Do crop models efficiently simulate crop under shade ?
Perspective for agroforestry system modeling

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Daily cumulated global radiation recorded under CS & NS treatments

Experimental set up

› Period shade : 16 days before flowering until harvest
› Shade material: Camouflage net
› Shade treatment : **NS**: no shade, *control plot*
  CS: continuous shade

Field measurements on winter wheat
› Total above ground biomass (t/ha)
› Final grain yield (t/ha)
› Yield components: Grain weight: *Pgrain* (g), # grains : *Nbgrain*

Modeling approach : STICS model (Brisson et al., 2003)

Does STICS efficiently simulate wheat development and yield under NS and CS treatment using common plant parameters?

Inputs
› Same soil : Luvisol
› Same technical itinerary : sowing date, tillage management, N supply ….
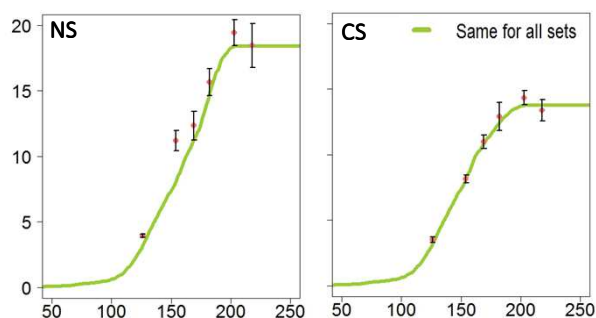› 2 distinct climates only in term of global radiation : CS and NS treatment

Plant parameters : we test 4 distinct set
They only differ on 2 parameters associated to yield elaboration

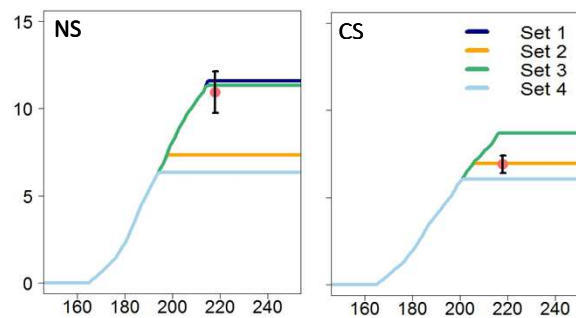|	Set 1	Set 2	Set 3	Set 4
NBGRMAX	30000	30000	26000	26000
PGRAINMAXI	0.05	0.028	0.05	0.028

Results

Daily total above ground biomasse (t/ha/julian days)

Whatever the parameter set used, the total aboveground biomasse dynamic were correctly reproduced under both treatment.

Grain yield dynamic (t/ha/julian days)

The model appeared to be unable to correctly simulate crop yield under both treatments using a common set of parameters.

		Obs.	Set 1	Set 2	Set 3	Set 4
NS	Nber of grain /m²	26375	26183	26183	22692	22692
	Grain weight (g)	0.042	0.045	0.028	0.05	0.028
CS	Nber of grain /m²	21519	24872	24872	21556	21556
	Grain weight (g)	0.028	0.036	0.028	0.041	0.028

Final grain yield was correctly reproduced under CS treatment when reducing the PGRAINMAX parameter. Decreasing also NBGRMAX allowed to simulate correctly both yield components : nbers of grain/m² and grain weight.

Perspectives for agroforestry modeling

These preliminary results give us a first hint towards an improvement of the coupling between tree and crop models for agroforestry. We showed that a relation between the cumulated global radiation, the nber of grain/m² and the grain weight needs to be established in order to adjust the parameters values NBGMAX and PGRAIMAX under shaded conditions.