From sensors to crop science

✓ A field platform with controlled environments and environmental sensors
✓ High capacity for housing large genotype panels
✓ A unique suite of validated and novel sensors
✓ A fully implemented data analysis pipeline
✓ Tailored protocols and research programs

Our implication in major R&D projects

Constructing PhénoField® is a strategic decision of the French Cereal and Maize growers’ boards that manage ARVALIS - Institut du végétal, the technical institute which mutualizes R&D for French farmers. The platform is supported by the French government via the «Investissements d’Avenir» program, as part of the PHENOME (French Plant Phenotyping Network) project.

PHENOME
As a platform of the Phenome network, PhénoField® is a key element for the development and validation of novel field phenotyping techniques.

AMAIZING project
In 2015 and 2017, PhénoField® will house a historic series of maize hybrids from France to evaluate the genetic progress in drought response and the physiological traits underpinning it.

BREEDWHEAT Project
In 2016 and 2018, PhénoField® will welcome the BreedWheat association genetics panel representing the last 25 years of wheat breeding in France. This trial will provide insight into the genetic and physiological architecture of drought response in French wheats.

Research targets: What questions can we answer?

PhénoField A platform for deep characterization of germplasm
My elite/breeding line seems great for drought: what’s the physiology behind its performance?

PhénoField A tool for quantitative genetics
What is the genetic architecture of my panel’s response to drought?

PhénoField A technology evaluation platform
Is my sensor relevant and precise for screening genotypes responses?

Localisation

Contacts

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Environmental characterization
Weather and soil description to increase heritability

Weather
- Overall site meteorology
- Micropplot scale micrometeorology

Soil water
- 1000 observations of soil horizon depths and pedological analyses
- Micropplot level estimations of Soil Water Holding Capacity
- 8 tensiometers
- TDR sensors (fixed and mobile)
- NIR sensors

High-throughput Canopy dynamics
Faster, more frequent non-destructive measurements

Crop Canopy
8 phenotyping gurneys equipped with:
- 2 LiDARs, 6 Cameras, 4 spectroradiometers
- And more to come

1 hexacopter drone
- High resolution multispectral and thermal imaging

Standardized measurement methodologies
One measurement every 100 degree days, i.e. up to 20 points per cropping cycle

Available tools at PhénoField®
- 8 mobile rain-out shelters
- 5 000 m² of sheltered trialing capacity
- 384 sheltered microplots
- 384 rainfed microplots
- Up to 350 genotypes
- 16 irrigation carts
- Up to 17 different irrigation regimes

A wealth of scientific and technical know-how

Around PhénoField®, an ecosystem of expert researchers in agronomy, crop physiology robotics, biophysics, bio-informatics make it possible to:
- Cultivate the major field crop species properly in the platform
- Propose adapted experimental designs
- Control and calibrate sensors
- Analyze and interpret sensor data to provide physiological/agronomic indicators
- Connect environmental, soil and plant canopy data
- Model the relations between plant and environmental factors to extract complex traits...

Physical
To date, we provide frequent, rapid, non-destructive measurements of:
- Canopy architecture
- Leaf area expansive growth
- Senescence
- Radiation Use Efficiency (RUE)
- Water Use Efficiency (WUE)...

N0: Raw data
Sensor level
N1: Corrected data
Physical level
N2: Descriptive data
Crop level
N3: Functional data
Agronomical level
Breeding

PhénoField® infrastructure
A wealth of scientific and technical know-how

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