

The XPEST modelling platform: an online tool to help design and use models that predict crop losses as a function of injury profiles in given production situations

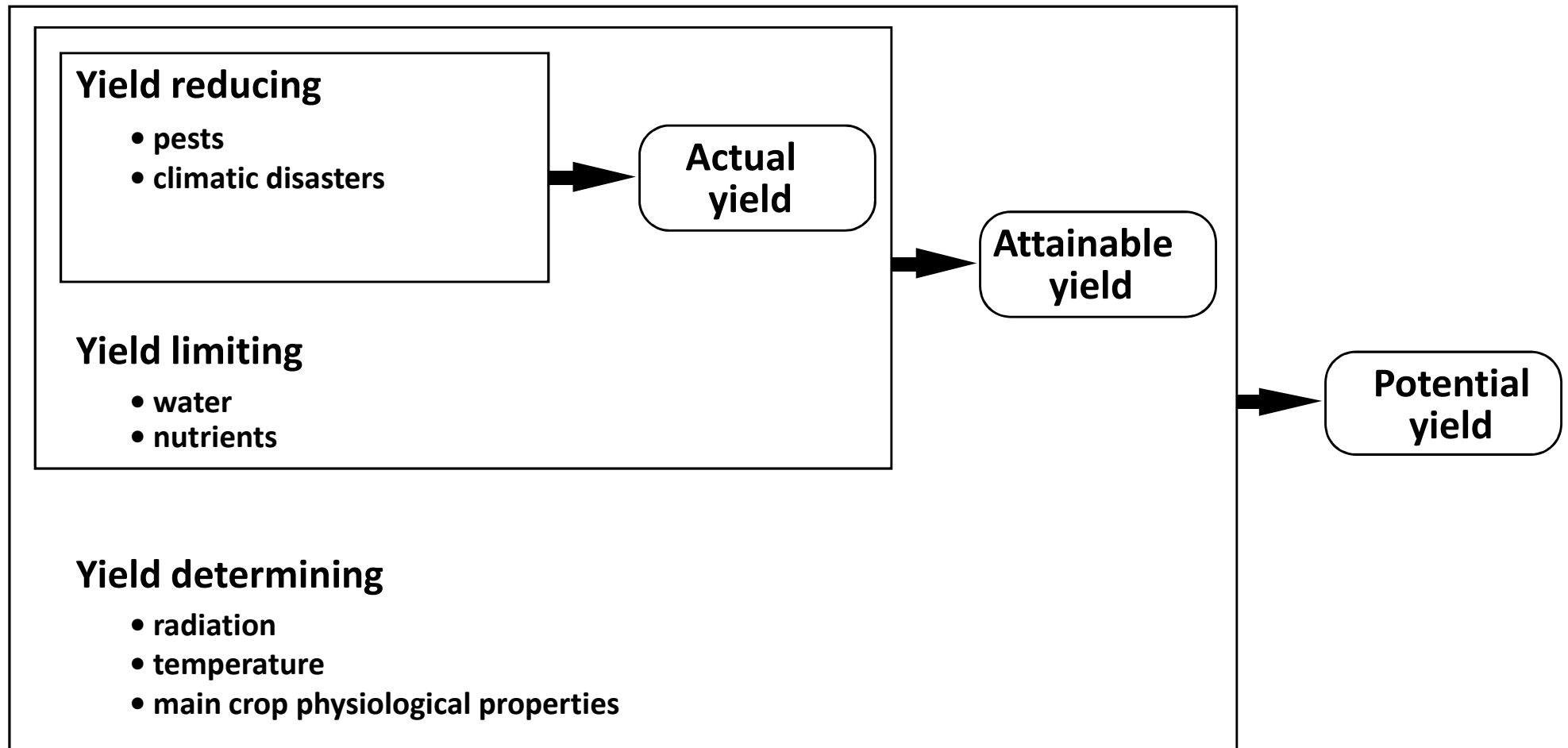
Jean-Noël Aubertot



Summer School 2016

**The role of IPM in mitigating pest development under climate change—
modelling approaches**

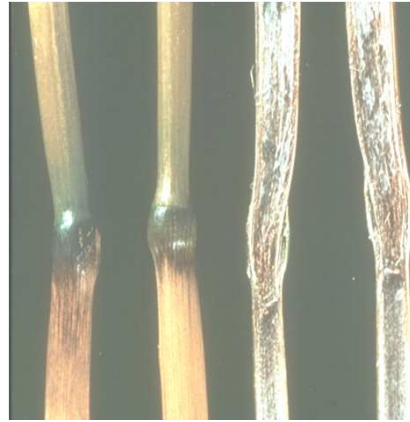
Yield defining factors



Zadoks, J.C., Schein, R.D., 1979. *Epidemiology and Plant Disease Management*. Oxford University Press, New York.

Rabbinge, R., 1993. The ecological background of food production. In: Chadwick D.J., Marsh, J. (Eds.), *Crop Protection and Sustainable Agriculture*. John Wiley and Sons, Chichester, UK, pp 2-29.

Multiple pests



SUNFLOWERPEST V1.0

<http://147.100.164.75/xpest>

Demo...

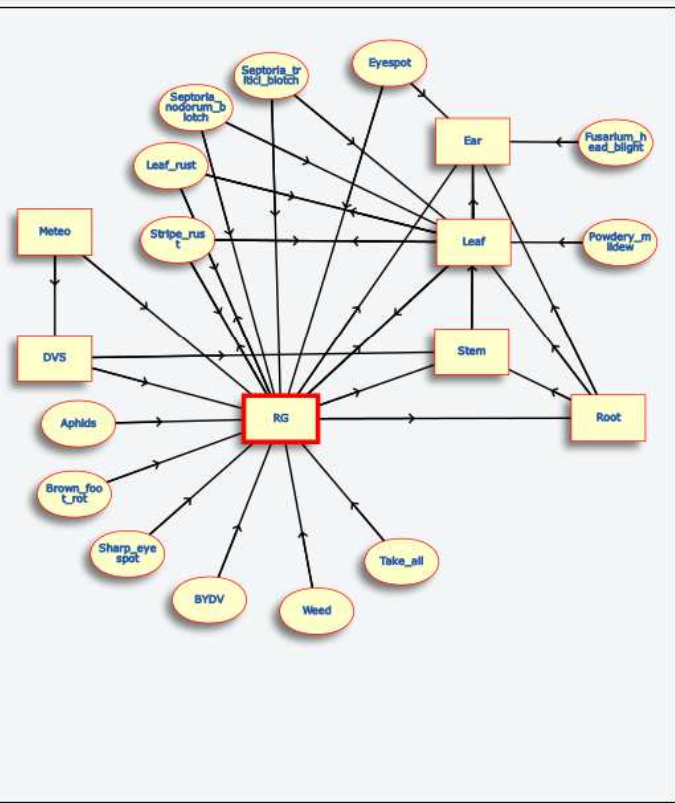
WHEATPEST under XPEST

X-PEST

- Documentation
 - Model documentation
 - References
- Modelling
 - Modelling forge
- Simulation
 - Simulation center

Project : **Wheatpest** VPZ

Model : **ModelRG** UI



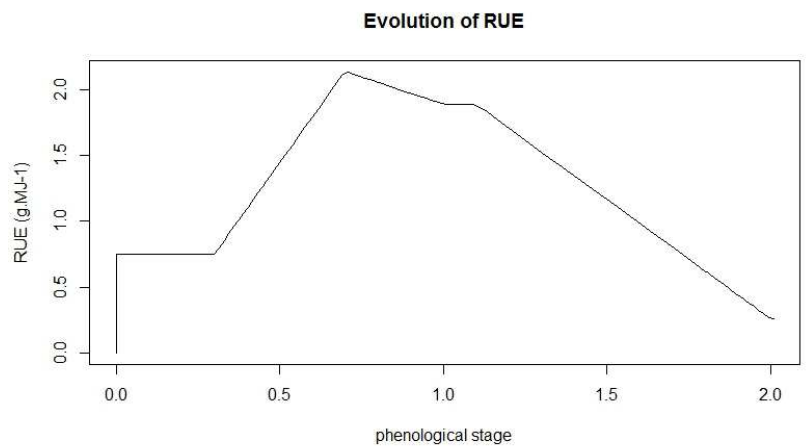
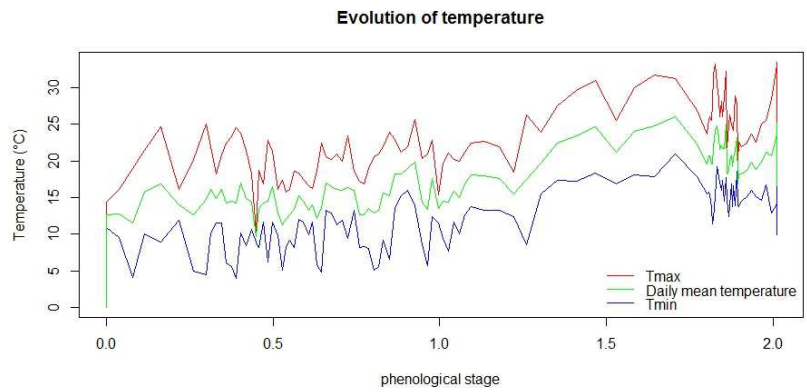
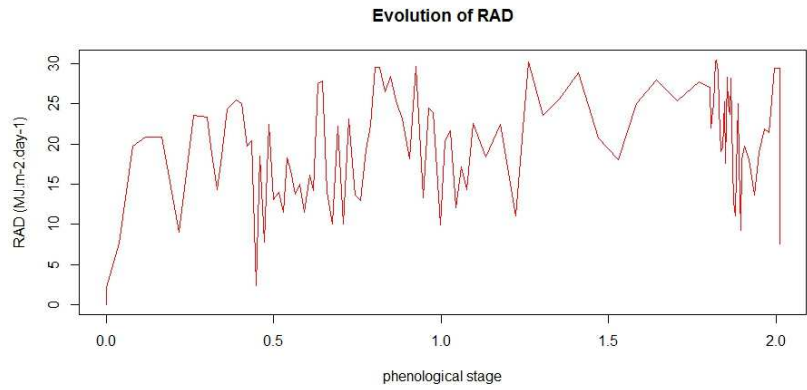
Variable expressions			
Variable	Expression	Init.	Unit
RG	$RGATT * RF_ES * RF_SES * RF_WEED * RF_BFR * RF_BYDV * RF_TA * RF_SNDV * RF_STDV * RF_SR * (-1) * RF_LR * (-1) * RF_APH - RSAP$	0	g.day-1.m-2
RGATT	$RAD * RUE * (1 - \exp(-k * LAI))$	0	g.day-1.m-2

Parameters		
Parameter	Value	Unit
k	0.65	Dimensionless

Dynamic parameters and variables			
Variable	File	Time	Unit
RUE	RUE.txt	DVS	g.MJ-1

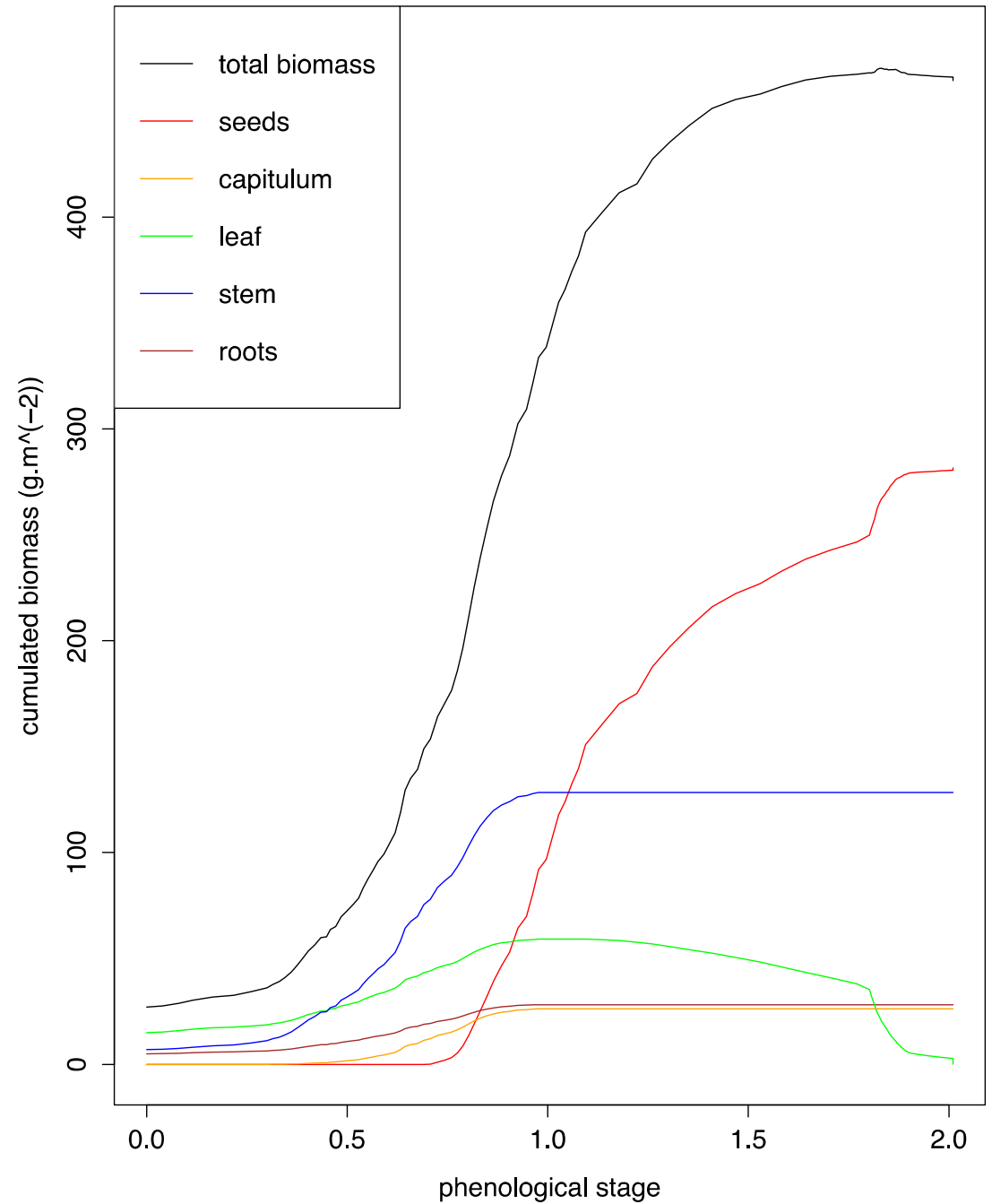
Links			
Variable	Model	Mode	Unit
LAI	Leaf	synchrone	m2.m-2
DVS	ModelDVS	synchrone	Dimensionless
RAD	ModelMeteo	synchrone	MJ.m-2.day-1
RF_APH	Aphids	synchrone	Dimensionless
RF_BFR	Brown_foot_rot	synchrone	Dimensionless
RF_BYDV	BYDV	synchrone	Dimensionless
RF_ES	Eyespot	synchrone	Dimensionless
RF_LR	Leaf_rust	asynchrone	Dimensionless
RF_SES	Sharp_eyespot	synchrone	Dimensionless
RF_SNDV	Septoria_nodorum_blotch	synchrone	Dimensionless
RF_SR	Stripe_rust	asynchrone	Dimensionless
RF_STDV	Septoria_tritici_blotch	synchrone	Dimensionless
RF_TA	Take_all	synchrone	Dimensionless

Input variables



Output variables

Evolution of cumulated biomass



Discussion

- XPEST permits to easily create models that represent the impact of one or multiple pests on yield built-up
- These models can represent interactions among damage mechanisms
- Need to enhance research on multiple pest modelling
- Need to strengthen interactions among crop modellers and pest specialists