European Plant Phenotyping Network

EPPN

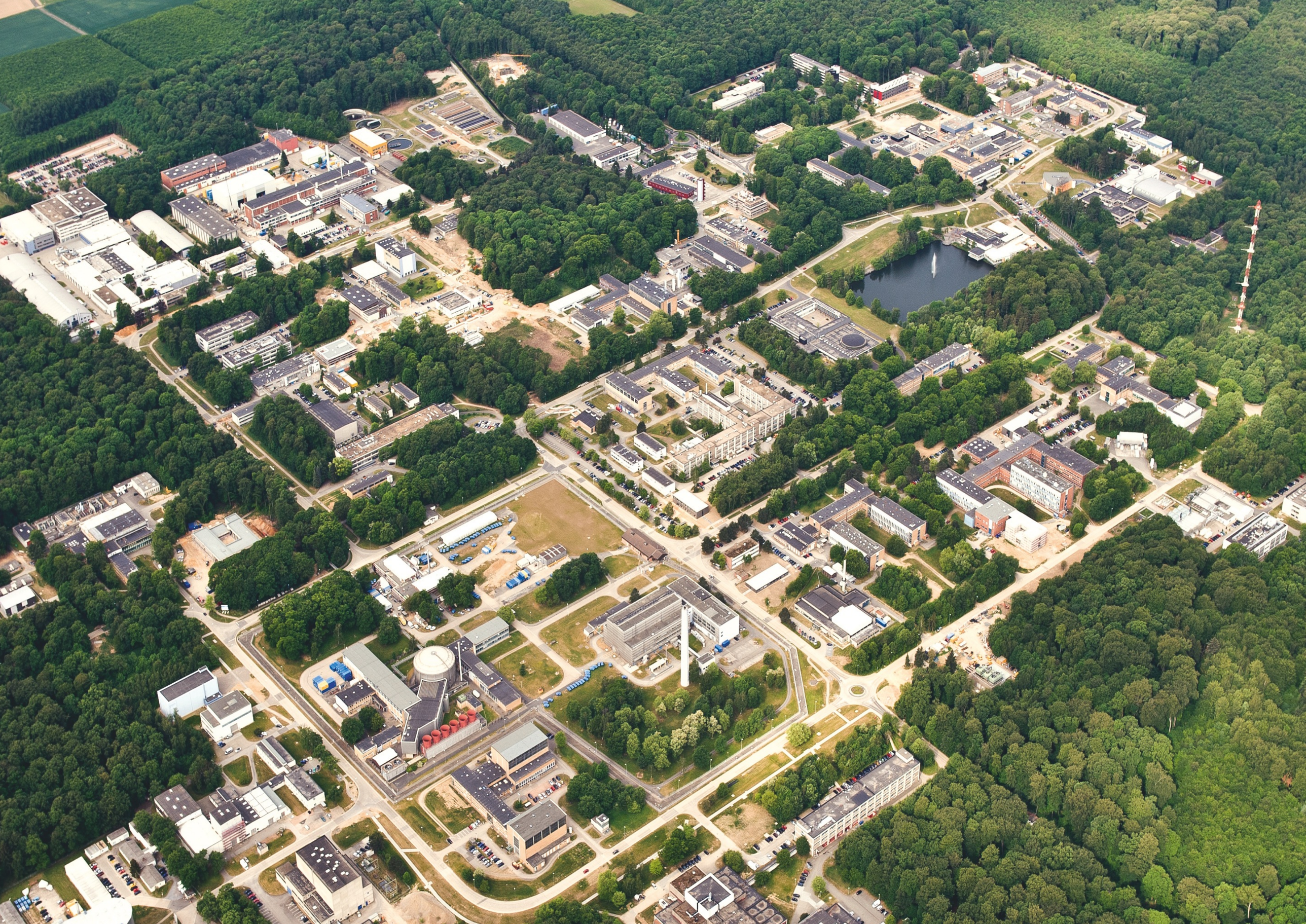
JÜLICH FORSCHUNGSZENTRUM

European Plant Phenotyping Network

www.plant-phenotyping-network.eu

SEVENTH FRAMEWORK PROGRAMME

Grant Agreement No. 284443.



Automated imaging systems at IBG2-JPPC

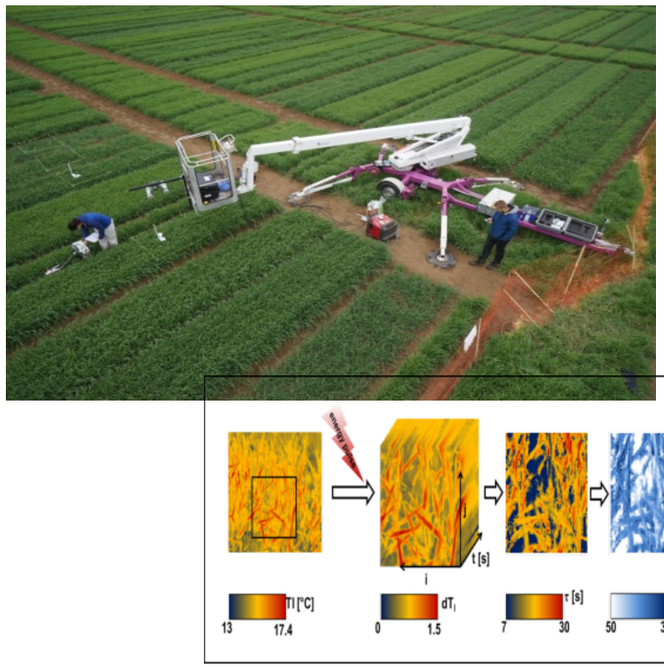
Operational capacity for non-invasive phenotyping of whole plants

MAX CAPACITY	SPECIES	EXP. VARIABLES
2500	Arabidopsis Rosette species	• Reduced water • Nutrients (N, P) • Temperature • CO_2
300	Monocots Dicots	• Reduced water • Nutrients (N, P)
300	Arabidopsis Small seedlings	• Nutrients (N, P) • Temperature • Osmotic
72 (1 plant/rhizobox)	Monocots Dicots	• Nutrients • Reduced water • Soil compaction

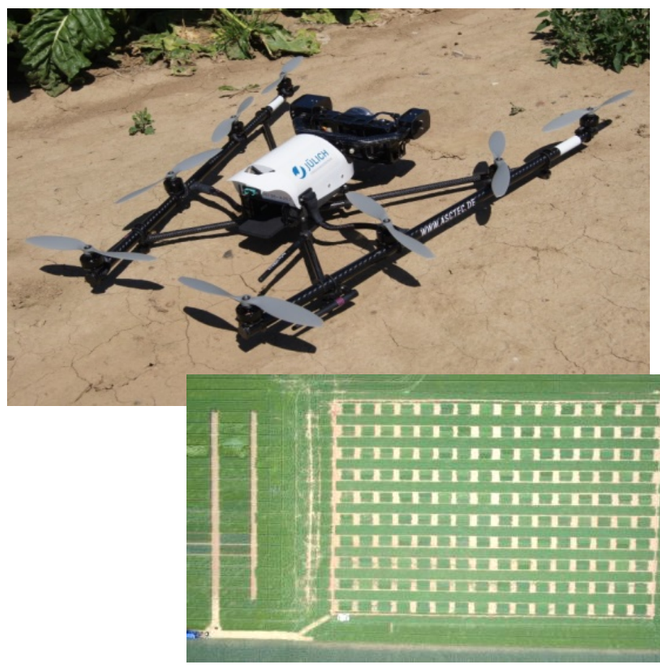
Field phenotyping platforms

Field-Mobile

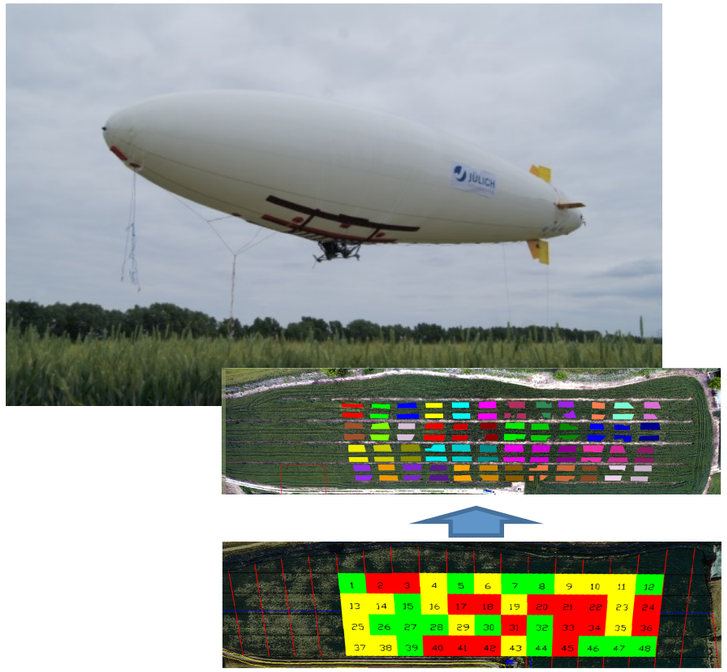
Field-Lift



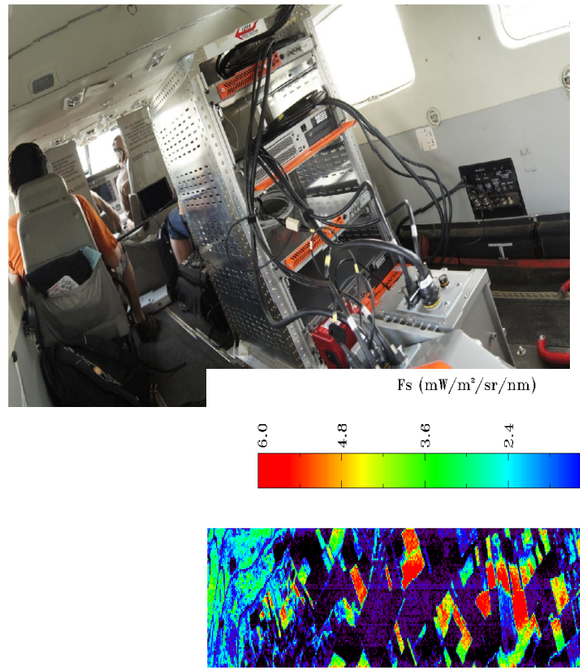
Field-Bee



Field-Ship



HyPlant



www.plant-phenotyping-network.eu

Grant Agreement
No. 284443.

EPPN is the first integrated FP 7 EU

Research Infrastructure project in Plant Sciences

Goals:

Create a European integrated network

Provide access to EPPN facilities for the user community

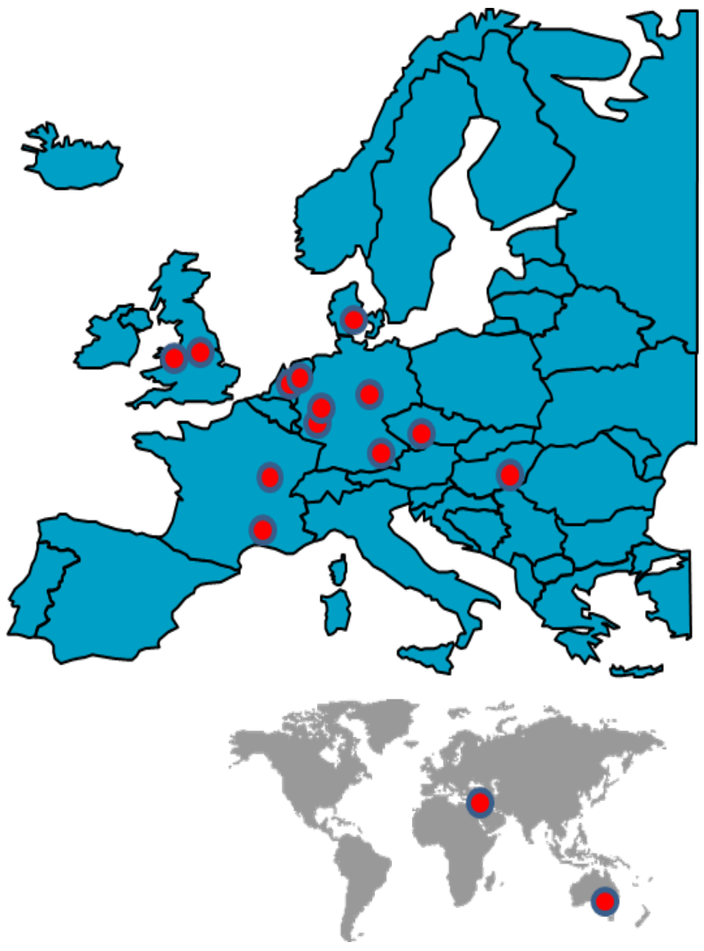
Develop novel instrumentation for non-invasive methods

Establish definition of standards

Duration: January 2012 – December 2015

Budget: 5 500 000 €

The EPPN consortium consists of 14 Partners



JÜLICH FORSCHUNGSZENTRUM

IPK GATERSLEBEN

HelmholtzZentrum münchen
Deutsches Forschungszentrum für Gesundheit und Umwelt

RWTH AACHEN UNIVERSITY

INRA

AARHUS UNIVERSITY

The University of Nottingham

WAGENINGEN UNIVERSITEIT WAGENINGEN UR

MAGYAR TUDOMÁNYOS AKADÉMIA 1825

Australian Plant Phenomics Facility

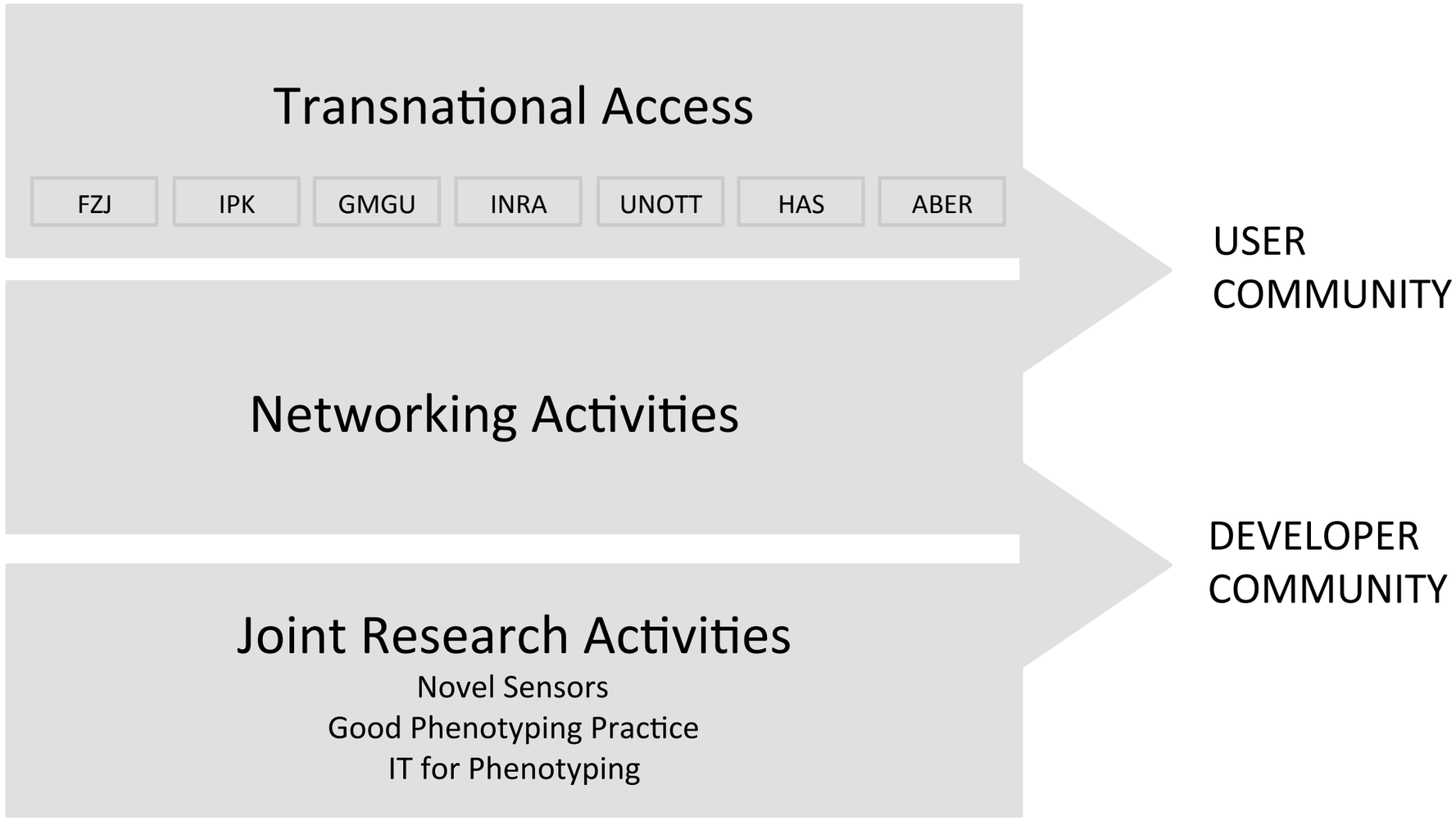
CzechGlobe

PRIFYSGOL ABERYSTWYTH UNIVERSITY

KeyGene

PHENOM networks

Key elements of EPPN

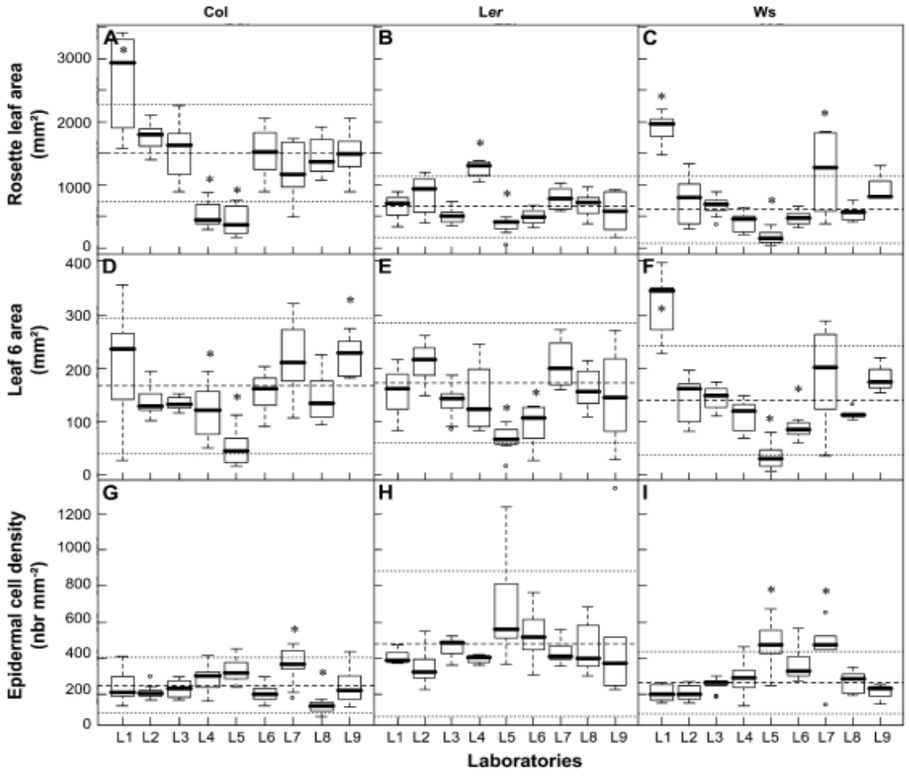


Joint research activities

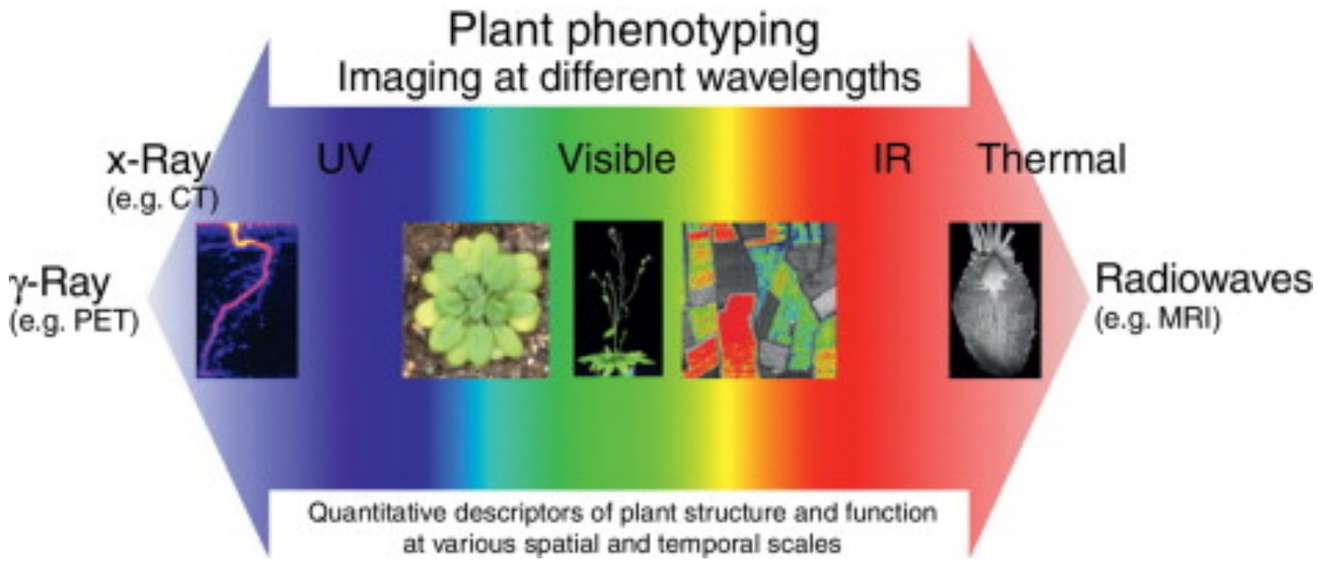
Sensor development

Good Phenotyping Practices

IT for phenotyping



Massonnet et al., *2010*

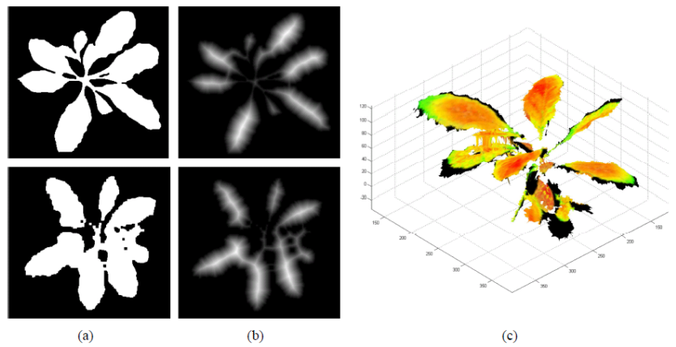


Fiorani et al., *2012*

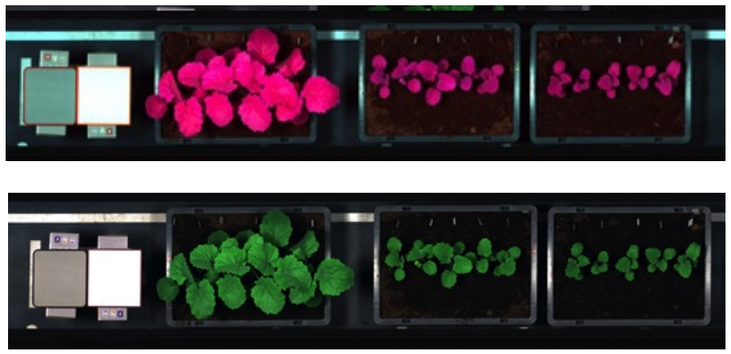
Joint research activities

Sensor development

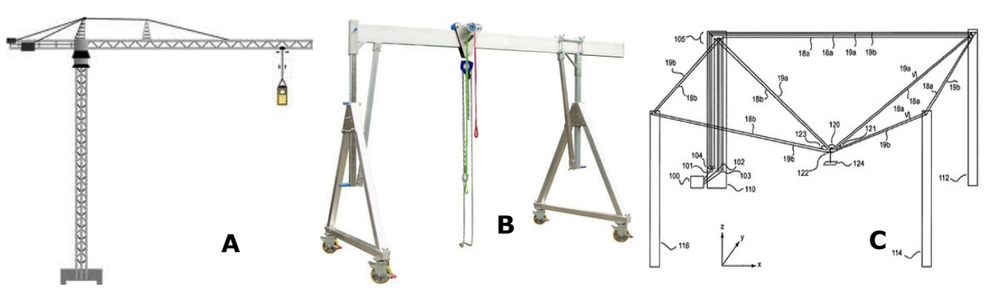
Acquisition of 2.5D models



Hyperspectral imaging



Positioning systems and automation

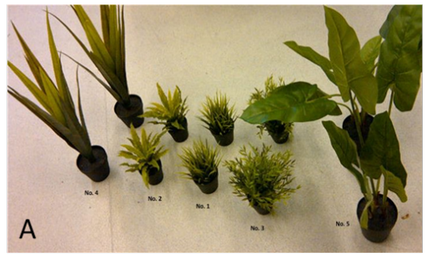


Joint research activities

Good Phenotyping Practices

Reference Experiment

Collection of Standards



Standards in Plant Phenotyping

European Plant Phenotyping Network
EPPN

HOME
ENVIRONMENT
TRAITS
IT STANDARDS
LITERATURE
CONTACT INFORMATION

>> EPPN Website

EPPN is an Integrating Activity, Research Infrastructure project funded by the European Union under FP7 Capacities Programme. Grant Agreement No. 284443.

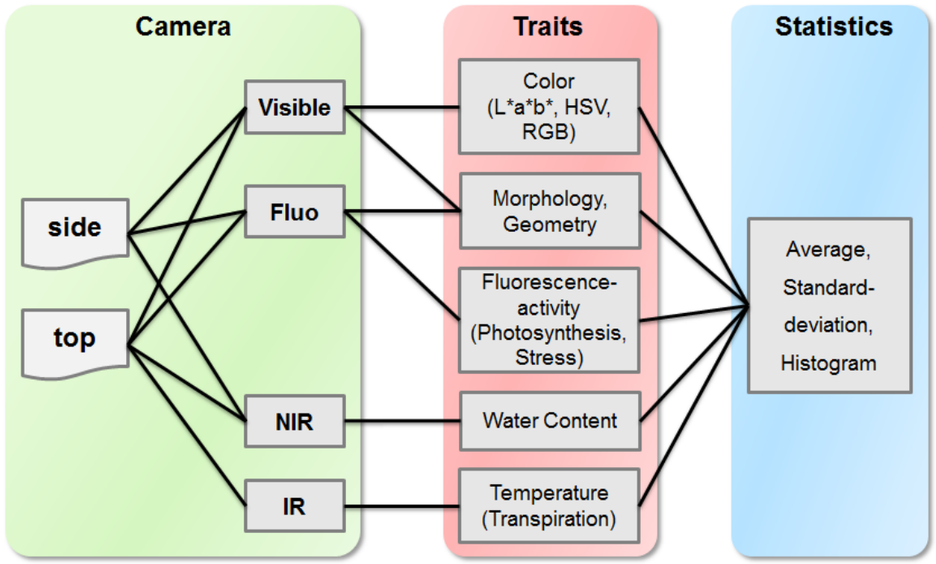
> Home

The need for Good Phenotyping Practice – Standards in Plant Phenotyping

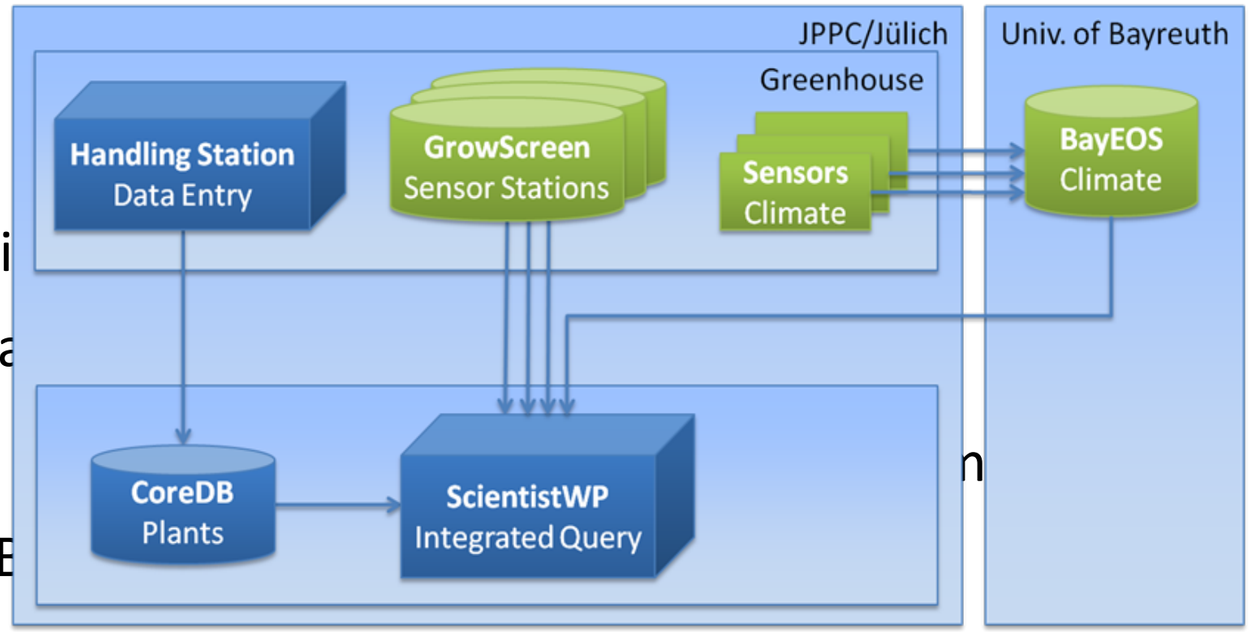
EPPN consortium

Groundbreaking discoveries in molecular biology have allowed us a detailed characterization and understanding of complex genetic networks. However, the plant phenotype is the unit of importance in particular for practical issues such as crop production (Fiorani and Schurr 2013; Pieruschka and Poorter 2012). The phenotype is the result from the complex interrelation between genes and the environment (Kohl *et al.* 2010). While the development in plant molecular biology and in molecular-based breeding techniques has progressed rapidly within the last decades the understanding of the link between genotype and phenotype did not keep up with this development. Advances in phenotyping as the process of quantitative characterizing the phenotype has become the major limiting step. The gap between the knowledge about genes and phenotypes is particularly large in analyses of plant-environment interactions that are urgently needed for research and application to sustainable and resource-efficient crop production in the context of climate change and varying agricultural production conditions (Houle *et al.* 2010).

Joint research activities



Example Trait-Notation: side.vis.hsv.h.average

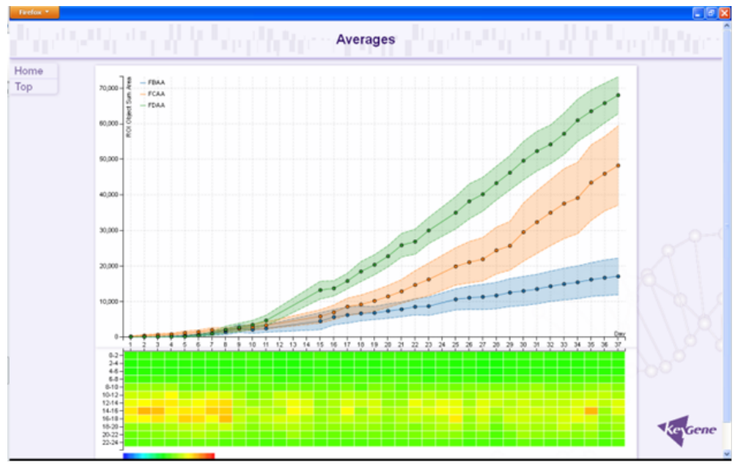


Data pre-processing and visualization tools

Timing of experiment
Experiment location
Type of growth facility
Light intensity
Light quality
CO_2
Rooting medium
Nutrients
Air humidity
Water supply
Temperature
Salinity
Seed source
Selection protocols
Biotic interactions
Planting density

Minimum Information for Plant Phenotyping Experiments

Poorter et al Functional Plant Biology 2012



Networking

Workshops with users and developers

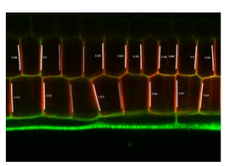
Round table meetings

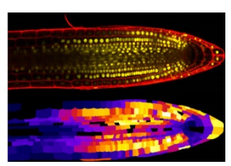
Summer schools

Sessions at conferences

57th ANNUAL CONGRESS
ITALIAN SOCIETY OF AGRICULTURAL GENETICS

Image Analysis for Biologists





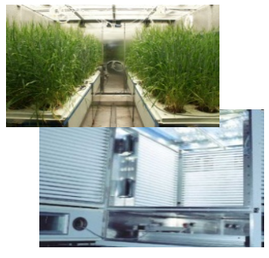
Transnational Access

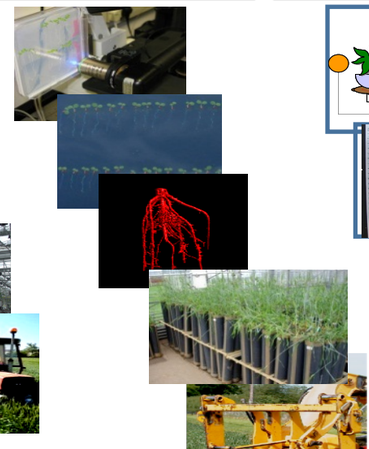
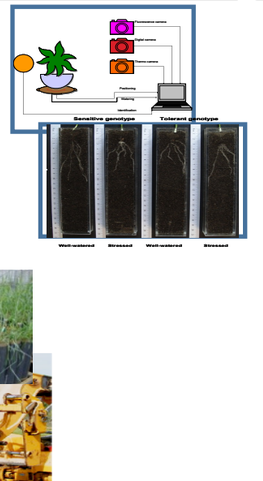
Access for 23 facilities across Europe

Based on a simple selection procedure

FZJ	IPK	HMGU	INRA	UNOTT	HAS	ABER






How to obtain Transnational Access?

Step 1: User selects the platform of interests

Step 2: Contact the platform experts for feasibility assessment

Step 3: Submit an application to the EPPN office

Step 4: Review and selection process - “peer review”-like process

Step 5: Negotiate access

What is included in Transnational Access?

For the user:

Access to infrastructure/expertise not available for the user

Preparation/Execution/Analysis of the proposed experiment

Logistical, technological and scientific support

Specific training to perform/analyze the experiment

“Mentoring program” – support by dedicated local staff members

For the TA provider:

EU covers the operating costs of the phenotyping platform

Logistic support of the user

basic operating costs (utilities, consumables...)

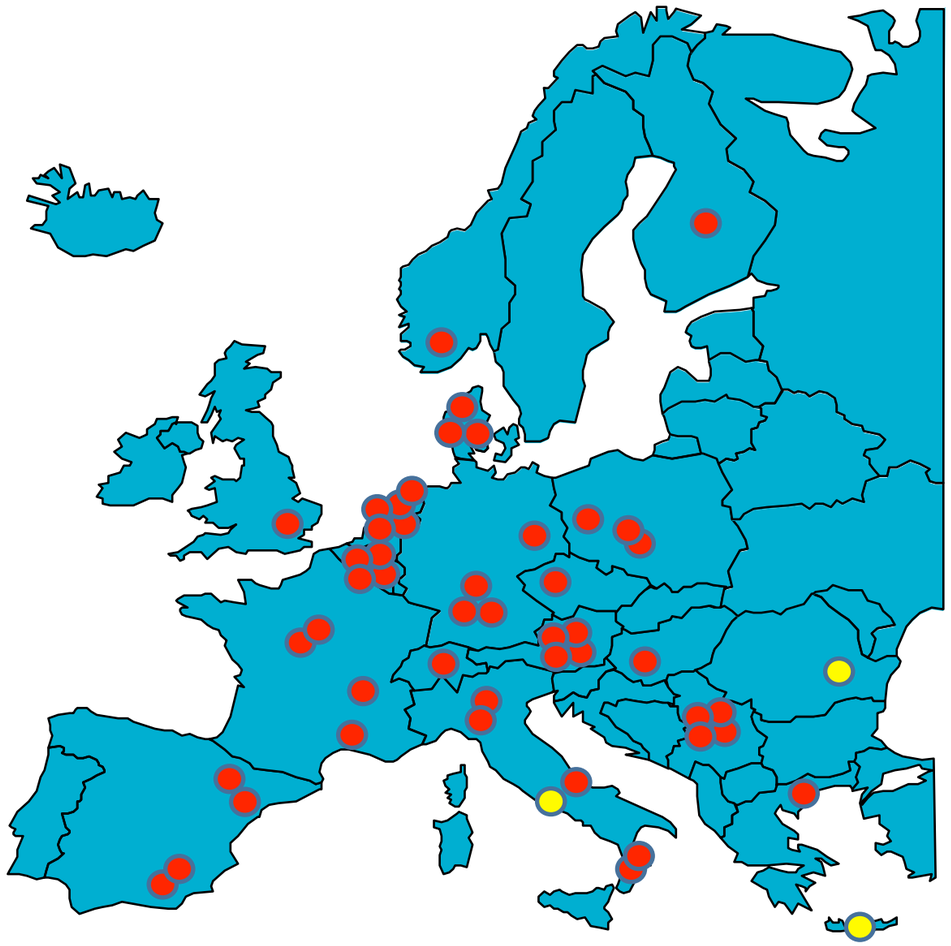
personal costs (training of users, operating the platform…)

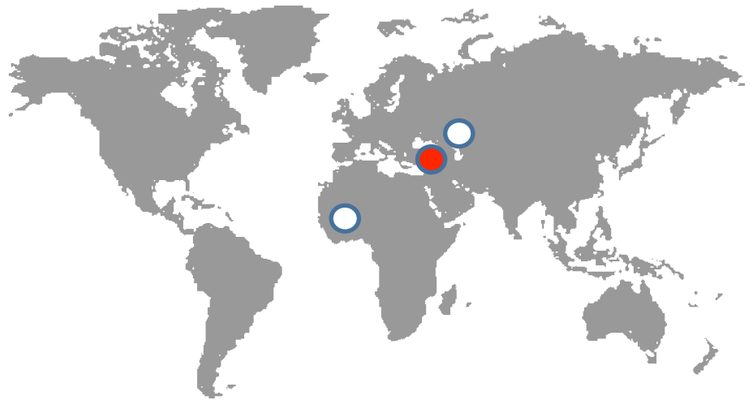
Transnational Access

Status June 2014:

48 experiments form 18 countries

3 experiments in review





Ongoing experiments

In review

TA consortium partners

Transnational Access

18 plant species were investigated

14 experiments with Arabidopsis

20 experiments with cereals (wheat, maize, rice…)

7 experiments with other crops (tomato, canola, legumes…)

2 tree species (poplar, spruce)

Transnational Access

Major experimental focus abiotic stress

25 drought stress

15 temperature stress

8 nutrient limitation

9 root development

10 combination of different abiotic stress factors

www.plant-phenotyping-network.eu

European Plant Phenotyping Network

EPPN

Transnational Access call is permanently open for 23 facilities across Europe

Several workshops and summer schools were/will be organized

Standards and protocols will be accessible

Considerations for EPPN future:

- Infastructure EU program (call in 2015)
- ESFRI

SEVENTH FRAMEWORK PROGRAMME

Grant Agreement No. 284443.

European Plant Phenotyping Network

EPPN

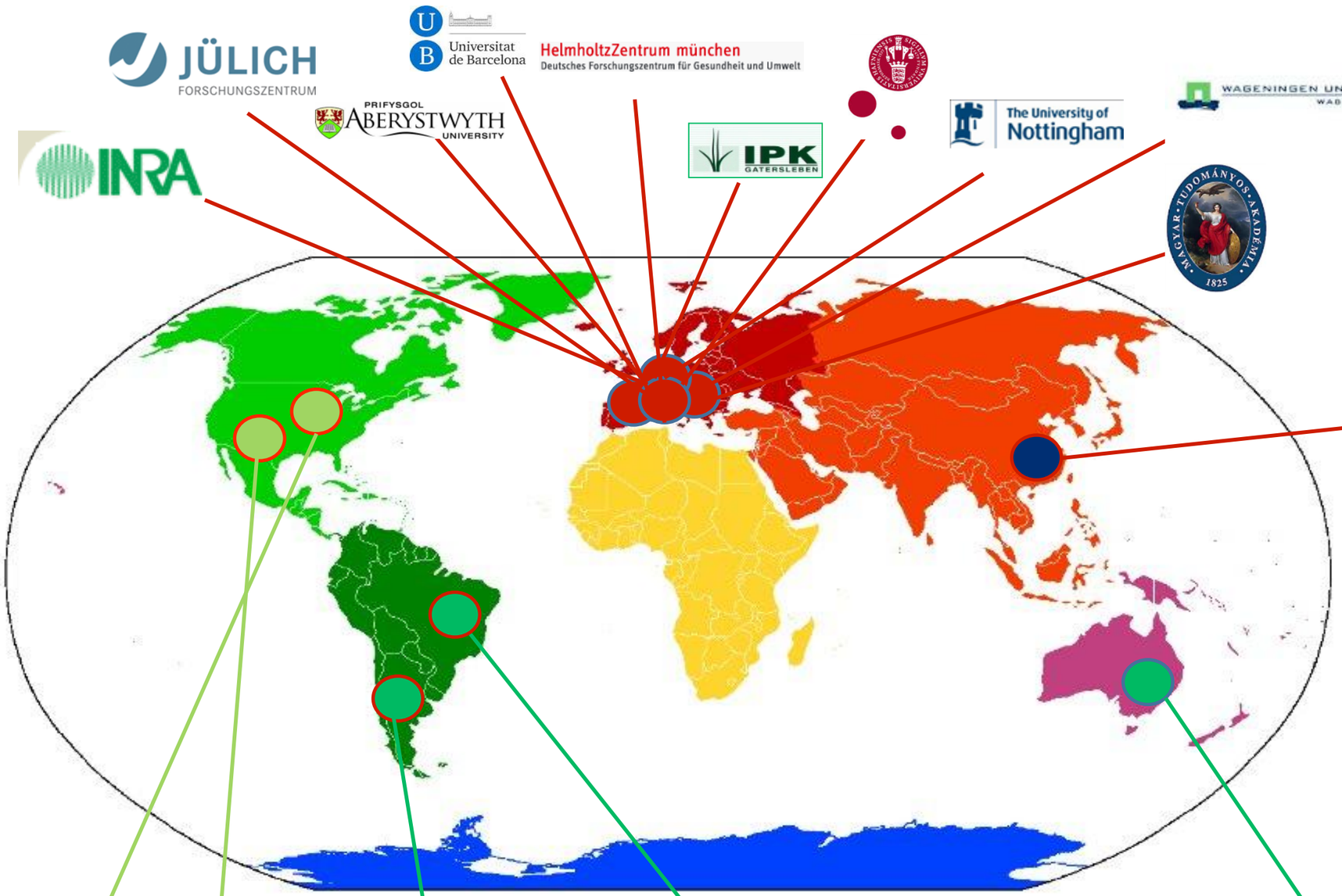
JÜLICH FORSCHUNGSZENTRUM

European Plant Phenotyping Network

www.plant-phenotyping-network.eu

SEVENTH FRAMEWORK PROGRAMME

Grant Agreement No. 284443.



European Plant Phenotyping Network
EPPN

DkPPN

Deutsches Pflanzen Phänotypisierungs-Netzwerk
DPPN

PHENOME
Réseau Français Phénomique végétale
F P P N

UK Plant Phenomics Network

WATBIO

DROPS

EUROOT

CROP.SENSE.net

HRPPC

The Accelerator