The B-CGMS project: evaluation after 5 years of monitoring and prediction

Curnel Y.¹, Oger R.¹, Leteinturier B.¹, Tychon B.², Eerens H.³

¹ Walloon Agricultural Research Centre (CRA-W)
² University of Liège (ULg)
³ Flemish Institute for Technological research (VITO)

Introduction

- B-CGMS: adaptation of the European Crop Growth Monitoring System (CGMS) to Belgian conditions
- More detailed information/inputs
Introduction

• Crop Yields predictions
  – Monthly basis
  – Growing season (April to September)
  – 6 crops
    • Winter wheat
    • Winter Barley
    • Maize
    • Sugar beet
    • Potatoes
    • Rapeseed (2006)

Introduction

• Crop Yields predictions
  – Published in agrometeorological bulletins (French / Flemish) sent by e-mail (since 2002)
    • Analysis of meteorological situation of the month (ULg)
    • RS information on the state of the crops (VITO)
    • Crop yields prediction (CRA-W) at agricultural circumscriptions/regions and national levels (CRA-W)
Introduction

- Crop Yields predictions
  - Published in a agrometeorological bulletins (French / Flemish) sent by e-mail (since 2002)
  - Information also available on B-CGMS website (currently modified / updated)

http://b-cgms.cra.wallonie.be

Introduction

- Crop Yields predictions
  - Combination of linear regression models
  - Including different categories of yield indicators

\[
\text{Official yield} = f(\text{trend}) + f(\text{RS}) + f(\text{meteo})
\]
Introduction

- Crop Yields predictions
  - Combination of linear regression models
  - Including different categories of yield indicators
  - Semi-automated procedure (StatCat)

B-CGMS predicted yields vs. MARS predicted yields

- National level
- Necessity: to have a reliable dependant variable (official yields - NIS)

NIIS data are consistent with data obtained independently from crop protection trials conducted on a number of experimental sites (1989-1997 period)
Official yields vs. B-CGMS Predicted yields

- Predictions accuracy (difference between official yields and published values in bulletins) according to the month for which the prediction is made.
  - Agricultural circumscriptions level

<table>
<thead>
<tr>
<th>Crop</th>
<th>R² adj</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter wheat</td>
<td>0.80</td>
</tr>
<tr>
<td>Winter Barley</td>
<td>0.78</td>
</tr>
<tr>
<td>Fodder maize</td>
<td>0.64</td>
</tr>
<tr>
<td>Sugar beet</td>
<td>0.67</td>
</tr>
<tr>
<td>Potato</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Difference of the quality of prediction according to the yields level range

Winter wheat

- FROST2
- Pseudo-R² "normal years"
- Pseudo-R² "extreme years"
Influence of the yields level range on the quality of prediction

Conclusions

- The most accurate predictions in Belgium are realised (in average) in June or July.
- Yield predictions are coherent compared with official yields particularly for extreme years.
- Agrometeorological model is not efficient for some crops (e.g. winter wheat).
- Adding other yield indicators (e.g. FROST2) can improve the quality of prediction.
Perspectives

- Producing new model outputs in order to comply with end-users expectations (e.g. Potato, Sugar beet)
- Improvement of yield predictions for rapeseed
- Study the possibility to include new relevant meteo indicators
- Adjustment of some parameters as e.g. SPAN value on the basis of field information
- New statistical methods (StatCaT)