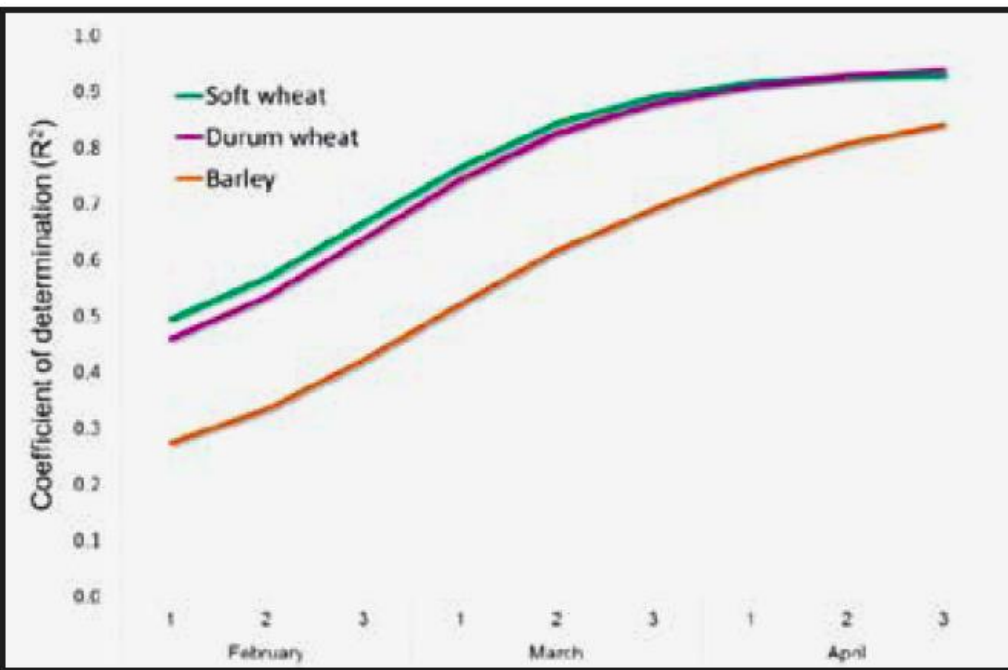
# Belgium: B-CGMS

- Remote sensing (RS):
  - NDVI
  - Dry Matter Productivity (DMP)
- Trend: Historical technological trend of yields
- Yield forecasting model:

$$Y = a + f_1(\text{Trend}) + f_2(\text{CGMS}) + f_3(\text{RS}) + \xi$$

# Morocco

- Similar system to Belgium
- Soft wheat, durum wheat, barley



# Institutional set-up

- Highly interdisciplinary
  - Data
  - Technical expertise
- Collaboration among relevant offices is key
  - Meteorology – BMD
  - Agronomy – DAE, BARI, BRRI, etc
  - Statistics – BBS
  - .....

# Thank you

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