Green leaf area decline of wheat top three leaves in Belgium and G-D of Luxembourg from 2003 to 2006: the relationships with grain yield

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Plan of the presentation

- Introduction
- Objectives
- Materials and methods
- Results
- Integration of a « disease module » into B-CGMS : calibration & validation
- Conclusions

III CGMS Experts meeting - Arlon
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Introduction

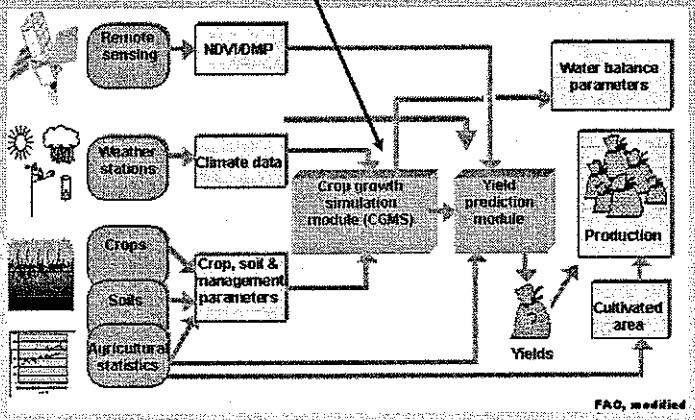
- B-CGMS : an integrated information system predicting reliable, timely and objective estimates of crop yields
- No integration of the effects of the **diseases** in the system

Septoria tritici → major cause of yield loss in wheat (20 to 30%) (El Jarroudi, 2005)

- Effects of contrasting diseases on yield of wheat grain can be related to effects on **green leaf area**, or precisely, absorption of photosynthetically active radiation by healthy green tissues (Waggoner & Berger, 1987; Bryson et *al.*, 1997)
- The yield of wheat is particularly related to **leaf area duration** between ear emergence and maturity (Thorne, 1966)

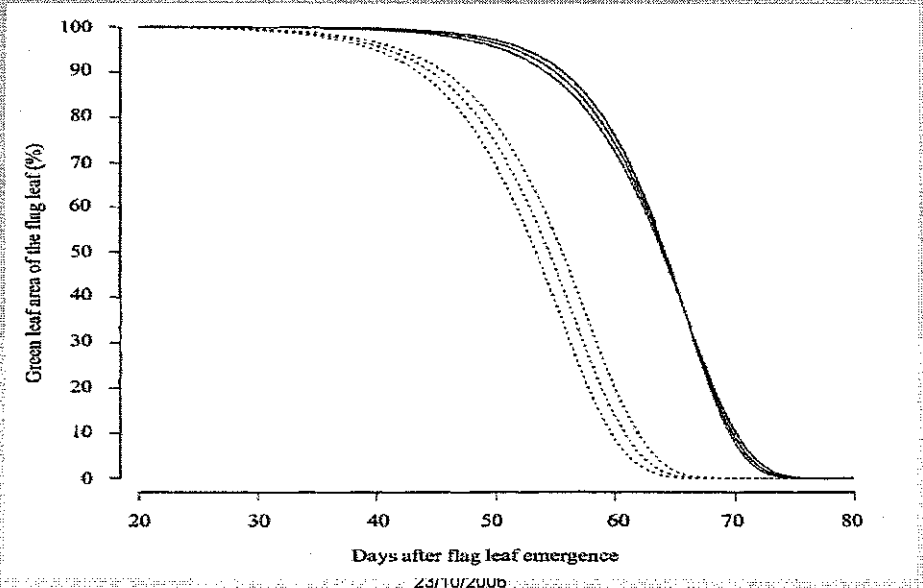
Objectives

to developp and to introduce a « diseases module » into B-CGMS

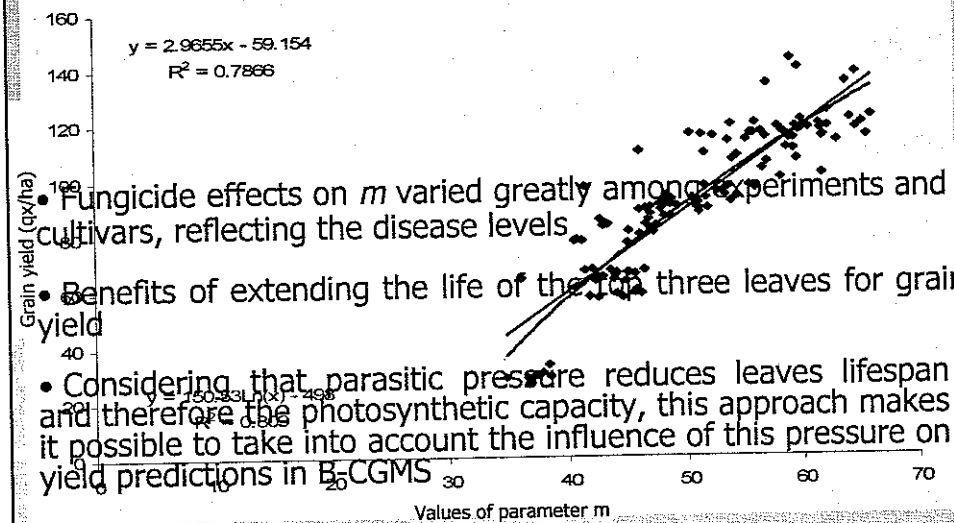


Materials and methods : the data

Materials and methods : the model

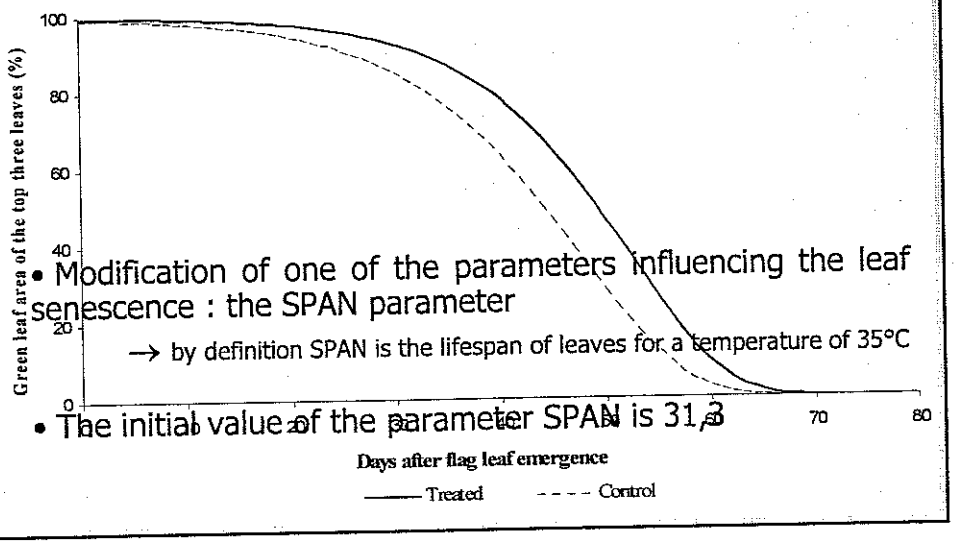


Results



- Fungicide effects on *m* varied greatly among experiments and cultivars, reflecting the disease levels
- Benefits of extending the life of the top three leaves for grain yield
- Considering that parasitic pressure reduces leaves lifespan and therefore the photosynthetic capacity, this approach makes it possible to take into account the influence of this pressure on yield predictions in B-CGMS

Integration of a « diseases module » into B-CGMS : How?

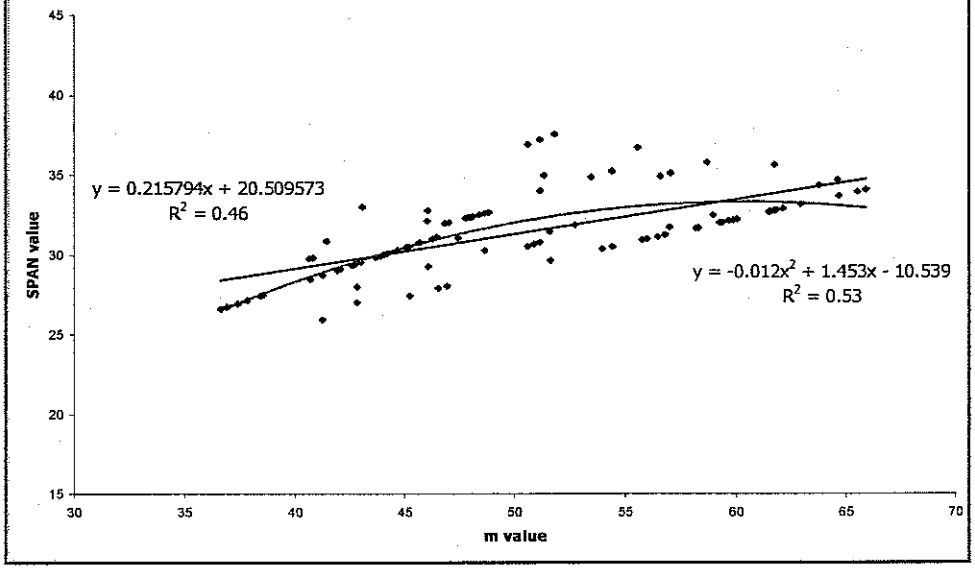


- Modification of one of the parameters influencing the leaf senescence : the SPAN parameter

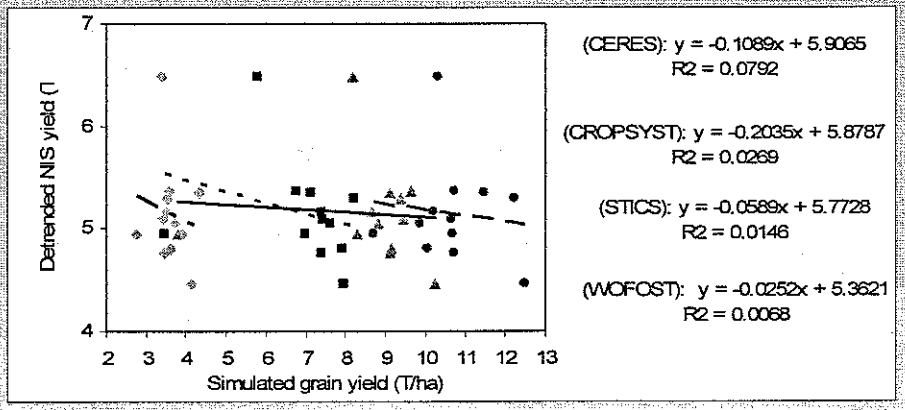
  → by definition SPAN is the lifespan of leaves for a temperature of 35°C

- The initial value of the parameter SPAN is 31,3

Integration of a « disease module » into B-CGMS : calibration



Integration of a « disease module » into B-CGMS : calibration



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International symposium on modeling cropping systems - Florence - 16-18.07.2001

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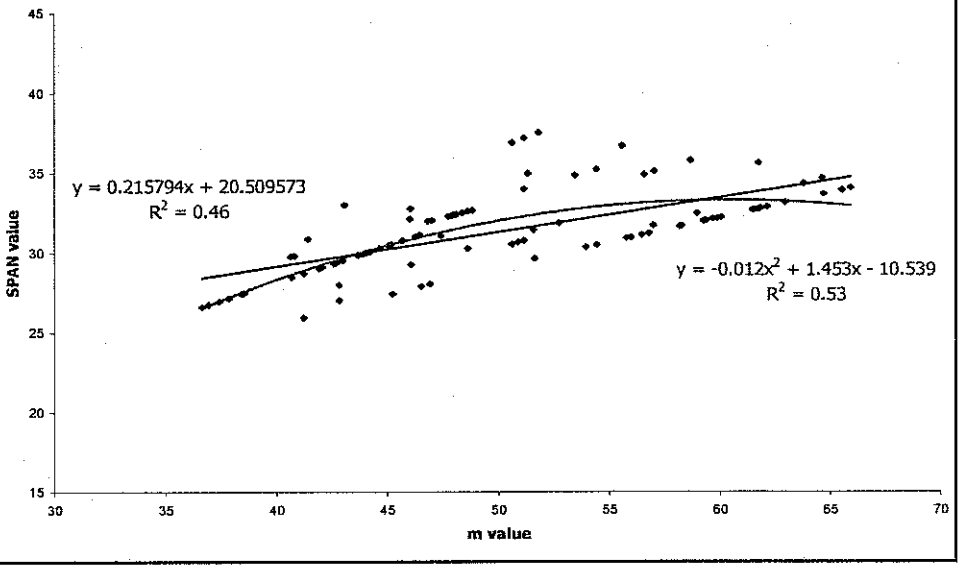
Integration of a « disease module » into B-CGMS : validation



Conclusions

- Substantial improvement of yield assessments : R^2 from 0.11 to 0.57
- These results confirm the benefits of extending the life of the top three leaves for grain yield
- For a pratical use : estimation for each grid or for a group of grids of the parameter *m* based on fields observations (network of observations)

Thank you