

PROGRAM

INTERNATIONAL THEMATIC SCHOOL

Analysing and modelling phenotypes for challenging environments

3 – 7 June 2019



The PhenoArch plant phenotyping platform. © M3P

Montpellier, France

Monday 3 June 2019

Meeting point: SupAgro Campus, Annexe Mandon, 397 rue Las Sorbes, Montpellier, building n°14, in the large classroom on the ground floor.

Module general presentation

9:00 – 9:30

Organization of the week.

Round-table: who are the participants, what do they expect?

9:30 – 10:30

Multiscale phenotyping, modelling and genomic prediction.

(François Tardieu)

10:30 – 10h45

Questions

10:45 – 11:00 >> Coffee break

Cycle duration and crop production

11:00 – 12:00

How to estimate cycle duration, thermal time, unifying phenological stages and consequences on light interception?

(Boris Parent)

12:00 – 13:30 >> Lunch at Montpellier SupAgro cafeteria (offered by CultiVar)

13:30 – 14:45

Bio-physical bases of biomass production - Monteith formalism.

(Benoît Pallas)

15:00 – 18:00

Visit of a field installation (apple tree orchard and wheat field) in the INRA “Diascope” experimental unit (by bus).

(Benoît Pallas and Claude Welcker)

18:00 – 20:00 >> Leisure time by the beach and back to Montpellier (by bus)

Tuesday 4 June 2019

Meeting point: SupAgro Campus, Annexe Mandon, 397 rue Las Sorbes, Montpellier, building n°14, in the large classroom on the ground floor.

Canopy temperature

09:00 – 10:00

Exercise about “Thermal time”.

(Boris Parent)

10:00 – 10:15 >> Coffee break

10:15 – 11:15

Energy balance, evaporative demand – Canopy temperature.

(François Tardieu)

11:30 – 12:30

What are we measuring with canopy temperature? When is a cool temperature favorable?

(François Tardieu)

12:30 – 14:00 >> Lunch at Montpellier SupAgro cafeteria (offered by CultiVar)

Intercepted light, stomatal control and leaf growth

14:00 – 15:30

Stomatal control and growth, water deficit, WUE.

(François Tardieu)

15:30 – 15:45 >> Coffee break

15:45 – 17:00

Visit of PhenoArch platform.

(Claude Welcker and Boris Parent)

Wednesday 5 June 2019

Meeting point: Cirad Lavalette Campus, avenue Agropolis, Montpellier, building n°5, 1st floor, room n°102 A.

Water use, root system

9:00 – 10:00

Introduction to water balance modelling.

(Benoît Pallas)

10:00 – 10:15 >> Coffee break

10:15 – 11:45

Computer exercise “Construction of a water balance model”. Feedback between plant transpiration, water consumption and expected yield.

(Benoît Pallas and Delphine Luquet)

11:45 – 13:30 >> Lunch at CIRAD cafeteria (offered by CultiVar)

Integration at cycle scale, yield dissection

13:30 – 15:00

Yield elaboration: component trait interactions and consequence for modeling Genotype x environment interaction

(Benoît Pallas and Delphine Luquet)

15:00 – 15:15 >> Coffee break

15:15 – 17:00

Visit of CIRAD phenotyping facilities: rhizoscope, CO2 controlled greenhouses, biochemistry / histology labs

(Delphine Luquet and CIRAD colleagues)

Thursday 6 June 2019

Meeting point: SupAgro Campus, Annexe Mandon, 397 rue Las Sorbes, Montpellier, building n°14, in the large classroom on the ground floor.

Use of crop modelling in agronomy and plant breeding

9:00 – 10:00

A ecophysiological – modeler point of view. Yield prediction based on modelling and phenomics in current and future climates.

(Pierre Martre)

10:00 – 10:15 >> Coffee break

10:15 – 11:15

A geneticist - breeder's point of view on crop physiology and modelling.

(David Pot)

11:15 – 12:00

Discussion and debate

12:00 – 13:30 >> Lunch at Montpellier SupAgro cafeteria (offered by CultiVar)

Crop modelling of the genotype x environment interaction: computer exercise

13:30 – 14:30

Presentation of the crop model. Main equations and structure.

(Benoît Pallas, Delphine Luquet, Boris Parent)

14:30 – 16:00

Exercise “Construction of the main components (phenology, water & radiation use, growth, yield) of the crop model with Excel”. Simulations of potential yield.

(Benoît Pallas, Delphine Luquet and Boris Parent)

16:00 – 16:15 >> Coffee break

16:15 – 16:45

Presentation of other model components for simulating water stress and high or low temperature effects. Definition of genotypic model parameters.

16:45 – 17:45

Presentation of exercises “Using the crop modelling for environmental characterization and ideotype definition.” Brief presentation of real climates on which exercises are based.

(Benoît Pallas, Delphine Luquet and Boris Parent)

Friday 7 June 2019

Meeting point: SupAgro Campus, Annexe Mandon, 397 rue Las Sorbes, Montpellier, building n°18, in the large classroom on the ground floor.

Modelling the relations plant-environment: computer exercise

9:00 – 10:30

Personal work on exercises in sub-groups (3 groups, 1 per climate)

10:30 – 10:45 >> Coffee break

10:45 – 12:00

Personal work on exercises in sub-groups (3 groups, 1 per climate)

12:00 – 14:00 >> Lunch at Montpellier SupAgro cafeteria (offered by CultiVar)

14:00 – 15:00

Preparation of the restitution of exercises (3 groups, 1 per climate)

15:00 – 16:00

Restitution of exercise results by each sub-group.

16:00 – 16:15 >> Coffee break

16:15 – 17:00

Conclusion and evaluation of the course.

The teaching group

Delphine Luquet
(CIRAD, AGAP)



Benoit Pallas
(INRA, AGAP)



Boris Parent
(INRA, LEPSE)



François Tardieu
(INRA, LEPSE)



Claude Welcker
(INRA, LEPSE)



A big “thank you” to the other scientists involved in this school

LLorenç Cabrera-Bosquet (INRA-PHENOARCH)

Romain Chapuis (INRA-DIAPHEN)

Anne Clément-Vidal (CIRAD, AGAP)

Denis Fabre (CIRAD, AGAP)

Sébastien Martinez (INRA, AGAP)

Pierre Martre (INRA, LEPSE)

David Pot (CIRAD, AGAP)

Jean Luc Verdeil (CIRAD, AGAP)