Development of a National Plant Phenomics Centre at Aberystwyth University

IBERS & AU

UK

NPPC

Breeding Industry

A BBSRC-supported National Facility

John Doonan

International

IBERS

UK

EMBL-EBI

Rothamsted Research

senova

Limagrain

Bayer

European Plant Phenotyping Network
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

Quantification of Image Features

Developmental stage (entity): rosette

Feature (attribute) extraction

Convex hull
Bounding box
Calliper
Center of mass

Computed phenotypes

Rosette Area
Rosette Compactness
Rosette Roundness
Proxy for physiological trait
Prin. Comp
etc

Agronomic traits
Morphological traits
Composite traits

Rosette x feature

Area
Compactness
Roundness

Image feature
(preơse mathematicał description)

Derived “features”?

Traits

QTL & gene id

Agronomic traits
Morphological traits

GCP Crop Ontology (TO)

Anyela Camargo-Rodriguez (submitted)
Challenges & opportunities: integration across scales & sectors

Remote sensing → Plot Phenotyping ← Smarthouse & lab

PC1

PC2

NDVI

Nitrogen, herbicides and disease screening

Breeders & Biotech
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