European Plant Phenotyping Network

EPPN 2020

# D5.5 International Plant Phenotyping Conference

*Simone Gatzke, Uli Schurr, Roland Pieruschka*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 731013. This publication reflects only the view of the author, and the European Commission cannot be held responsible for any use which may be made of the information contained therein.

# Document information

| | | | |
|---|---|---|---|
| **EU Project N°** | 731013 | **Acronym** | EPPN2020 |
| **Full Title** | European Plant Phenotyping Network 2020 | | |
| **Project website** | www.eppn2020.plant-phenotyping.eu | | |

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|---|---|---|---|---|
| **Deliverable** | **N°** | D5.5 | **Title** | International Plant Phenotyping Conference |
| **Work Package** | **N°** | 5 | **Title** | Networking |

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|---|---|---|---|---|---|
| **Date of delivery** | **Contractual** | 31/07/2021 (Month 51) | **Actual** | 14/10/2021 (Month 54) | |
| **Dissemination level** | X | **PU Public, fully open, e.g. web** | | | |
| | | **CO Confidential, restricted under conditions set out in Model Grant Agreement** | | | |
| | | **CI Classified, information as referred to in Commission Decision 2001/844/EC.** | | | |

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| **Authors (Partner)** | FZJ | | | |
| **Responsible Author** | **Name** | Roland Pieruschka | **Email** | r.pieruschka@fz-juelich.de |

| **Version log** | | | |
|---|---|---|---|
| **Issue Date** | **Revision N°** | **Author** | **Change** |
| 30/09/2021 | 1st draft | Roland Pieruschka | Ex: first version/first review by WP leader etc/accepted version |
| 18/10/2021 | 2 | François Tardieu | Validated version |
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# Executive Summary

**Objectives**
The emerging field of plant phenotyping requires community engagement and particularly conferences represent a platform to inform about EPPN2020 and to disseminate results. Additionally, conferences allow timely circulation and exchange of ideas concerning new developments related to phenotyping-specific technologies and methods.

**Rationale:**
EPPN2020 has enabled over 150 TNA experiments, which are relevant for the community at large, and applications in the domains of environmental characterization, imaging, statistical analyses and data management. As such these results were presented at international conferences, where EPPN2020 was strongly involved. The goal was to join or co-organize conferences in cooperation with other organizations such as IPPN (International Plant Phenotyping Network) to effectively use the synergies. IPPN has organized conferences in the last decade across the globe attracting a lot of participants.

**Main Results:**
EPPN2020 was actively involved in international conferences with dedicated sessions and presentations:

- At the beginning of the projects EPPN2020 was active at the International Plant Phenotyping Symposium (IPPS 2018) in Adelaide, Australia, advertising the opportunity for TNA and specifically demonstrating the results from the TNA obtained within the EPPN starting community project (Grant Agreement No. 284443) and best case examples for access.
- EPPN2020 beneficiaries and users of TNA were active at the International Plant Phenotyping Symposium 2019 (IPPS 2019) in Nanjing, China. During this conference the opportunity for TNA was advertised with best case examples from first results from EPPN2020 including the TNA projects and Joint Research Activities.
- EPPN2020 organized a dedicated plant phenotyping session at the Conference of the Experimental Society of Biology, 2021 in Antwerp, Belgium in cooperation with IPPN and EMPHASIS including the presentation of a number of results from EPPN2020 including TNA as well as the results from Joint Research Activities.

**Authors/Teams involved:** Roland Pieruschka, Simone Gatzke, Uli Schurr

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# 1. PLANT PHENOTYPING CONFERENCES WITH STRONG INVOLVEMENT OF EPPN2020

## 1.1. International Plant phenotyping Symposium 2018 (IPPS 2018) in Adelaide, Australia

The International Plant Phenotyping Symposium in 2018 (IPPS2018) brought together the multidisciplinary plant phenotyping community attracting 225 participants from all over the world with 53 Europeans to foster knowledge sharing, collaboration, innovation, and the beginning of new partnerships, ideas and research projects.


The Symposium addressed three areas of interest:

- Understanding the interaction of a plant's genotype with the environment is a key driver of plant phenomics addressing:
  - the need to measure large numbers of plants in varying environmental conditions to identify the traits that will make them more tolerant to our changing climate
  - latest camera and sensor technology to get a better understanding of plant physiological processes and the environment
- Data acquisition as the potential bottleneck in plant phenotyping addressing:
  - the need to ensure the data we capture is high-quality and relevant
  - combine different data sources to enrich the phenotyping measurement information
  - annotate and manage data so it can be shared, re-used and queried
- Advance our understanding of plant performance and resilience
  - brings together a whole suite of expertise, from plant biologists to engineers and statisticians and working collaboratively to make progress towards identifying the genetics of stress tolerance and breeding higher yielding crops.

A detailed conference programme with recorded presentations is available: https://www.plant-phenotyping.org/ipps2018

In dedicated sessions a number of results from EPPN (Starting Community 2012-2017: Grant Agreement Number: 731013) were introduced and used to advertise for the Transition Access opportunity in EPPN2020. Additionally, the goals and approaches in EPPN2020 Jpint Research activities to enable harmonisation were discussed.

The Symposium resulted also in a special Issue in the journal Frontiers in Plant Sciences:

https://www.frontiersin.org/research-topics/9419/phenotyping-from-plant-to-data-to-impact-and-highlights-of-the-the-international-plant-phenotyping-s

## 1.2. International Plant phenotyping Symposium 2019 (IPPS 2019) in Nanjing, China

The International Plant Phenotyping Symposium in 2019 (IPPS 2019) addressed the recent development in plant phenotyping and provide a platform for discussion and exchange. The symposium attracted over 400 participants from all over the world with 120 international participants and 59 Europeans.

The Symposium addressed dedicated areas of interest:

- Technology for plant phenotyping:
  - discussing the latest and future technological and sensor developments in plant phenotyping including cost effective applications.
- Data management:
  - addressing the latest developments that will enable the reusability of data from acquisition to management and reuse and modelling.
- Impact of plant phenotyping research:
  - outlining the success stories in plant phenotyping leading improved plant production.

A detailed conference programme with recorded presentations is available: https://www.plant-phenotyping.org/program_ipps2019

In dedicated sessions a number of results from EPPN and EPPN2020 were introduced and used to advertise for the Transition Access opportunity in EPPN2020. Additionally, the goals and approaches in EPPN2020 Joint Research activities to enable harmonisation were discussed.

## 1.3. Conference of the Experimental Society of Biology, 2021 in Antwerp, Belgium

A session on plant phenotyping sessions was included in the program of the virtual conference of the Society of the Experimental Biology. Within this session, latest developments in plant phenotyping were addressed specifically how plant phenotyping can advance our understanding of plant performance and resilience, and how we can make progress towards identifying the genetics of stress tolerance and breeding higher yielding crops. The focus was on i) the latest technology development, ii) case studies indicating better understanding of plant physiological processes and the growth environment, iii) acquisition and reuse of data to enrich the phenotyping measurement information. The session were complemented by the presentation of plant phenotyping landscape in Europe including EPPN2020, the Research Infrastructure EMPHASIS and IPPN as co-organizers.

A conference programme https://www.sebiology.org/events/event/seb-conference-2021/programme/plant-biology-sessions#phenotyping

Session programme with oral presentations is outline below; additionally about 20 posters were presented in dedicated poster sessions.

| AM Session | | |
|---|---|---|
| **Tuesday 6 July 2021** | | |
| 10:35 - 11:05 | Uli Schurr | Plant phenotyping landscape in Europe and beyond - technologies - access - knowledge |
| 11:10 - 11:25 | Lamis Abdelhakim | Investigating the combined drought and heat stress effect on physiological traits in spring wheat by using dynamic image-based phenotyping |
| 11:30 - 11:45 | | |
| 11:50 - 12:05 | Angela Burnett | Phenotyping drought and metabolic stress responses in glasshouse- and field-grown crops, using hyperspectral reflectance at leaf and canopy scales |
| 12:10 - 12:40 | Stefan Paulus | A technical workflow analysis for hyperspectral plant screening in greenhouses |
| **End of AM session** | | |
| PM Session | | |
| **Tuesday 6 July 2021** | | |
| 14:00 - 14:30 | Michela Janni | Bioristor, a novel tool for in vivo phenotyping |
| 14:35 -14:50 | David Eyland | Dynamic transpiration phenotyping discerns contrasting water use strategies within the wild banana diversity |
| 14:55 -15:10 | Silvana Francesca | Understanding the biostimulating action of a product of plant origin by phenotyping tomato plants under abiotic stress. |
| 15:10 - 15:30 | | |
| 15:35 - 15:50 | Florian Tanner | Development of a high-throughput, sensor-based method to measure Ascochyta blight resistance in chickpea |
| 15:55 - 16:10 | Mirella Sorrentino | High-throughput automated phenotyping as a shortcut to more effective biostimulants: from seeds to crops |
| 16:15 - 16:30 | Alexandra Burgess | The effect of canopy architecture and wind-induced movement on the light environment within crops |
| 16:35 - 17:05 | Francois Tardieu | Plant phenotyping in a changing climate: which scales, methods and degrees of abstraction? |
| **End of AM session** | | |

| **Wednesday 7 July 2021** | | |
|---|---|---|
| 09:35 - 10:05 | Vincent Vadez | High throughput phenotyping (HTP) for yield improvement: Define the right phenotypes and platforms, make them accessible to breeders |
| 10:10 - 10:25 | Bethany Nichols | A pipeline for integrating genetic and phenotypic data for genetic loci identification associated with plant development in *Brassica napus* |
| 10:30 - 10:45 | Beata Czajkowska | Changed to poster: Diversity of a cytokinin dehydrogenase gene in wild and cultivated barley indicates genetic selection for water utilization during cereal domestication |

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| 10:45 - 11:05 | | |
| 11:05 - 11:20 | Kiflemariam Belachew | - |
| 11:25 - 11:40 | Clothilde Collet | Alternative routes to unlock architectural information from root system image series |
| 11:45 - 12:00 | Adrien Heymans | Creation of high resolution root system hydraulic atlas from root cross-section images and modelling tools. |
| 12:05 -12:35 | Saoirse Tracy | Phenotyping root resilience in fiel structured soils |
| **End of AM session** | | |
| | | |
| PM Session | | |
| **Wednesday 7 July 2021** | | |
| 15:10 - 15:40 | Emilie Millet | New strategies for designing phenotyping experiments and analysing phenotyping data |
| 15:30 - 15:45 | Felicià Maviane-Macia | IPSO Phen, a user interface program to create image-processing pipelines for high throughput plant phenotyping platforms |
| **End of AM session** | | |

## 2. PARTICIPANT LIST

The lists of participants can be provided upon request for the IPPS2018 and the IPPS 2019 (list of international participants, the list of Chinese participants is not available).
The list of participants at the SEB2021, as a virtual event is not available. 800 participants registered to the SEN 2021, about 40 joint the phenotyping sessions.

# Conclusion

EPPN2020 was involved in 3 international events with dedicated sessions and presentation:

- International Plant phenotyping Symposium 2018 (IPPS 2018) in Adelaide, Australia Advertising EPPN2020 TNA opportunity and showcasing the results from EPPN the starting community project as best case examples for TNA (Grant Agreement No. 284443)
- International Plant phenotyping Symposium 2019 (IPPS 2019) in Nanjing, China Advertising EPPN2020 TNA opportunity and showcasing first results from EPPN2020 TNA and Joint research activities and EPPN (Grant Agreement No. 284443)
- Conference of the Experimental Society of Biology, 2021 in Antwerp, Belgium Showcasing the results from EPPN2020 including TNA as well as the results from Joint Research Activities

# Glossary

EPPN2020: European Plant Phenotyping Network - 2020

# Definitions

EPPN: European Plant Phenotyping Network (https://www.plant-phenotyping-network.eu/)
IPPN: International Plant Phenotyping Network (https://www.plant-phenotyping.org/)