

Validation of "Proculture" model to predict *Septoria tritici* Development on winter wheat in the Grand-Duchy of Luxembourg in 2001.



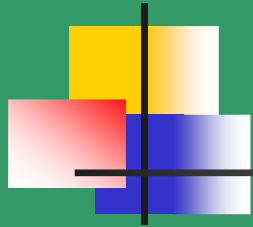
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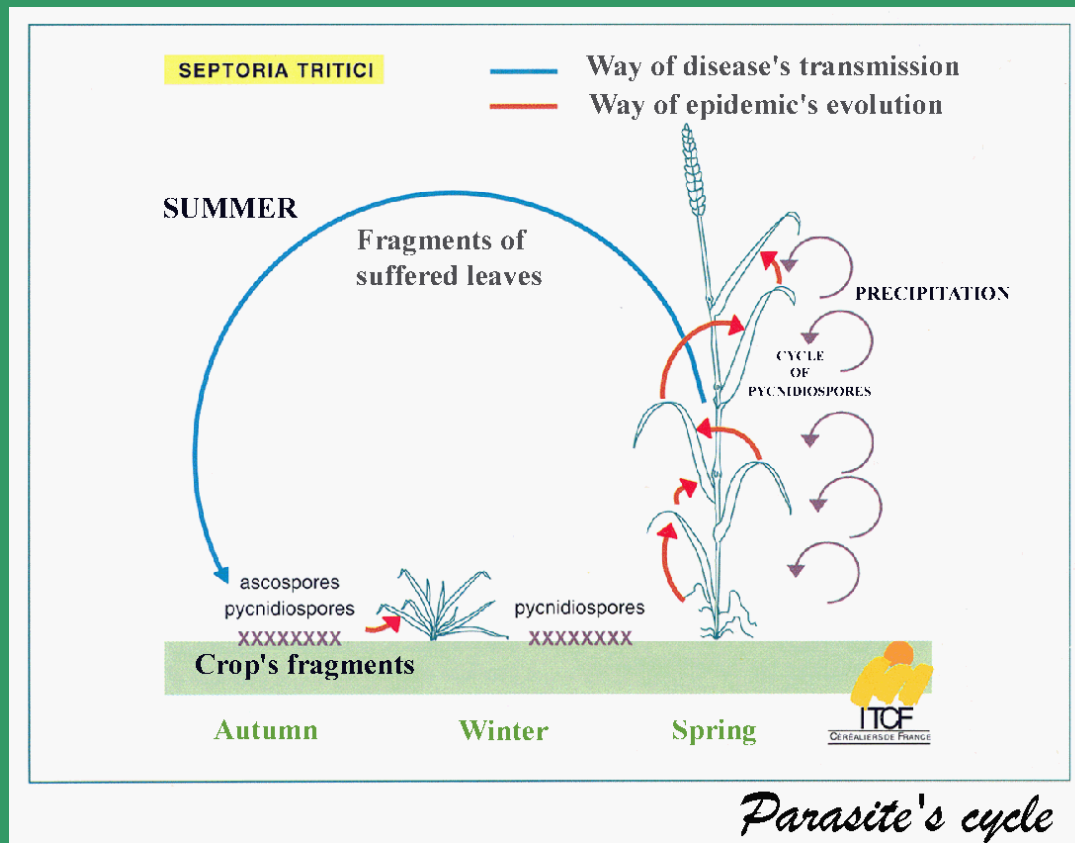
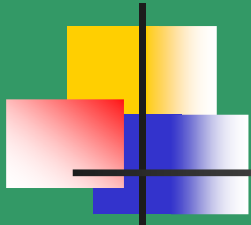
ESA VII Congress - Cordoba -
July 17th 2002 -El Jarroudi et al.



Plan of the presentation

- Introduction
- objectives
- Methodology
- Model validation
- Conclusions and perspectives

Introduction



Pycnidia



**Leaf of winter wheat
with *Pycnidia***



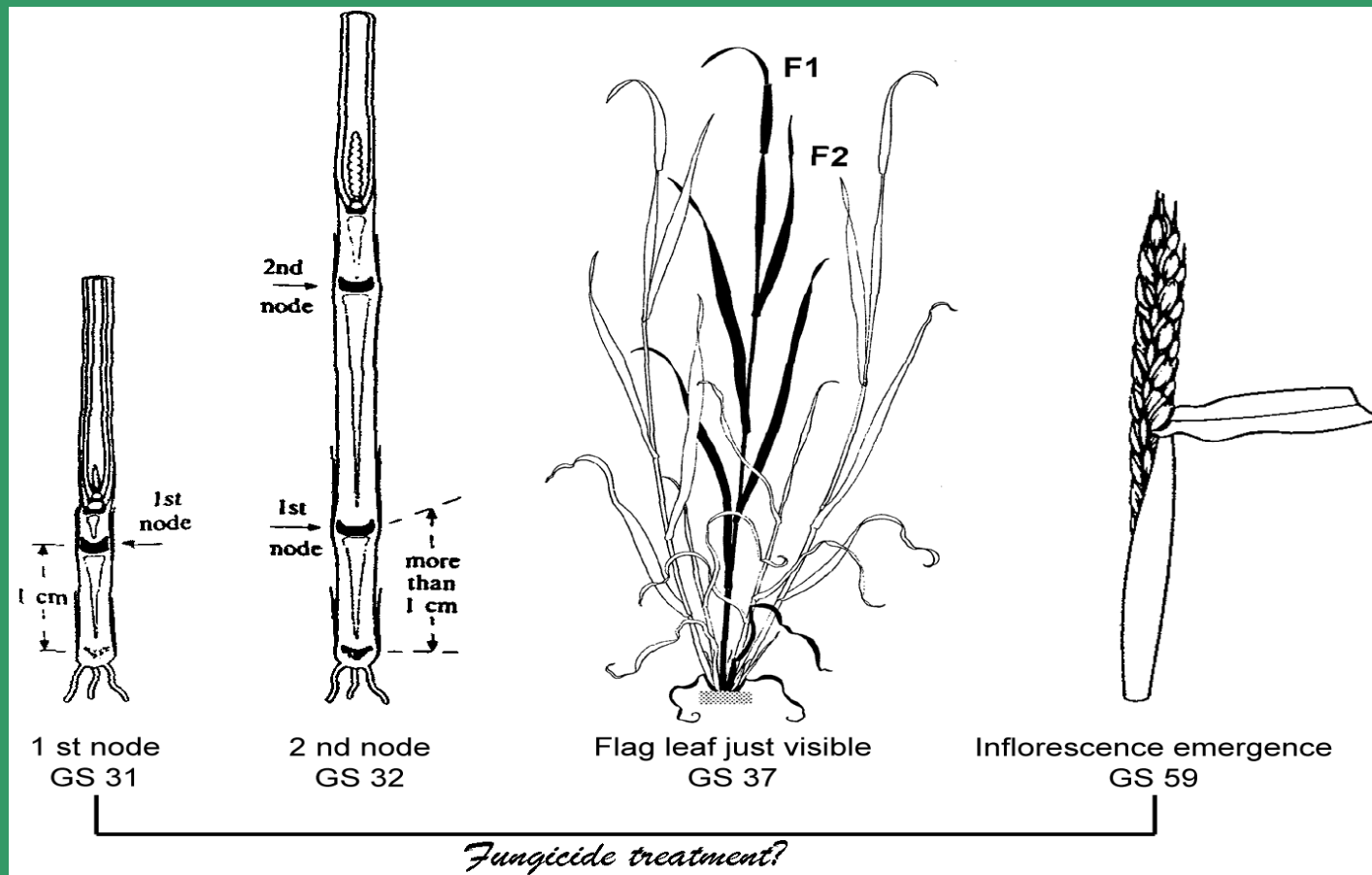
Objectives of the work 1/2

- To help **farmers** to decide when to **apply fungicides** during stem elongation
- To decrease the risk of strain's resistance

the decision-support for *Septoria tritici* control called «Proculture » developed at UCL was tested and Calibrated to different sites in the G-D of Luxembourg.
<http://www.fymy.ucl.ac.be/proculture/>

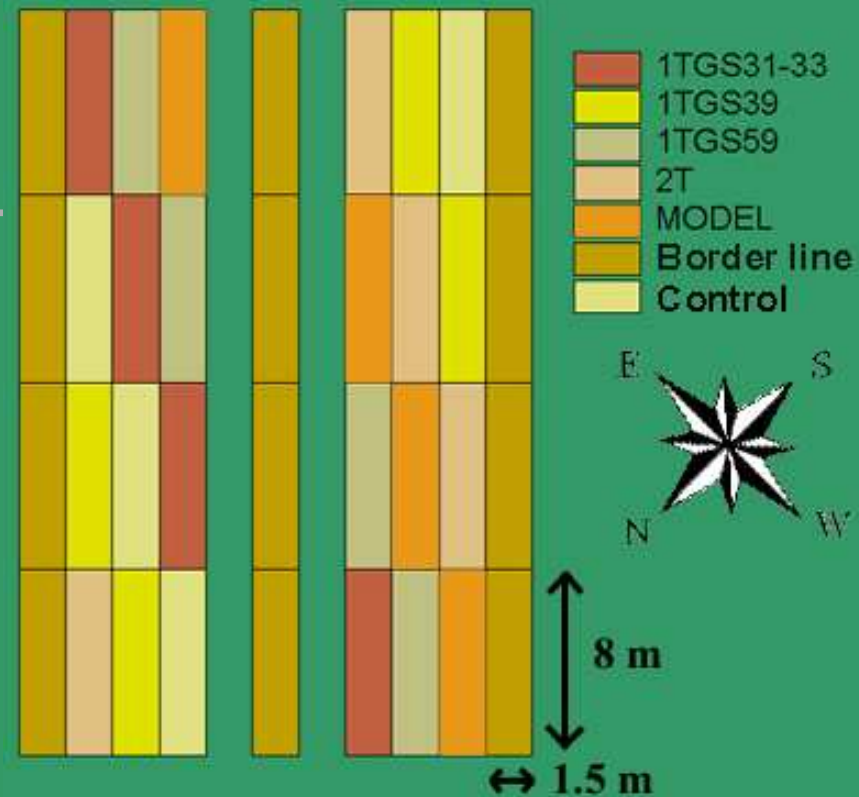
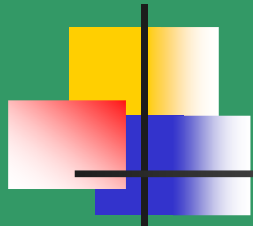


Objectives of the work 2/2



Methodology^{1/2}

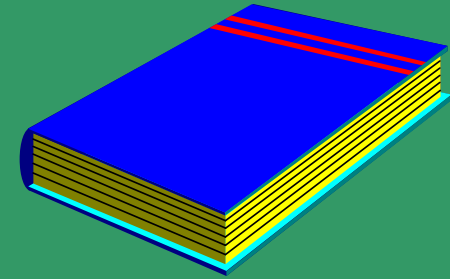
Bloc for cv Bussard (the same for cv Flair)



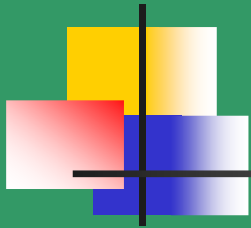
3 sites studied, only one will be presented : Everlange.



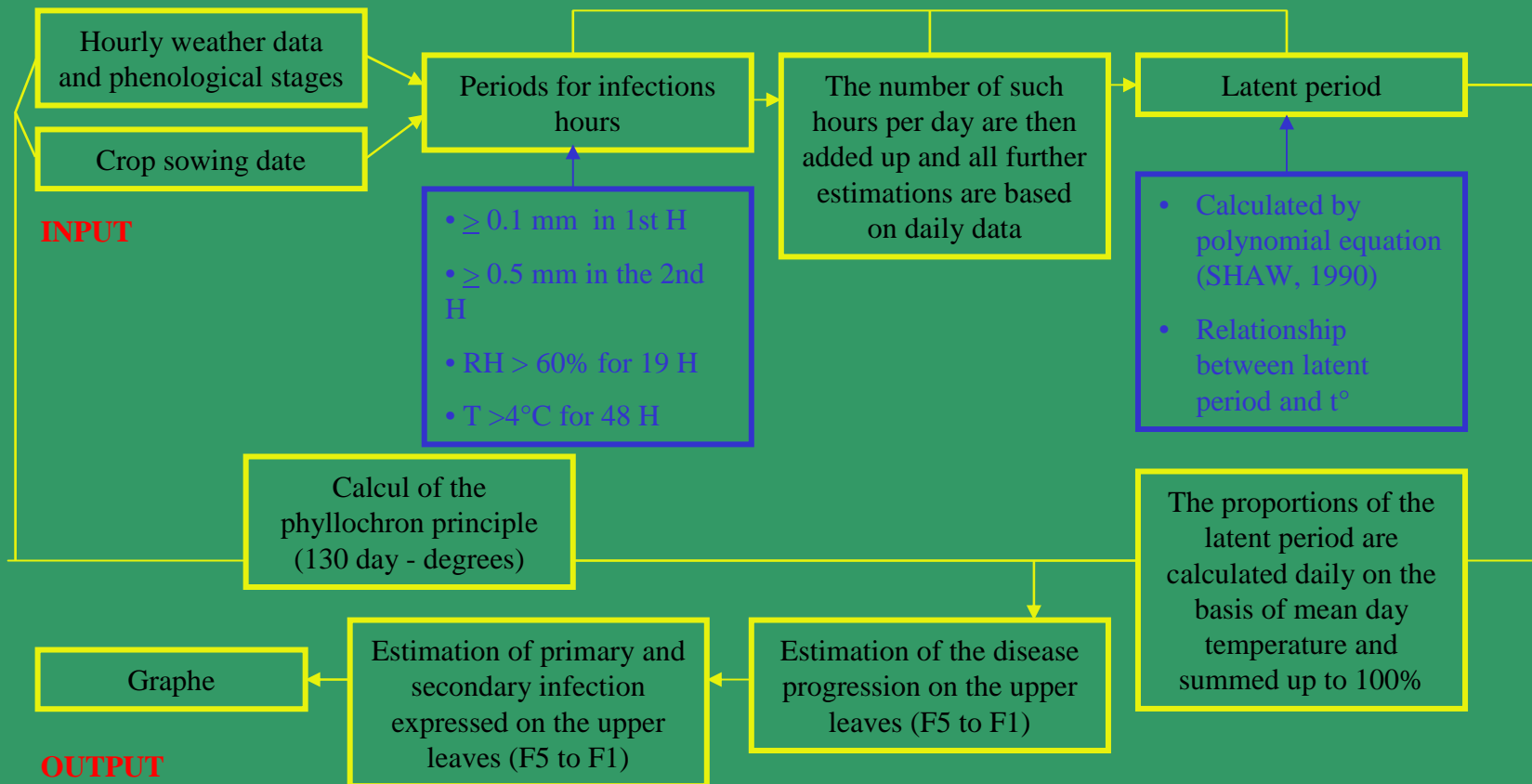
Methodology (2/2)



- Visual estimates of the area covered by sporulating *S. tritici* were made on both varieties of **winter wheat, 4 replicates.**
- Frequency of sampling : **2/week.**
- Comparison between **forecasted** and **observed** leaf blotch development.

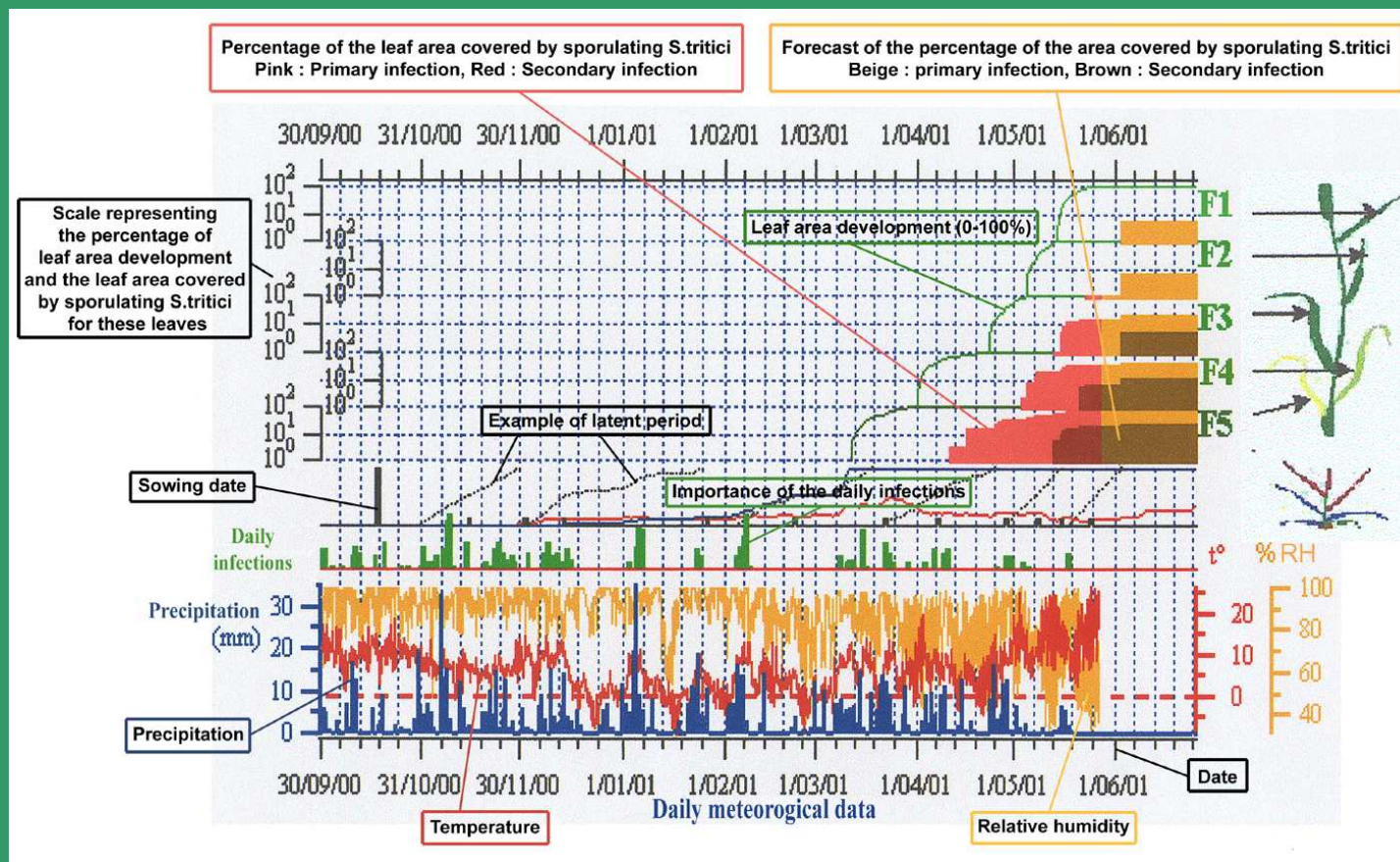


The Proculture Model



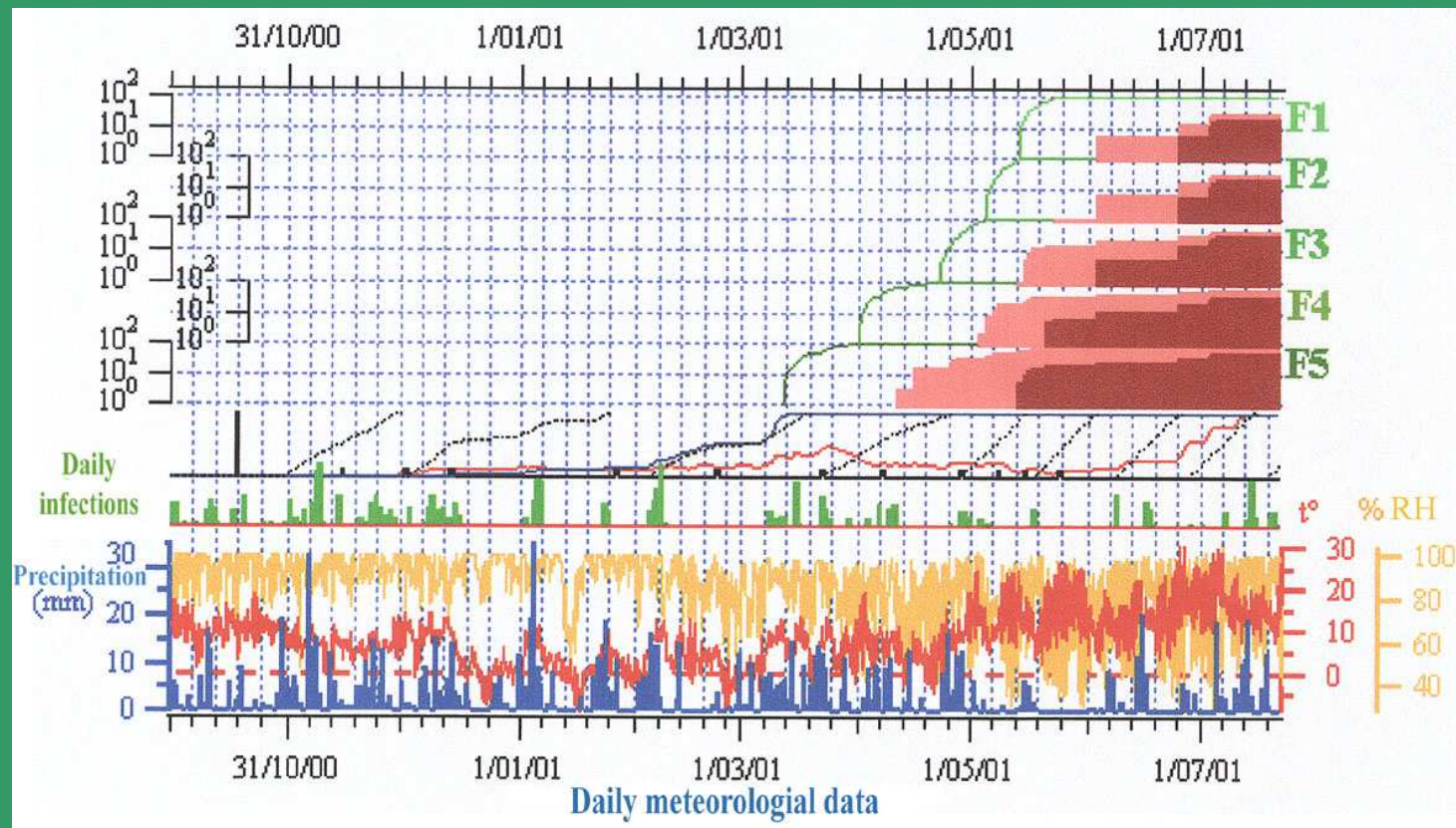


Results and discussion (1/5)





Results and discussion (2/5)





Results and discussion (3/5)

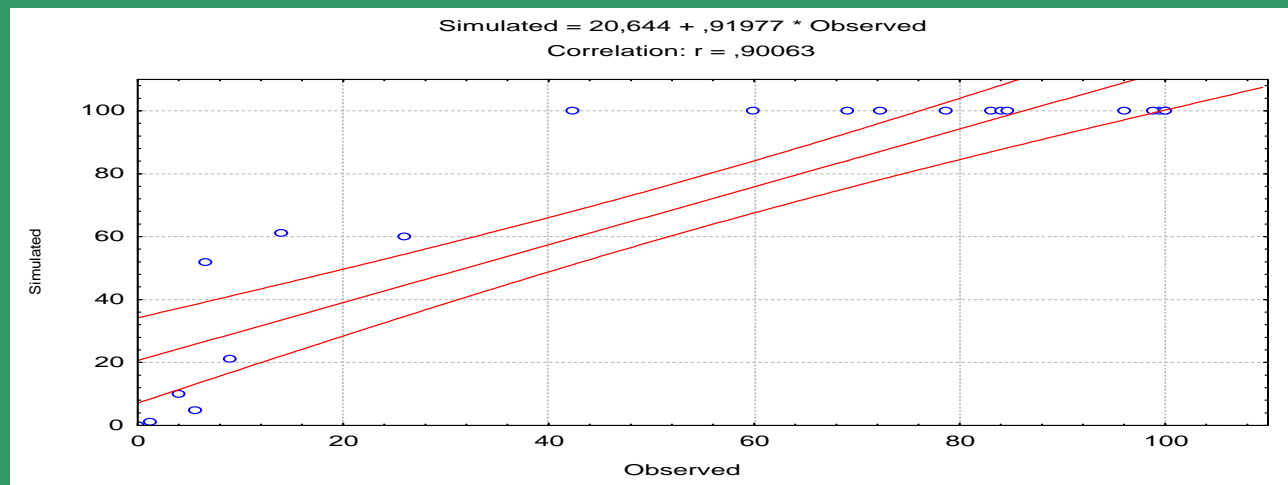
Fields observations of Mean leaf surface (%) with *Septoria* leaf blotch on various leaf levels (F1=flag leaf) in control plots on cv Bussard (B) and Flair (F) at Everlange.

Date/var	F5		F4		F3		F2		F1	
	B	F	B	F	B	F	B	F	B	F
9/4/01	0.3	0.3	-	-	-	-	-	-	-	-
23/4/01	3.7	2.6	-	-	-	-	-	-	-	-
4/5/01	4.2	3.7	-	-	-	-	-	-	-	-
7/5/01	23.1	34.1	2.3	7.3	-	-	-	-	-	-
10/5/01	23.5	32.8	1.7	5	-	-	-	-	-	-
14/5/01	58.6	65.4	15.7	25.4	0.9	2	-	-	-	-
17/5/01	60	75	13.3	27	0.9	1.6	-	-	-	-
21/5/01	77	85	23.1	37.1	1.7	3	-	-	-	-
28/5/01	80	91	30.7	49.7	3.7	9	0.8	0.8	0.05	-
31/5/01	77	92.5	26.3	53.8	2	5.3	0.3	0.2	0.2	-
5/6/01	79.4	97	32.9	53.4	6.5	8.3	2.2	1.03	0.7	0.4
7/6/01	77.4	94	27.4	53	4.3	5	0.9	0.9	0.4	0.4
11/6/01	82.4	87	32.4	42	5	4	0.8	0.2	0.4	0.1
14/6/01	78	91.4	28	44.2	3	4	0.6	0.5	0.3	0.2
18/6/01	-	-	32.2	52.3	6	5.8	1.2	0.6	0.2	0.1
21/6/01	-	-	26.7	41.4	6.1	3.7	1.8	0.8	0.1	0.1
25/6/01	-	-	54.4	62.2	20.3	15.3	6.7	3.4	1.3	0.9
28/6/01	-	-	55	64.1	27.3	19.9	8.3	4.6	2	1.2
2/7/01	-	-	88.1	73.5	57.3	31.5	30.9	12.5	9.8	3.4
5/7/01	-	-	83.4	81.6	55	41.3	33.9	19.6	12.2	3.3
9/7/01	-	-	-	-	85.4	54.02	55.5	22.5	18.1	4.7
12/7/01	-	-	-	-	81.8	61	58.8	26.2	19.9	2.3
19/7/01	-	-	-	-	-	-	81.8	51.6	39.8	11.7



Results and discussion (4/5)

Agreement between observed and simulated leaf emergence.



Good agreement was observed between model data output and field observations of the disease.

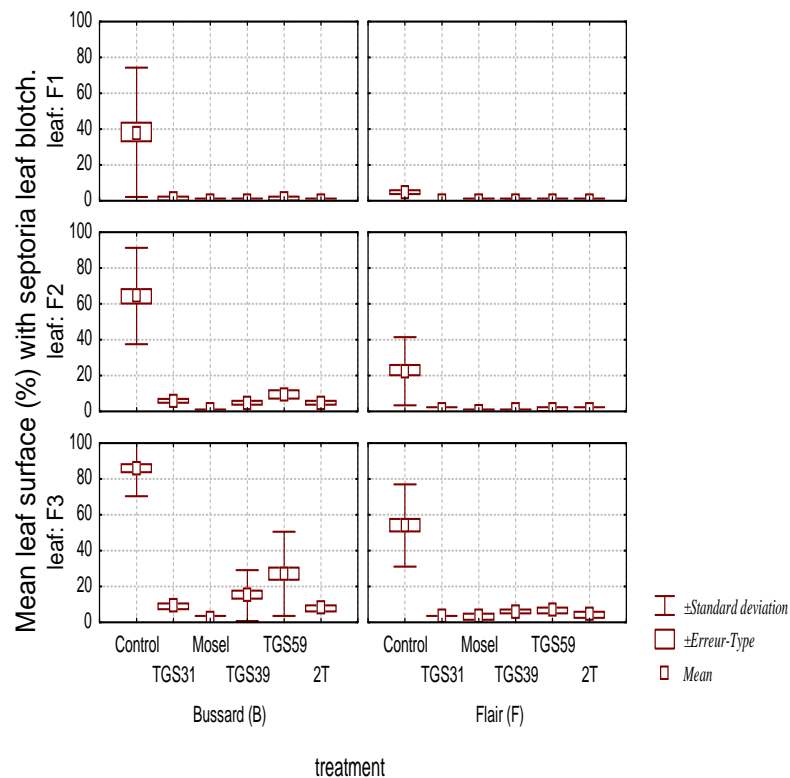
Agreement between forecasted and observed leaf blotch development.

Periods/leaves	F5	F4	F3	F2	F1	Total
Forecasted and expressed	16	10	7	6	6	45
Forecasted but not expressed.	1	3	2	0	0	6
Expressed but not forecasted.	0	0	0	0	1	1
% accurate forecasting	94%	77%	78%	100%	86%	87%



Results and discussion (5/5)

variation of the septoriosis according to the various treatments and the control.



Means of wheat with the same letter are not significantly different (% leaf surface area).

	Duncan Grouping	Mean	N	Treatment
	A	29.02	480	Control
	B	4.66	480	1TGS59
	C	2.73	480	1TGS39
D	C	2.2	480	2T
D	C	2.13	480	1TGS31
D		0.99	480	Model

Alpha=0.05 confidence = 0.95 df=2856 MSE= 147.6447

Critical value of Dunnett's T= 2.513 Example 1TGS31

Minimum Significant Difference= 1.9709

Comparisons significant at the 0.05 level are indicated by '****'

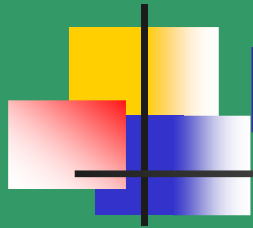
Treatment comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
Control-1TGS31	24.9186	26.8896	28.8605 ***
1TGS59-1TGS31	0.5561	2.5271	4.4980 ***
1TGS39-1TGS31	-1.3751	0.5958	2.5668
2T-1TGS31	-1.8980	0.0729	2.0439
Model-1TGS31	-3.1084	-1.1375	0.8334



Conclusions



- Advantages of the model :
 - **Information** on the **disease prediction** (F5 to F1);
 - **Information** about **disease severity** (F5 to F1);
 - **Decision-making** tool helps to find the **optimum time** of fungicide application at field level;



Perspectives



- Quantification of the infections;
- **Distinction** between **varieties** (crop structure, latent period) as well as **nitrogen** application rates;
- The model **validation** step ➡ next 3 years;
- **Topoclimatologic study** and the use of the meteorological radar ➡ estimate **dew time duration**.