Plant Phenotyping Survey 2016

Sustainable food security and increasing availability of plant biomass for human nutrition and bioindustries is the key challenge for the coming decades. Understanding the physiological and genetic basis of plant growth and its translation to crop improvements is vital to address the future challenges. This requires concerted action to closely interact between different stakeholders to evaluate and map the demand for phenotyping, available infrastructure, to evaluate the opportunities and limitations and, to discuss strategies for the development of the plant phenotyping community. For that purpose, we initiated a survey with some basic questions related to plant phenotyping to assess the status of the emerging field. The new survey addressed participants from all continents and we try to compare the results between different continents. However, some results may not be representative because a low number of participants per continent.

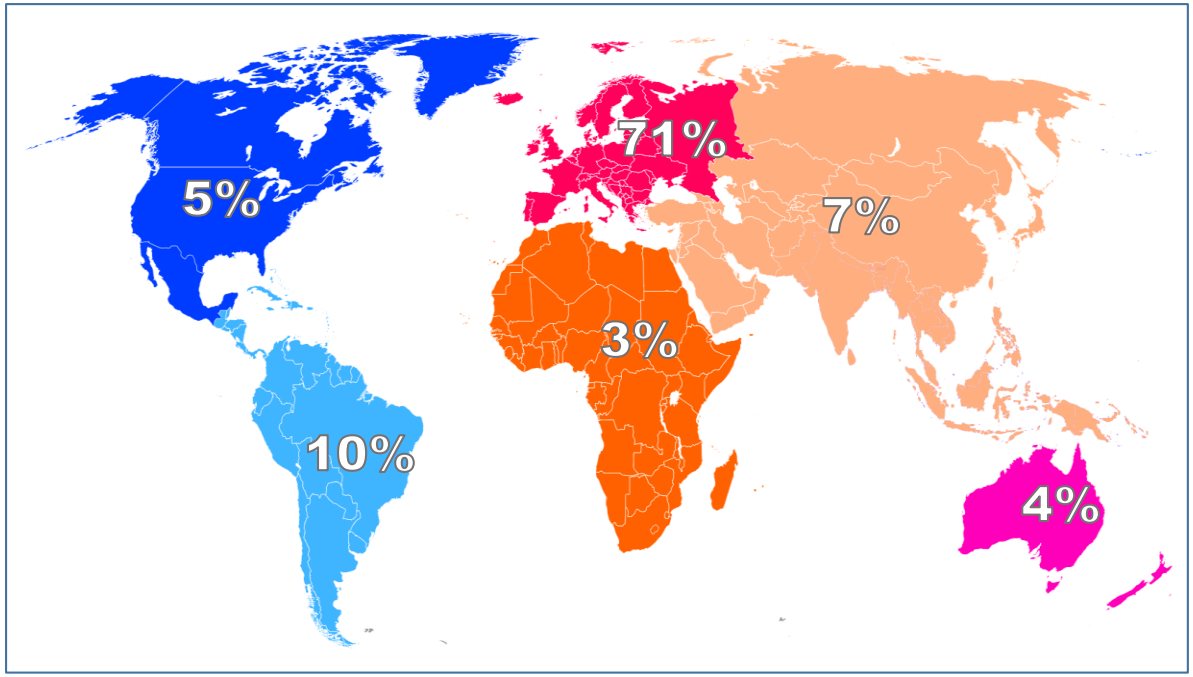
Result summary: With this survey we addressed mostly participants with academic background. Majority of the participants will be involved in plant phenotyping in the future and the demand for high throughput phenotyping has increased substantially as compared to the 2014 survey. Three key challenges for future development were identified: 1) field phenotyping, 2) abiotic stress 3) data management. As in the previous study the crop of interest is wheat, followed by maize replacing Arabidopsis (2nd in 2014). Additionally, a large number of plant species beyond major crops with regional and local importance was mentioned and many key traits indicating the large diversity plant phenotyping has to address.

The survey is supported by:
EMPHASIS: www.plant-phenotyping.eu
IPPN: http://www.plant-phenotyping.org
DPPN: http://www.dppn.de/dppn/EN/
COST Action http://www.plant-phenotyping.org/home_costfa1306

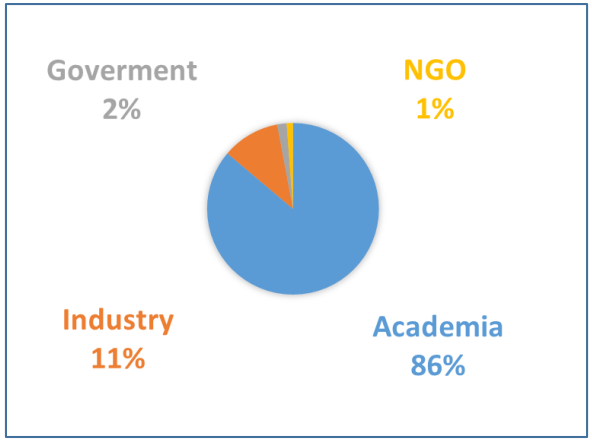
Thank you for participating in this survey

Survey Participants

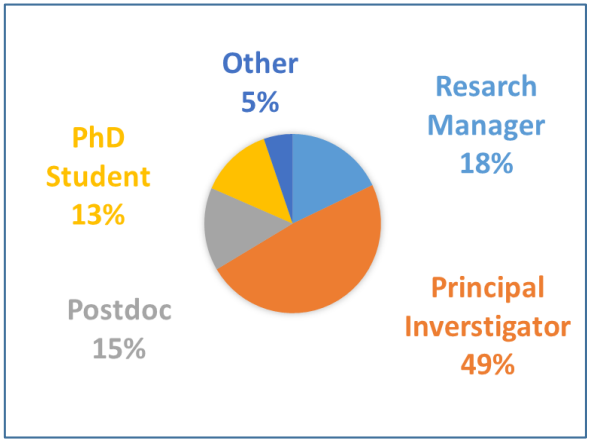
Global distribution



Background of the participants



Career level of the participants



We addressed 341 participants from 54 different countries across the globe

- majority of the participants were from Europe (71%)
- most survey participants had an academic background; industry participants ranged between 7-15% between different continents
- Principal Investigators represent the majority of the survey with approximately 50% (exception Africa 25%)

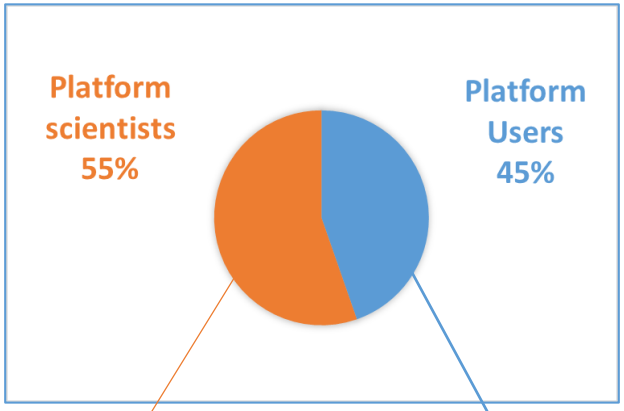
Users and Platform Scientists

Platform scientist represent the majority (> 50%) of the survey participants

exception Asia = 36%

Industry: 70% platform scientists
Academia: 53% platform scientists

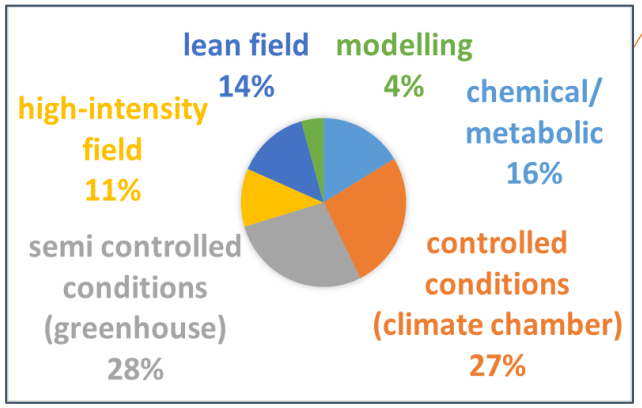
Involvement in phenotyping as:



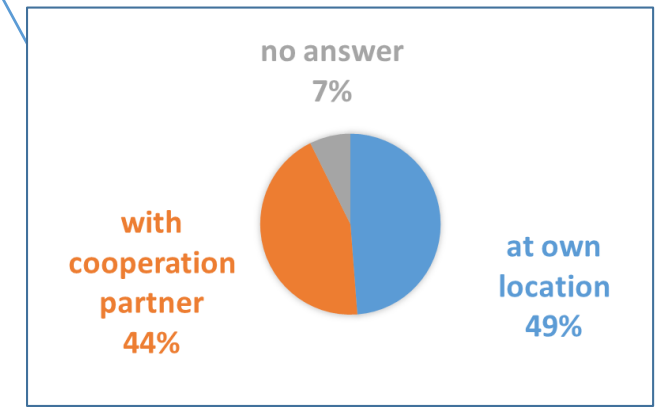
Nearly 50% of the platform users perform the experiments at their own location

exception Africa 20 %

Available platform categories[1]



User access to platforms

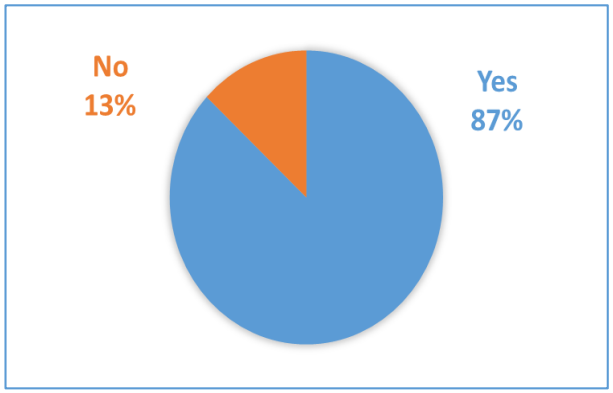


In Europe:
- the combined field platforms categories (high intensity and lean field) are below the average with 21 % as compared to other continents
- controller condition platform categories (growth chamber and greenhouse) are above average 65% as compared to other continents

[1]**Definition of terms see:** http://www.plant-phenotyping.org/ippn_infrastructure

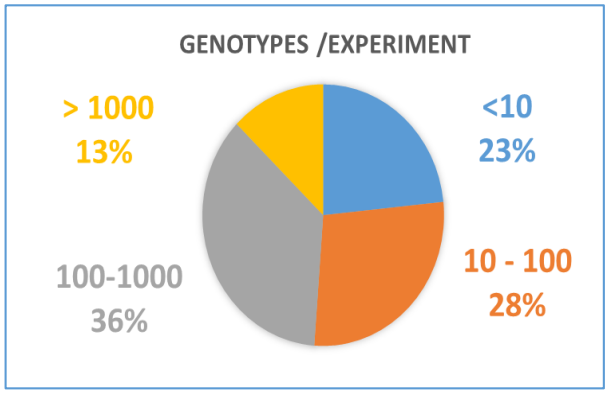
Requirements for Phenotyping Platforms

Does the future research require phenotyping?



Plant phenotyping has played an important role for 87% survey participants matching the result from previous study in 2014

What is the requirement for phenotyping?



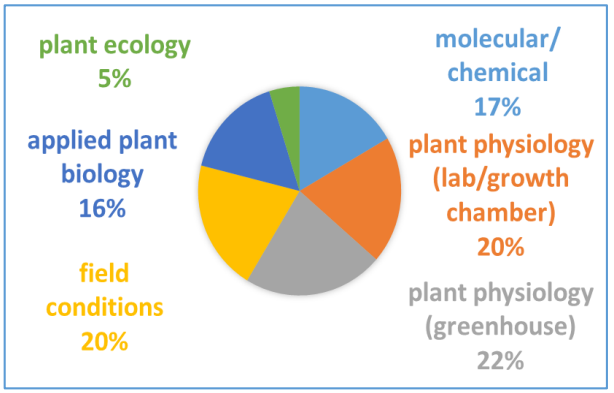
On average: 49% require >100 genotypes / experiment (in 2014: 36%).

Differences between the continents use of high throughput platform >100 genotypes / experiment:

< average:
Africa (20%), Europe (44%)

> average:
Asia (52%), South America (54%), Australia + New Zealand (73%), North America (83%)

Experimental context

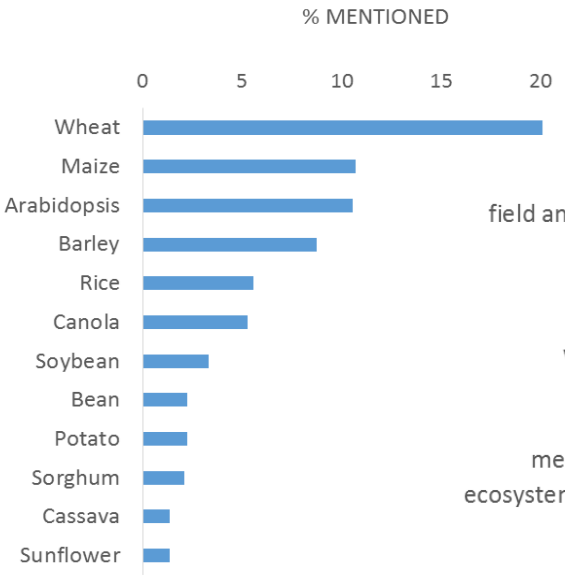


The experimental context matches the results from previous study in 2014 with similar distribution between the continents

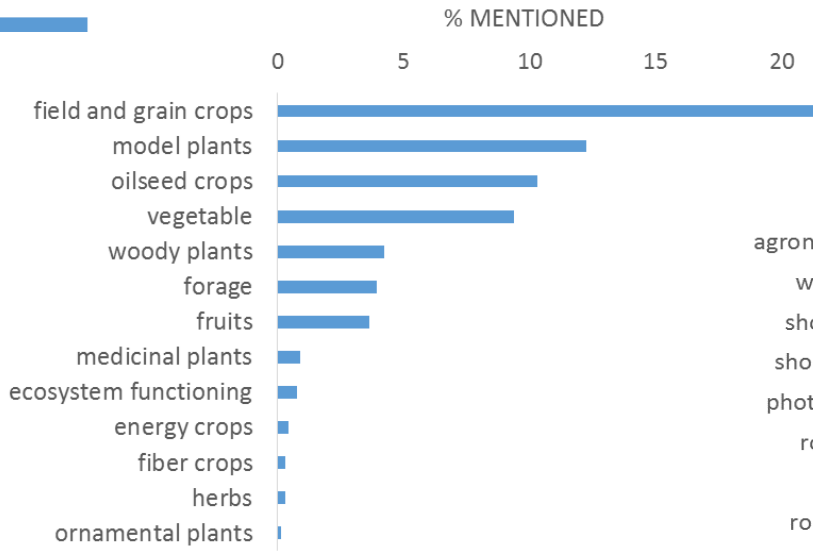
Species and Traits of Interest

Plant species of interest

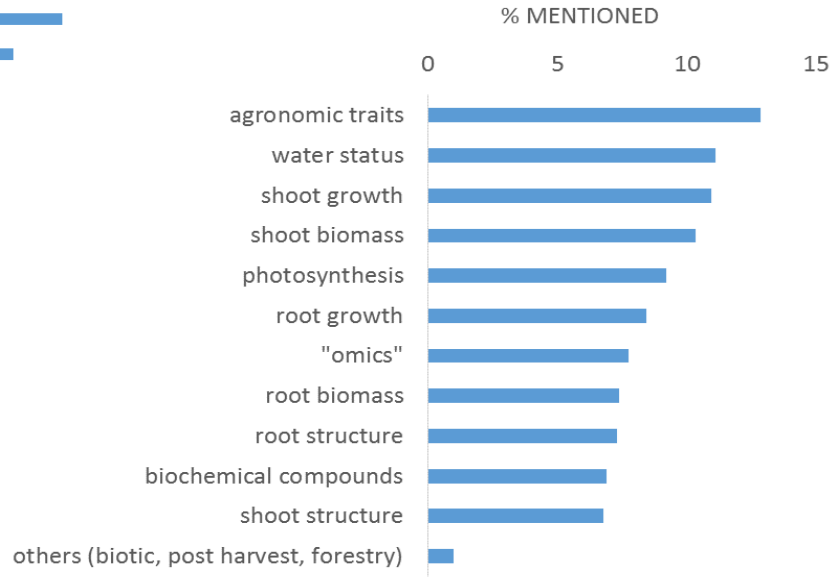
Selection of 12 out of 87 mentioned species



Plant groups addressed



Key plant traits

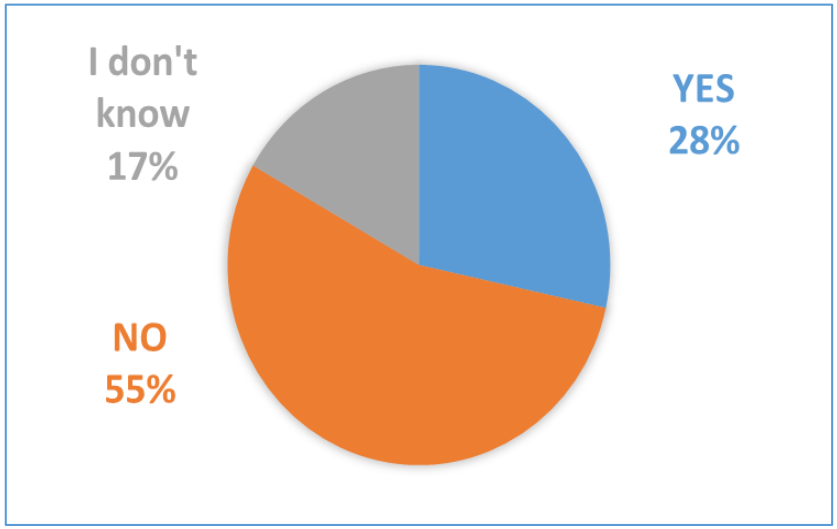


In addition to major crops, many specialty crops and other species such as plants relevant for ecosystem functioning or model plants were mentioned and are summarized as plant groups.

A large number of regionally and locally important plant species and crops was mentioned which entails also a wide range of traits of interest. Thus, plant phenotyping has to address a large diversity of plant species and traits of interest beyond major crops.

Capacity for Phenotyping

Is the currently experimental capacity for plant phenotyping sufficient?



In Europe 48% regard the plant phenotyping capacity as not sufficient; in all other continents it is substantially more then 55%

Largest Challenges in Plant Phenotyping

In the previous survey in 2014 the same top 5 challenges were identified with a different ranking:

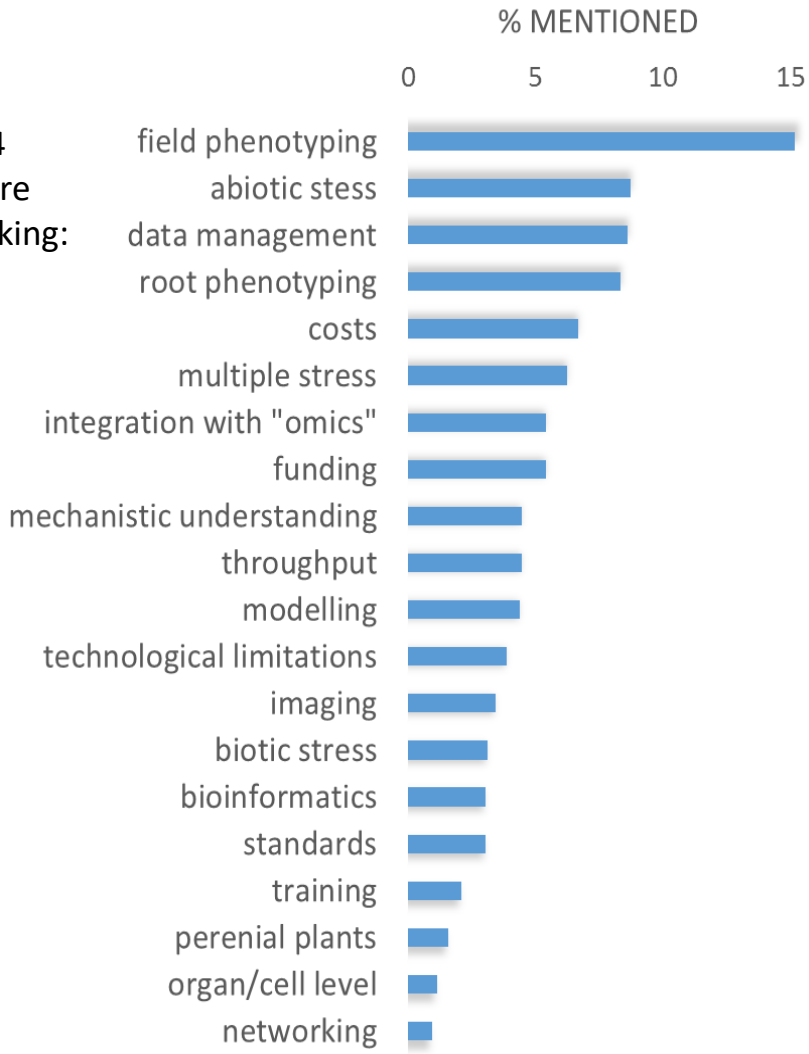
1 field phenotyping

2 data management

3 costs

4 root phenotyping

5 abiotic stress



Two most frequently mentioned challenges in:

North America/ Australia (+NZ)
1 data management
2 field phenotyping

Europe
1 field phenotyping
2 data management

Africa/Asia/South America
1 field phenotyping
2 abiotic stress

http://www.plant-phenotyping.org/ippn-survey2016