



# Insight into plant biological processes through phenotyping

## Course outline

Guillaume Lobet

Université of Liège, PhytoSYSTEMS



@guillaumelobet

# The organisers



Dirk Inzé  
VIB , Belgium



Nathalie Wuyts  
VIB , Belgium



Stijn Dhont  
VIB , Belgium



Guillaume Lobet  
Université de Liège, Belgium

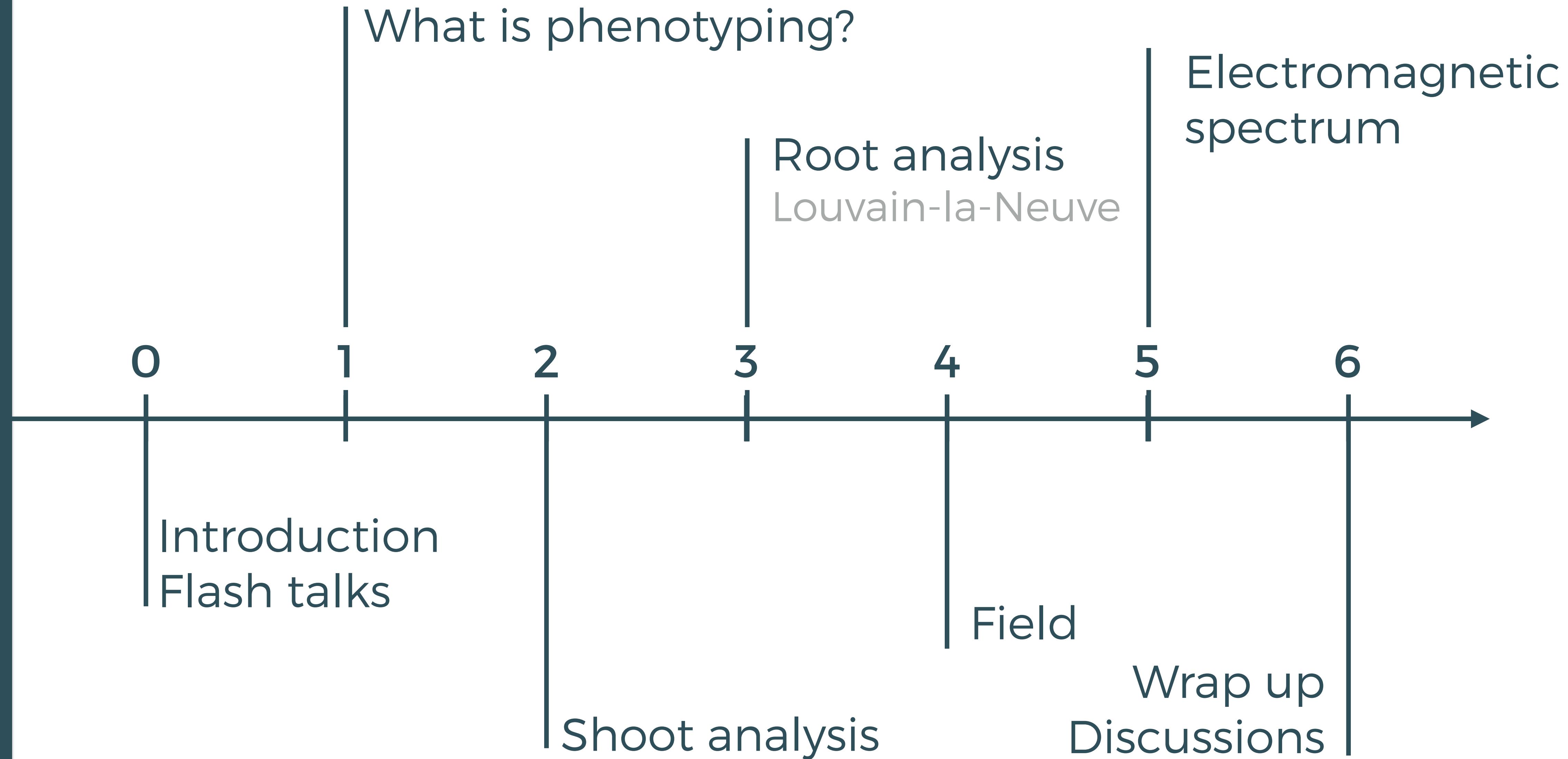


Xavier Draye  
Université catholique de Louvain,  
Belgium



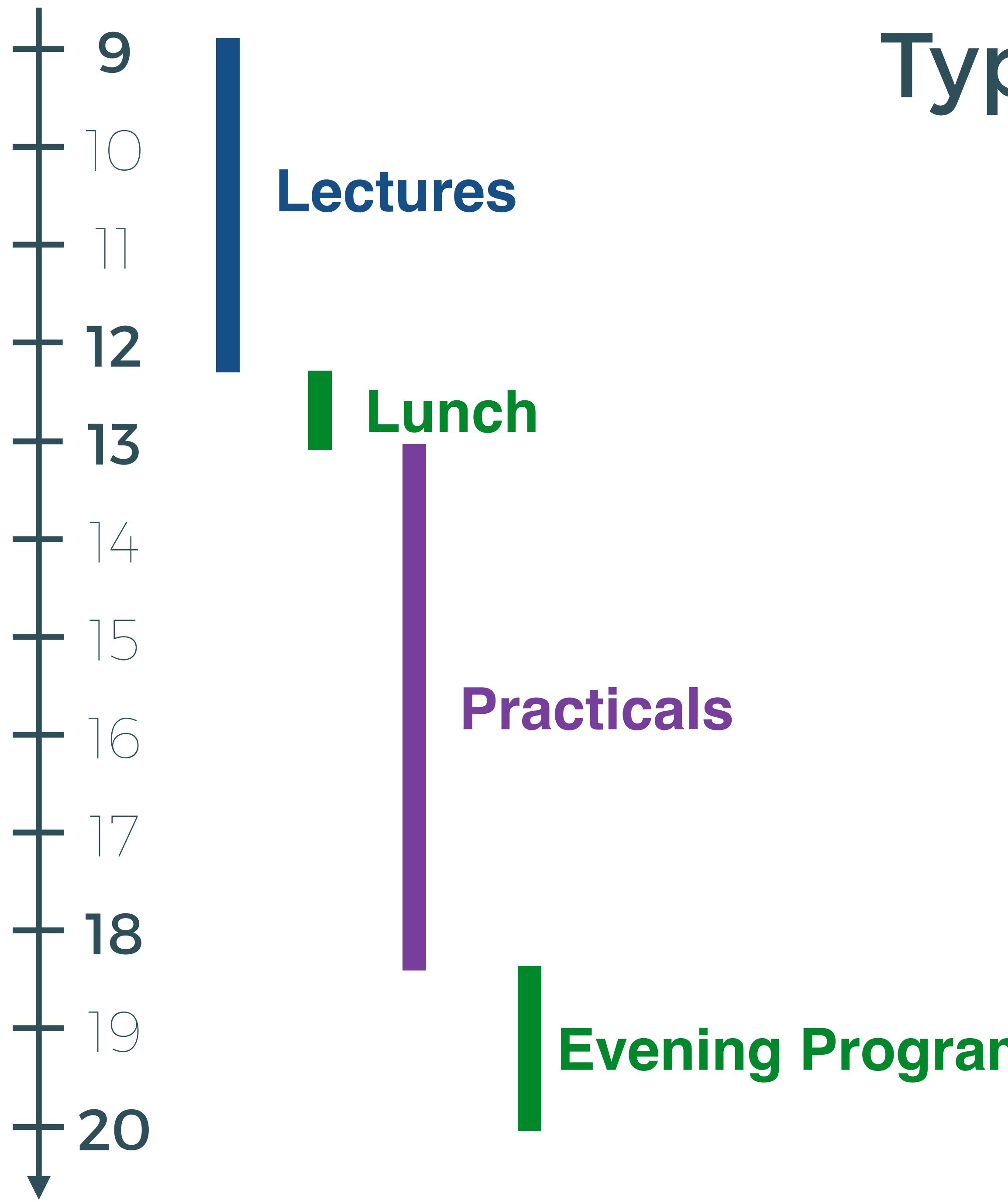
Christine Tiré  
VIB , Belgium

# Week overview





# Typical day



## Evening      Practicals

Introduction  
Course overview  
Flash Talks by you!  
  
Openning Dinner

# Day 0: Welcome in Ghent!



# Day 1: What is phenotyping

## Evening

Poster session and walking dinner

## Lectures

Christine Granier, Uli Schurr, Korneel Vandenbroucke, Dirk Inzé and Xavier Draye

Phenotyping in context (EU, industry)  
Why do we phenotype ?

## Practicals

Nathalie Wuyts, Raphael Abbeloos, Stijn Dhont and Guillaume Lobet

Guided tour of VIB  
Introduction to plant image analysis  
Plant phenotyping database



# Day 2: Shoot phenotyping

## Lectures

Mark Tester, Nathalie Gonzalez, Gerrit Beemster,  
Hilde Neelisen, Marie Neal and Joke Baute

Shoot growth analysis - Kinematic analysis  
High-Throughput phenotyping

## Practicals

Nathalie Wuyts, Stijn Dhont and Gerrit Beemster

Shoot level

Leaf level

Cell level

Kinematic analysis

## Evening

Typical Belgian Dinner



# Day 3: Root phenotyping

## Lectures

Andreas Hund, Anna Amtmann, Andrew French and Jonathan Lynch

Regulation and adaptation of root system architectures  
Multiscale approaches to root analysis

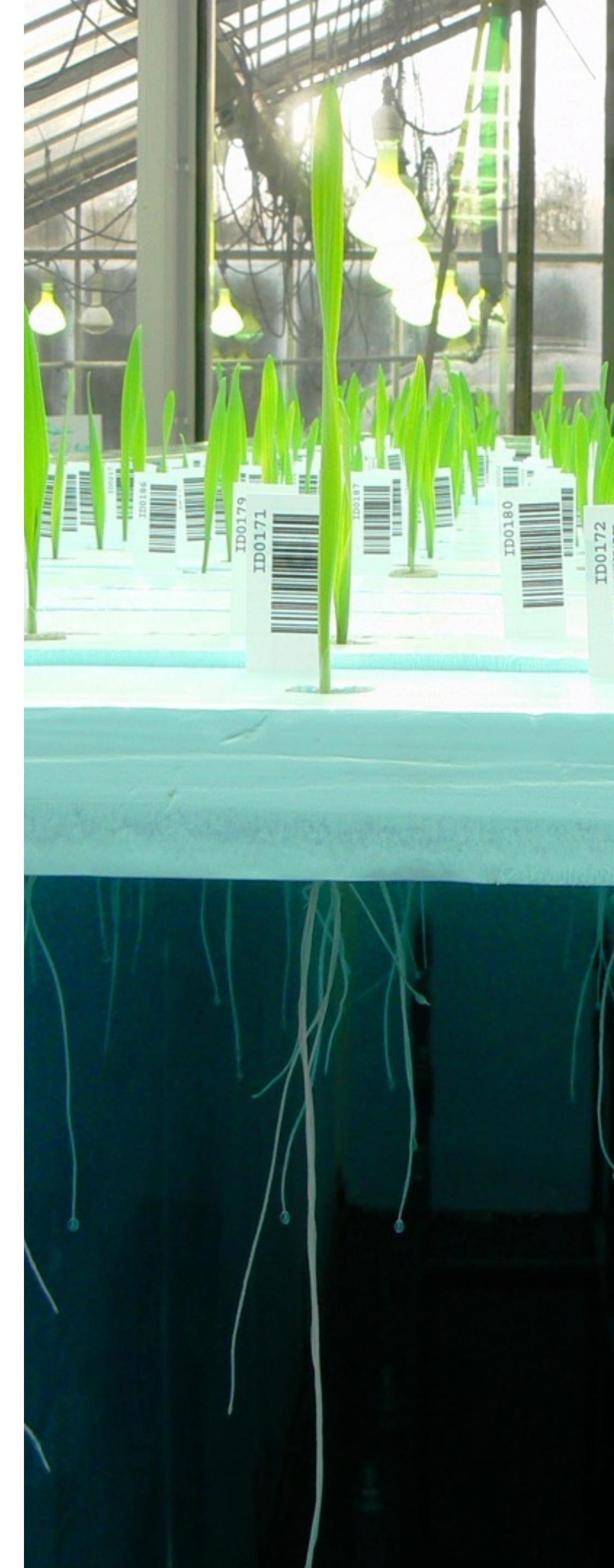
## Practicals

Anna Amtmann, Andrew French, Xavier Draye and Guillaume Lobet

Root image analysis softwares  
Single root vs root system analysis

## Evening

Dinner at the Brasserie



# Day 4: Field phenotyping

## Evening

Free Night

## Practicals

Maize field trial visit and demonstration of  
camera systems and equipment for diverse  
plant / envi parameters

## Lectures

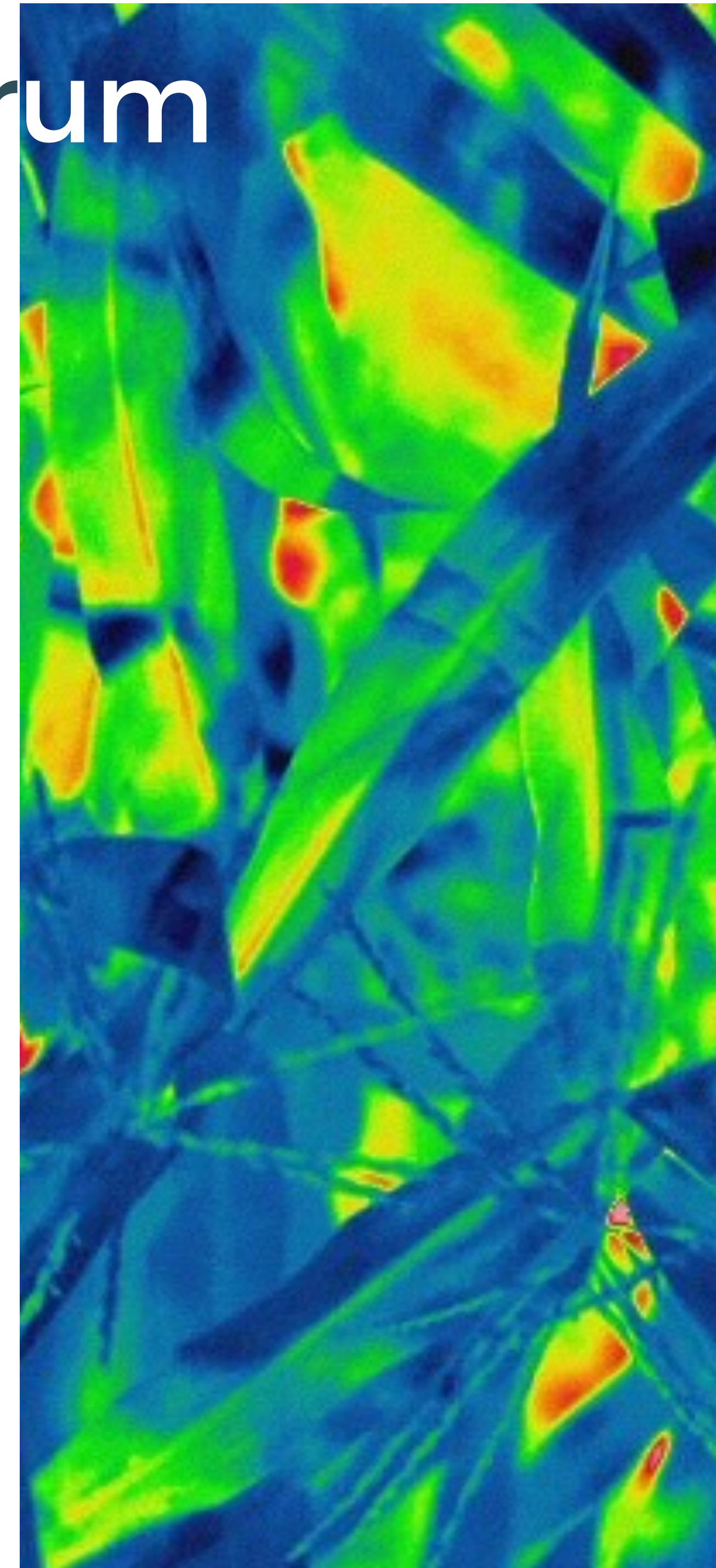
Jaume Sans Flexas, Kathy Steppe, Sarah Garré,  
Andrew Binley, Tracy Valentine and Claire Périlleux

Assessment of physiological and performance-  
related traits



# Day 5: Electromagnetic spectrum

- Lectures**
- Darren Wells, Siegfried Jahnke, Henk Van As, Guy Thoonen
- microCT, MRI-PET, NMR, MRI, Hyper-spectral imaging
- Practicals**
- Bjorn Usadel, Henk Van As, Siegfried Jahnke, Veerle Cnudde and Nathalie Wuyts
- Demonstration of portable NMR, microCT and hyper spectral visualisation
- Evening**
- Excursion in Ghent including beer tasting and dinner



## Lunch

Barbecue

## Practicals

General discussions about the whole course

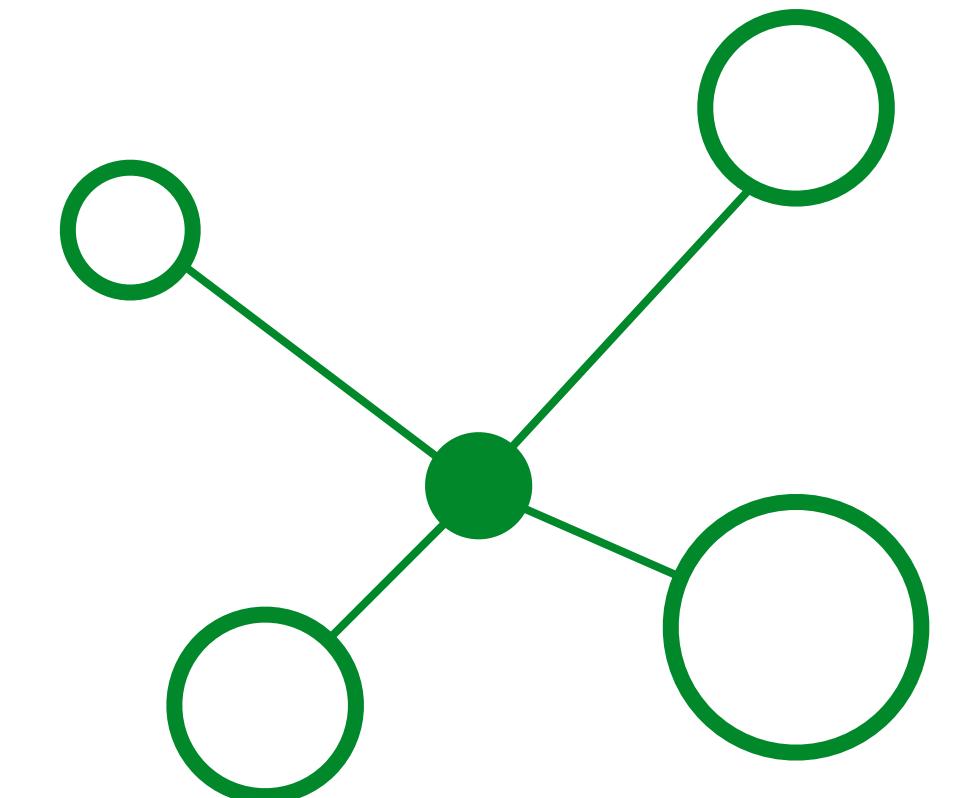
# Day 6: Discussions



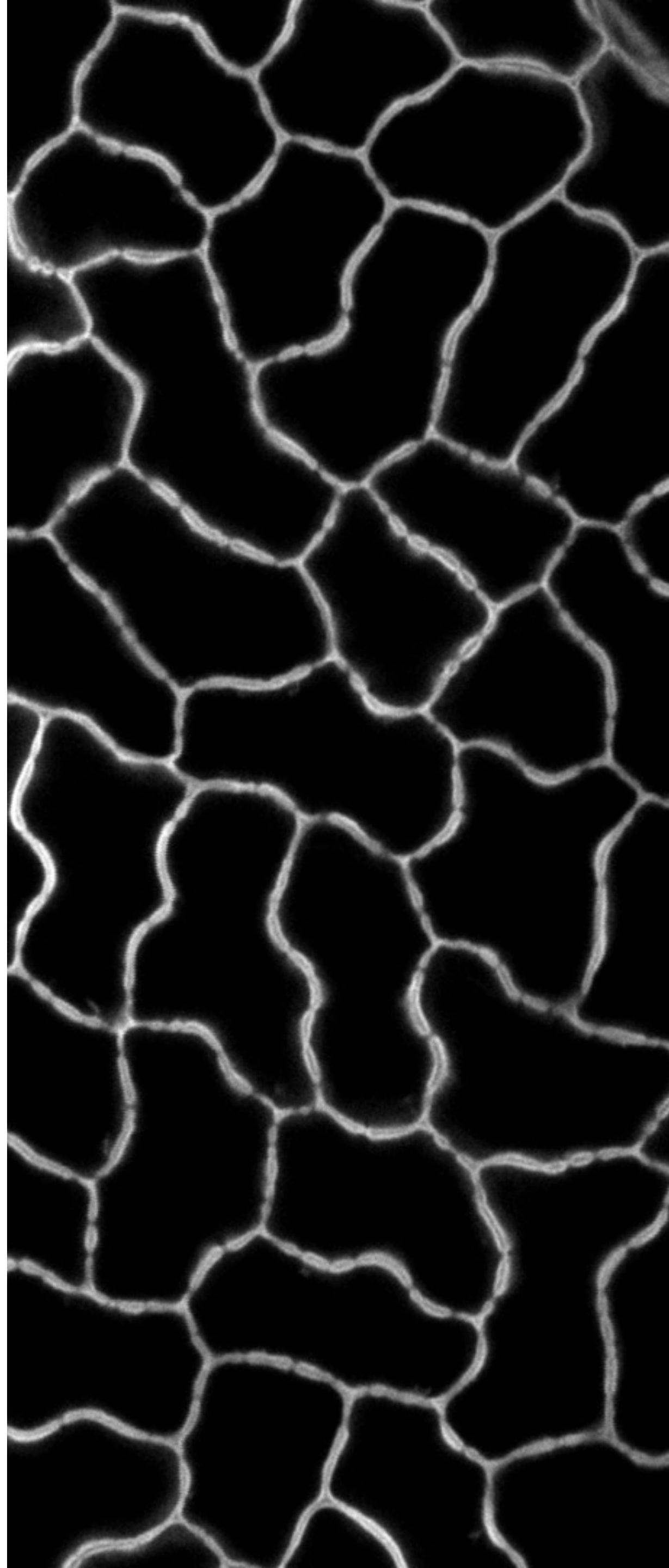
# Live discussion



Great panel of speakers



**INTERACT!**



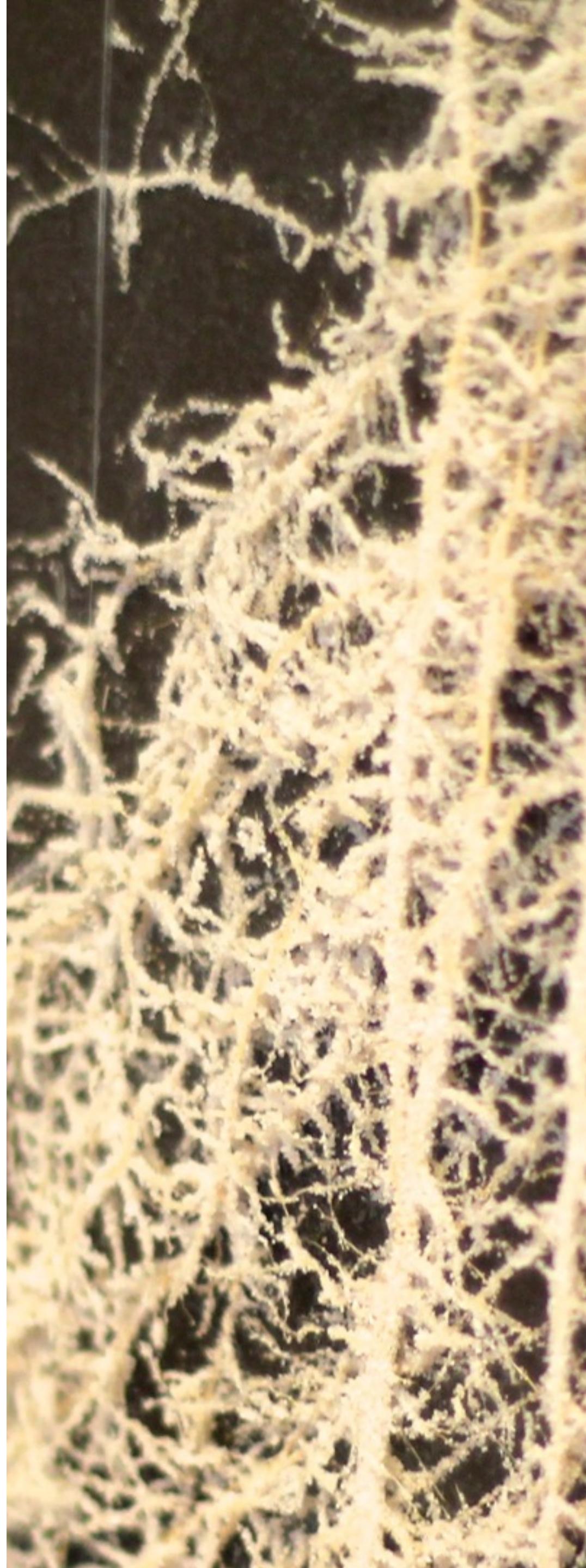
# Online discussion



#EMBOPlantphenotyping



[bit.ly/embo-phenotyping](https://bit.ly/embo-phenotyping)





ENJOY AND HAVE  
A GREAT WEEK!



# Gaining insights into biological processes through phenotyping: what is phenotyping, what is it used for and how is it done?

# What is phenotyping - Talks



Christine Granier  
INRA, France



Korneel Vandenbroucke  
Bayer CropScience, Belgium



Xavier Draye  
Université catholique de Louvain, Belgium



Dirk Inzé  
VIB , Belgium

# What is phenotyping - Practicals



Raphael Abbeloos  
VIB , Belgium



Nathalie Wuyts  
VIB , Belgium



Stijn Dhont  
VIB , Belgium



Guillaume Lobet  
Université de Liège, Belgium



Xavier Draye  
Université catholique de Louvain,  
Belgium



Quantitative shoot growth analysis: on what the number and size of shoots, leaves and cells, as measured over time, can tell about underlying biological processes

# Quantitative shoot growth analysis - Talks



**Mark Tester**  
King Abdullah University,  
Saudi Arabia



**Nathalie Gonzalez**  
VIB , Belgium



**Gerrit Beemster**  
University of Antwerp , Belgium



**Hilde Nelissen**  
VIB, Belgium



**Marie Neal**  
Aberystwyth University, UK



**Joke Baute**  
VIB, Belgium

# Quantitative shoot growth analysis - Practicals



Stijn Dhont  
VIB , Belgium



Nathalie Wuyts  
VIB , Belgium

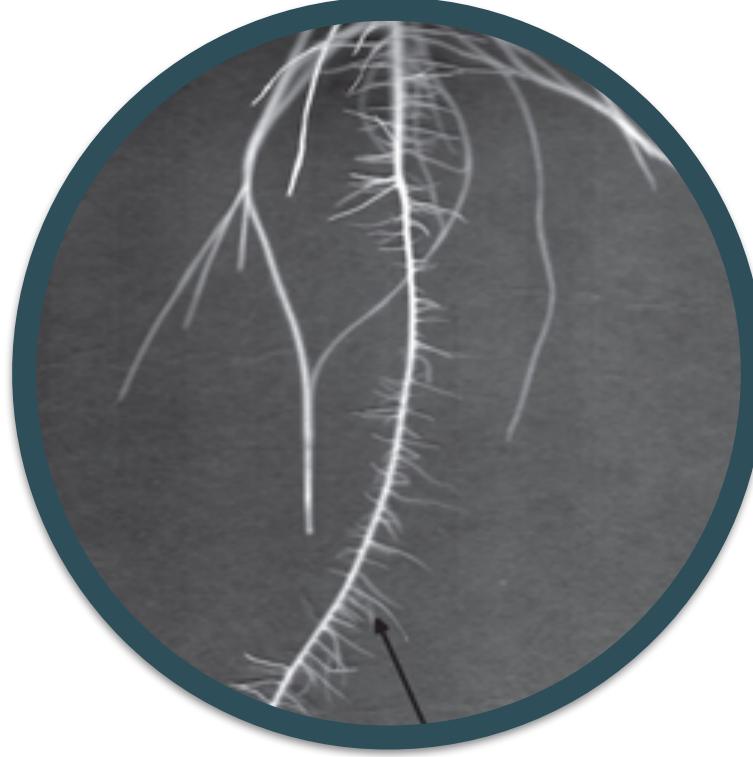


Gerrit Beemster  
University of Antwerp , Belgium



# Quantitative root system and root growth analysis: on what root system architecture and root growth can tell us about soil exploitation abilities of plants

# Quantitative root system and root growth analysis - Talks



Andreas Hund  
ETH Zurich, Switzerland



Andrew French  
University of Nottingham, UK



Anna Amtmann  
University of Glasgow, UK



Jonathan Lynch  
Penn State University, USA

# Quantitative root system and root growth analysis - Practicals



Anna Amtmann  
University of Glasgow, UK



Andrew French  
University of Nottingham, UK



Guillaume Lobet  
Université de Liège, Belgium



Xavier Draye  
Université catholique de Louvain,  
Belgium



# Plant phenotyping beyond growth assessment and lab environments: physiological and performance trait measurements in field environments

# Phenotyping in field environment - Talks



**Jaume Sans Flexas**  
University of the Balearic Islands,  
Spain



**Kathy Steppe**  
Ghent University , Belgium



**Sarah Garré**  
University of Liège, Belgium



**Andrew Binley**  
Aberystwyth University, UK



**Tracy Valentine**  
Jame Hutton Institute, UK



**Claire Périlleux**  
University of Liège , Belgium

# Phenotyping in field environment - Practicals



Hilde Nelissen  
VIB, Belgium



Kathy Steppe  
Ghent University , Belgium



Jaume Sans Flexas  
University of the Balearic Islands,  
Spain



Xavier Draye  
Université catholique de Louvain,  
Belgium



# Exploration of the electromagnetic spectrum for the measurement or derivation of proxies for physiological plant traits

# Exploration of the electromagnetic spectrum - Talks



Darren Wells  
University of Nottingham, UK



Siegfried Jahnke  
Forschungszentrum Jülich, Germany



Guy Thoonen  
University of Antwerp, Belgium



Hank Van As  
Wageningen UR, The Netherlands

# Exploration of the electromagnetic spectrum - Practicals



Bjorn Usadel

Forschungszentrum Jülich, Germany



Hank Van As

Wageningen UR, The Netherlands



Siegfried Jahnke

Forschungszentrum Jülich, Germany



Veerle Cnudde

Ghent University, Belgium



Nathalie Wuyts

VIB , Belgium

