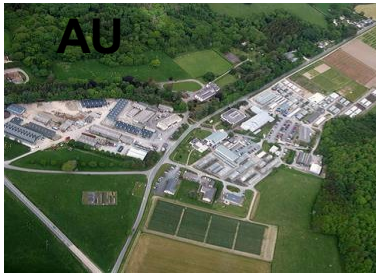
PRIFYSGOL ABERYSTWYTH UNIVERSITY

Development of a National Plant Phenomics Centre at Aberystwyth University

IBERS & AU



NPPC

UK

Breeding Industry

senova

biogemma

Limagrain

BAYER

A BBSRC-supported National Facility

bbsrc

John Doonan

International

European Plant Phenotyping Network EPPN

International context: EPPN, a FW7 transnational access consortium

14 labs (inc Australia)

Aberystwyth NPPC:

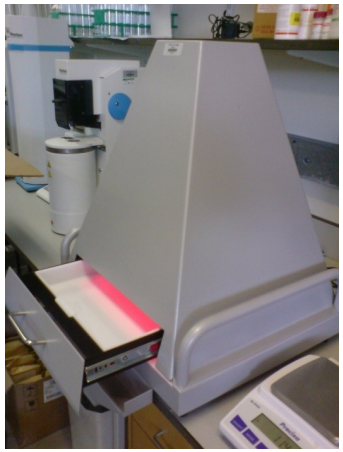
1. **Integration of biological and chemical phenomics**
2. **Development of laser scanning technologies**
3. **Calibrating technology for grasses & perennial crops**
4. **Providing transnational access to NCCP (~10% capacity)**
5. **Establishing data standards and ref expt**

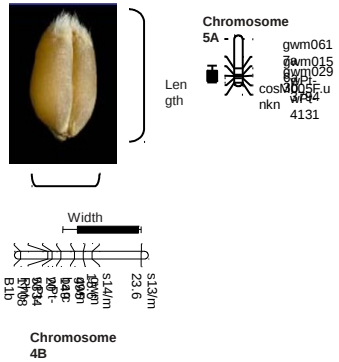
Project commenced July 2012

http://www.plant-phenotyping-network.eu/eppn/

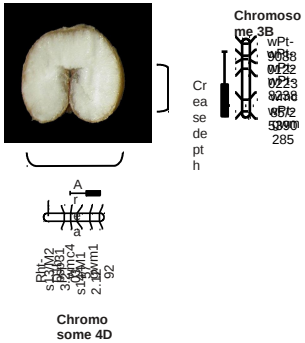
NPPC/EPPN Capabilities in non-destructive imaging

Conveyor based systems with automated delivery to imaging stations, dynamic imaging of shoot (and root) growth/physiology





HTP, but manual, end point analysis of organ (fruit/leaf/stem) size/shape and some quality traits

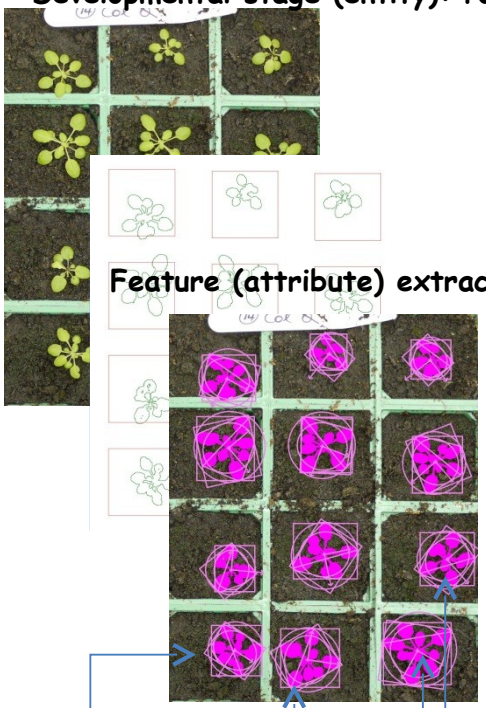


Manual, low TP and destructive

Root architecture & function; more extensive & specialized EPPN platforms at U of Notts and Julich

Developing Ontologies to support automated trait extraction

Developmental stage (entity): rosette



Feature (attribute) extraction

Convex hull

Calliper

Bounding box

Center of mass

Rosette Area

Rosette Compactness

Rosette Roundness

Proxy for physiological trait

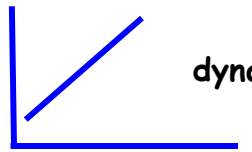
Prin. Comp

etc

Quantification of Image Features

Computed phenotypes

Integrate dt



dynamics

QTL & gene id

Agronomic traits — Gramene Trait Ontology (TO

Morphological traits — GCP Crop Ontology

Composite traits

- Rosette x feature
  - Area
  - Compactness
  - Roundness
- Derived "features"?

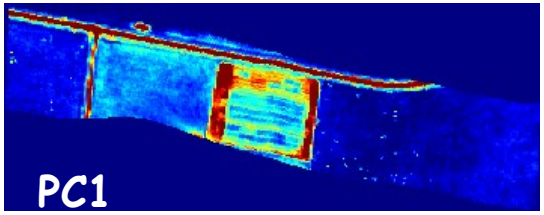
Image feature (precise mathematical description)

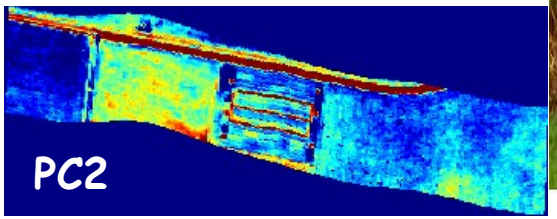
Traits

Anyela Camargo-Rodriguez (submitted)

Challenges & opportunities: integration across scales & sectors

Remote sensing ⟷ Plot Phenotyping ⟷ Smarthouse & lab





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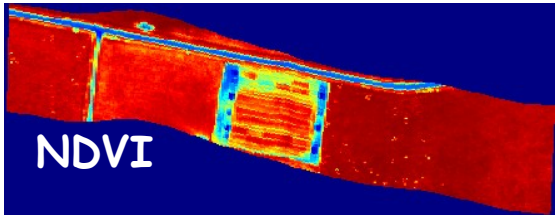
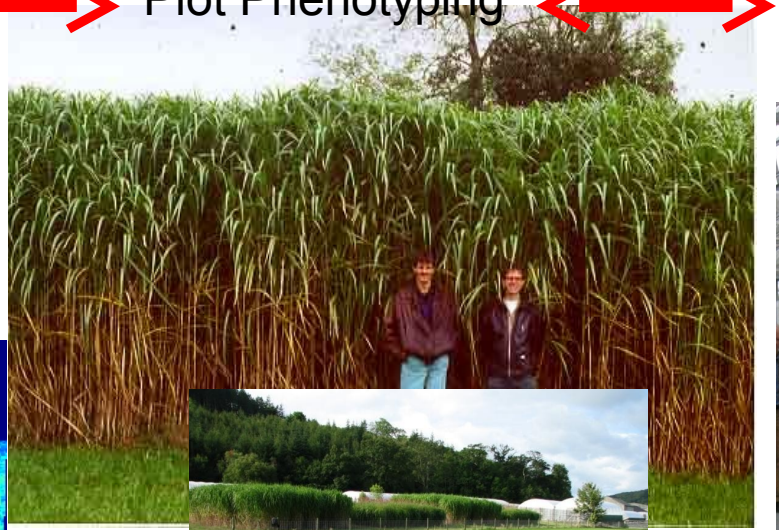


Nitrogen, herbicides and disease screening



Breeders & Biotech

The National Plant Phenomics Centre

A BBSRC-supported National Facility

funding from the BBSRC, AU, The Welsh Govt, BEAA and FP7