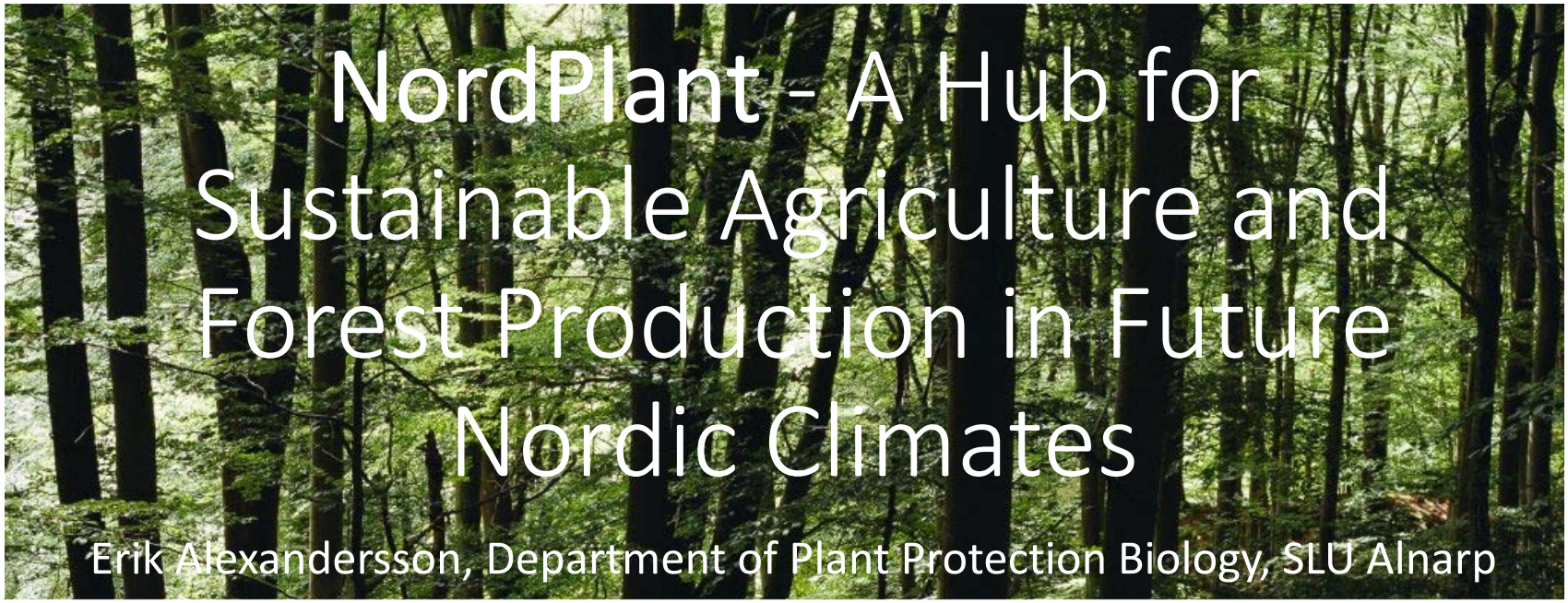


NordPlant - A Hub for Sustainable Agriculture and Forest Production in Future Nordic Climates

Erik Alexandersson, Department of Plant Protection Biology, SLU Alnarp

NordPlant

NordPlant - A Climate and Plant Phenomics Hub for Sustainable Agriculture and Forest Production in Future Nordic Climates

funded by NordForsk

SLU Alnarp

- Climate chambers with LED
- Focus: Biotic stress and plant pathogens

UHEL

- High through-put automated phenotyping
- Focus: Forest trees, automated phenotyping

UCPH

- High through-put automated phenotyping
- Focus: Microscopy and cell phenomics

UiT

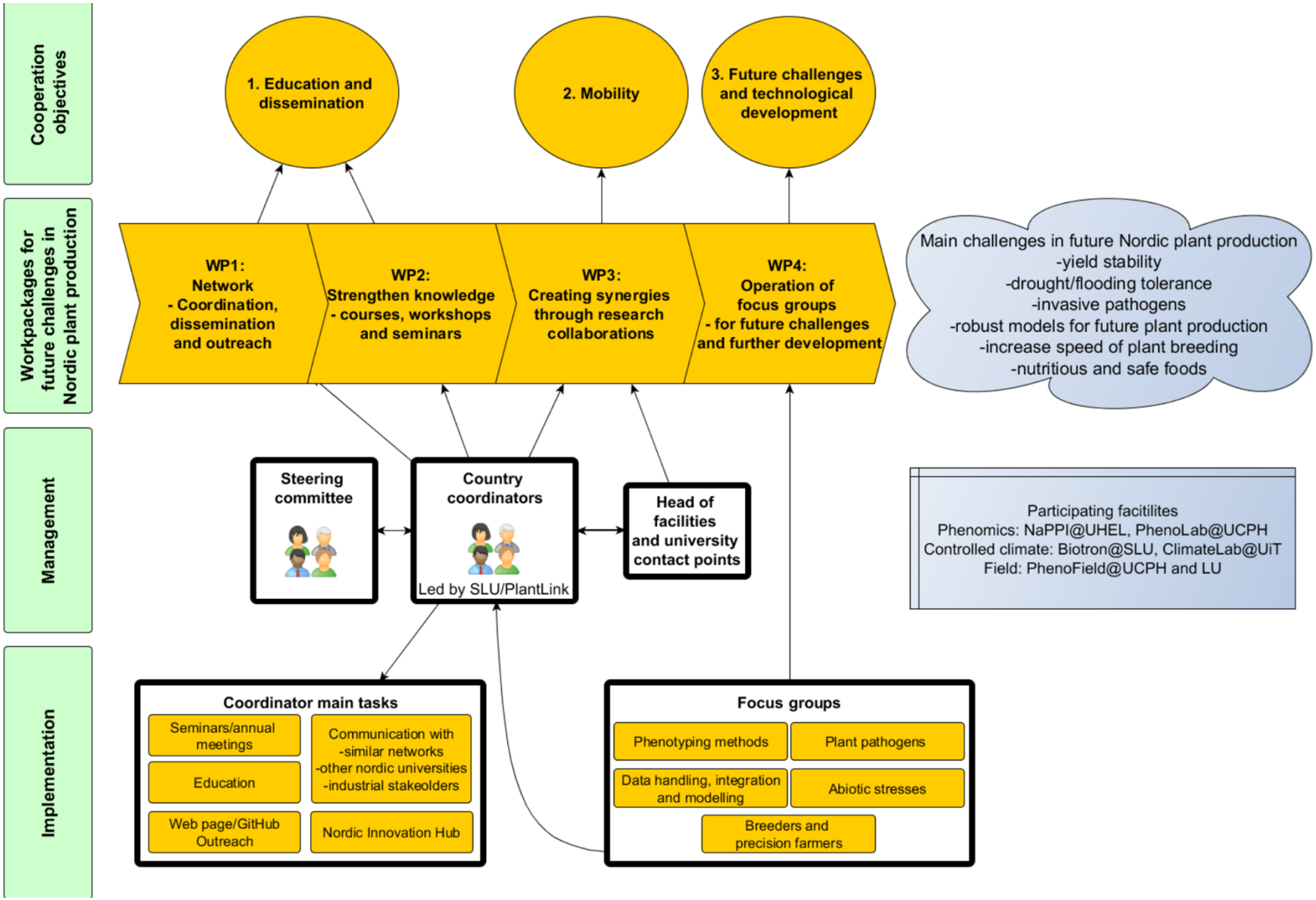
- Climate chambers with day light
- Focus: Abiotic stress and plant production

LU

- Field phenotyping
- Focus: Spectral analysis and modelling

Steering committee and funding researchers, NordPlant

Representative	Deputy representative
Jari Valkonen	Kristiina Himanen
Erik Andreasson	Rodomiro Ortiz
Thomas Roitsch (chair)	Alexander Shulz
Laura Jaakola	Kirsten Krause
Lars Eklundh	Anna Maria Jönsson


Cooperation objectives
Workpackages for future challenges in Nordic plant production
Management
Implementation
1. Education and dissemination
2. Mobility
3. Future challenges and technological development
WP1: Network - Coordination, dissemination and outreach
WP2: Strengthen knowledge - courses, workshops and seminars
WP3: Creating synergies through research collaborations
WP4: Operation of focus groups - for future challenges and further development
Main challenges in future Nordic plant production
-yield stability
-drought/flooding tolerance
-invasive pathogens
-robust models for future plant production
-increase speed of plant breeding
-nutritious and safe foods
Steering committee
Country coordinators
Led by SLU/PlantLink
Head of facilities and university contact points
Participating facitilites
Phenomics: NaPPI@UHEL, PhenoLab@UCPH
Controlled climate: Biotron@SLU, ClimateLab@UiT
Field: PhenoField@UCPH and LU
Coordinator main tasks
Seminars/annual meetings
Education
Web page/GitHub Outreach
Communication with -similar networks -other nordic universities -industrial stakeolders
Nordic Innovation Hub
Focus groups
Phenotyping methods
Plant pathogens
Data handling, integration and modelling
Abiotic stresses
Breeders and precision farmers

Focus groups

1. Phenotyping methods in field, greenhouse, and cell physiology (UHEL)

2. Data handling and integration related to phenotyping and modelling by integrated climate and phenomics data (UCPH/LU)

3. Emerging and increasing plant pathogens and pests in the Nordic countries (SLU)

4. Abiotic stress relevant for future climate change in the Nordic countries (UiT)

5. Demands of breeders and precision farmers (UCPH)

Country coordinators

Country coordinators and executive group:

Kristiina Himanen (Finland)

Erik Alexandersson (Sweden + NordPlant coordinator)

Thomas Roitsch (Denmark)

Laura Jaakola (Norway)

Facility contact points:

Aakash Chawade (Biotronen, SLU); Kristiina Himanen (NaPPI), Laura Jaakola (Climate lab), Thomas Roitsch (PhenoLab)

Official **Kick-off 24-25 October** in Helsinki

Kick-off NordPlant!

Baoru Yang, University of Turku

Lukas Spichal, UPOL

Uli Schurr, Forschungszentrum Jülich

Anna Maria Jönsson, LU

Markku Keinänen, Uni of Eastern Finland

Morten Lillemo, NMBU

…focus group discussions, speed dating and more!

….covering controlled/field phenotyping, climate impact on plant physiology and nutrients, microscopical phenotyping, facilities/new techniques etc.

Register on www.nordplant.org

8 PhD/Post Doc Travel stipends!

- Alexander Koc, SLU
- Amos Samkumar Rajan Premkumar, UiT
- Bruna Marques dos Santos, UCPH
- Dhananjay Kumar, SLU
- Lena Lachner, UiT
- Okanlawon Lekan Jolayemi, SLU
- Sylwia Kacprzak, LU
- Wenjun Xie, UCPH

www.nordplant.org

Sign up!

PLANTLINK - technical platforms

- Proteomics platform
- Bioimaging centre
- Computational biology
- Bioinformatics
- Spectroscopy/spectrometry (NMR, GC-MS, IR-MS, Raman)
- MAXIV
- ESS
- Biotron
- Field trials

Review: Nordic research infrastructures for plant phenotyping, accepted in Agricultural and Food Science

Erik Alexandersson, Markku Keinänen, Aakash Chawade and Kristiina Himanen

Survey of 14 Nordic Plant Growth Facilities for phenotyping and controlled climates

Name of facility	PhenoDyn: Drought spotter and Planteye	Frederiksberg facilities at University of Copenhagen	Phenolab Taasterup at University of Copenhagen	Greenhouse Taasterup, University of Copenhagen	RERAF - Risø Environmental Risk Assessment facility	Controlled Environment Facility for Plant Research	The Centre for Plant Research in Controlled Climate (SKP)	Climate laboratory Holt	The biotron at SLU Alnarp
Host institution	Food Science, Aarhus University	PLEN, University of Copenhagen	PLEN, University of Copenhagen	PLEN, University of Copenhagen	Inst for Env engineering, Technical University of Denmark	Department of Biosciences, University of Oslo	Norwegian University of Life Sciences (NMBU)	UiT The Arctic University of Norway	LTV faculty, SLU Alnarp
Type of facility	Phenotyping and controlled environment	Controlled environment in greenhouses	Phenotyping and controlled environment	Greenhouse with controlled climate	Controlled environment	Controlled environment	Controlled environment, test fields	Controlled environment And test fields	Controlled environment
Year constructed	2012-2015	1972-1984-1996	2015	2013	1993, upgraded 2003	1973	1995-2017	1978	2016
Type and number of chambers/units, size of units	6 climate chambers, 6 full scale greenhouse cells	15 chambers	117 fixtures/plants	12 compartments ($50m^2$)	6 identical chambers are available (4 *6*3.1m)	16 artifical environments ($10m^2$). 6 conditioned natural daylight (CND; $30m^2$). 4 small chambers ($1m^2$)	22 freezing chambers (0.6-6.3m^2); 15 cooling chambers (6.3-8.8m^2); 62 greenhouse rooms (12-40m^2) 16 phytotron rooms ($12m^2$); 60 growth chambers (0.3-9m^2)	6 day light chamber (10,5m^2); 3 x 2 dark rooms (3,6m^2); 2 S3 rooms, (3,6m^2); 3 Cold rooms, (9,5m^2)	12 Climatized rooms (CR; 11.5m^2) 4 Climatized daylight rooms (DR; 14m^2) 4 Growth rooms (OR; 8m^2)), 4 Greenhouse rooms (GR; 14m^2)
Type of light sources available	LED near sun up to 900 in climate	HPS (SON-T) Minimum 100	LED and HPS (SON-T) Minimum 200	LED and HPS (SON-T) Minimum 200	Up to: 400 New LED system will be installed	Artificial environment max 300 Chamber max 400	HPI, HQI, SON-T, 50-200. LED in some chambers. Natural light in phytotron and greenhouse rooms	LED lights (0-3000, fluorescent lights max. 200 natural light in phytotrone	CR: CDM 75-600/LED 50-600; DR: assimilation lighting available; OR: T5

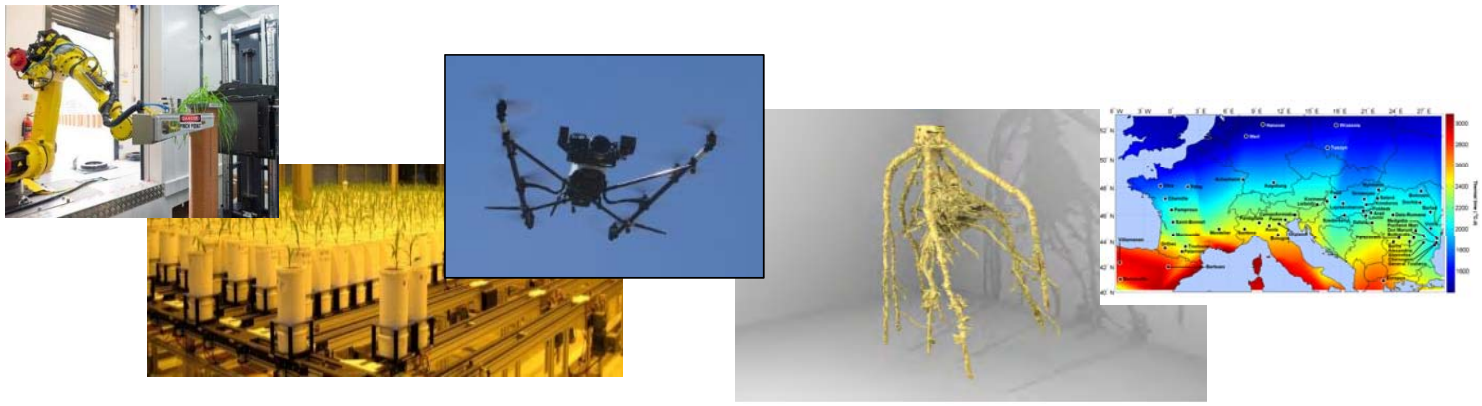
Stronger networks for Nordic plant phenotyping and controlled climates by:

- sharing research infrastructures and improving interoperability
- promoting researcher mobility
- providing controlled climate and phenotyping platforms for plant ecologists and botanists
- establishing a forum for developing low-cost phenotyping facilities
- synchronizing educational efforts
- evolving and unifying technological development
- drive innovation together with private enterprises
- opening Nordic crop repositories and sharing Nordic data
- aligning activities with European and global initiatives and networks

- **EMPHASIS-PREP**
- **6P/Nordic Plant Phenotyping Network (NPPN)**
- **NordPlant - A Climate and Plant Phenomics Hub for Sustainable Agriculture and Forest Production in Future Nordic Climates**

EMPHASIS- PREP

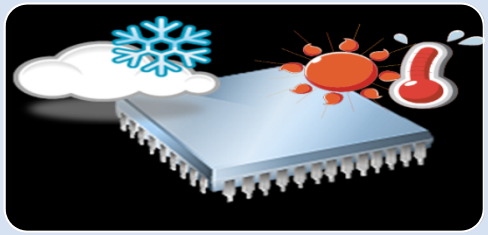
European infrastructure for **m**ulti-scale plant **ph**enotyping **a**nd **si**mulation for food **s**ecurity in a changing climate



Objectives

Develop an integrated pan-European infrastructure of instrumented phenotyping

facilities available to the user community

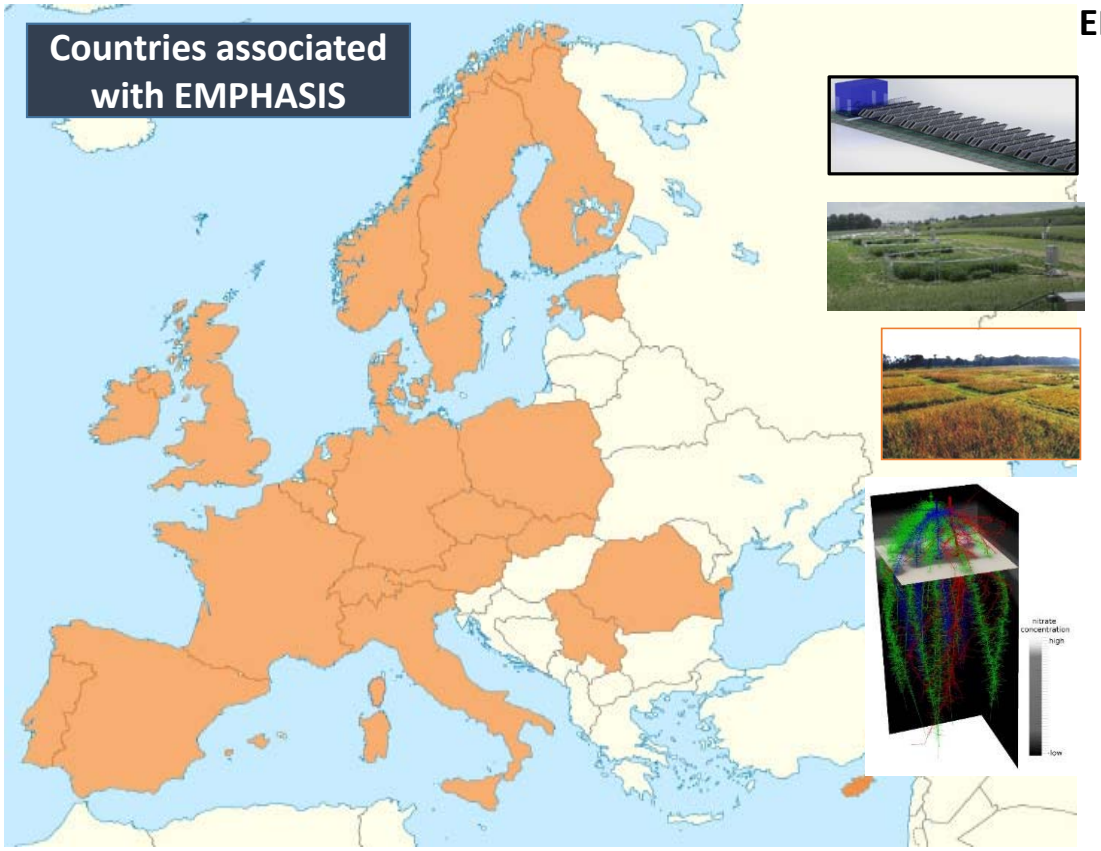


Link data acquisition to a European-level

data information system and modelling

Develop, evaluate and disseminate knowledge and novel technologies

providing innovative opportunities academia and industry



EMPHASIS infrastructure

Phenotyping platforms for high resolution, high throughput phenomics

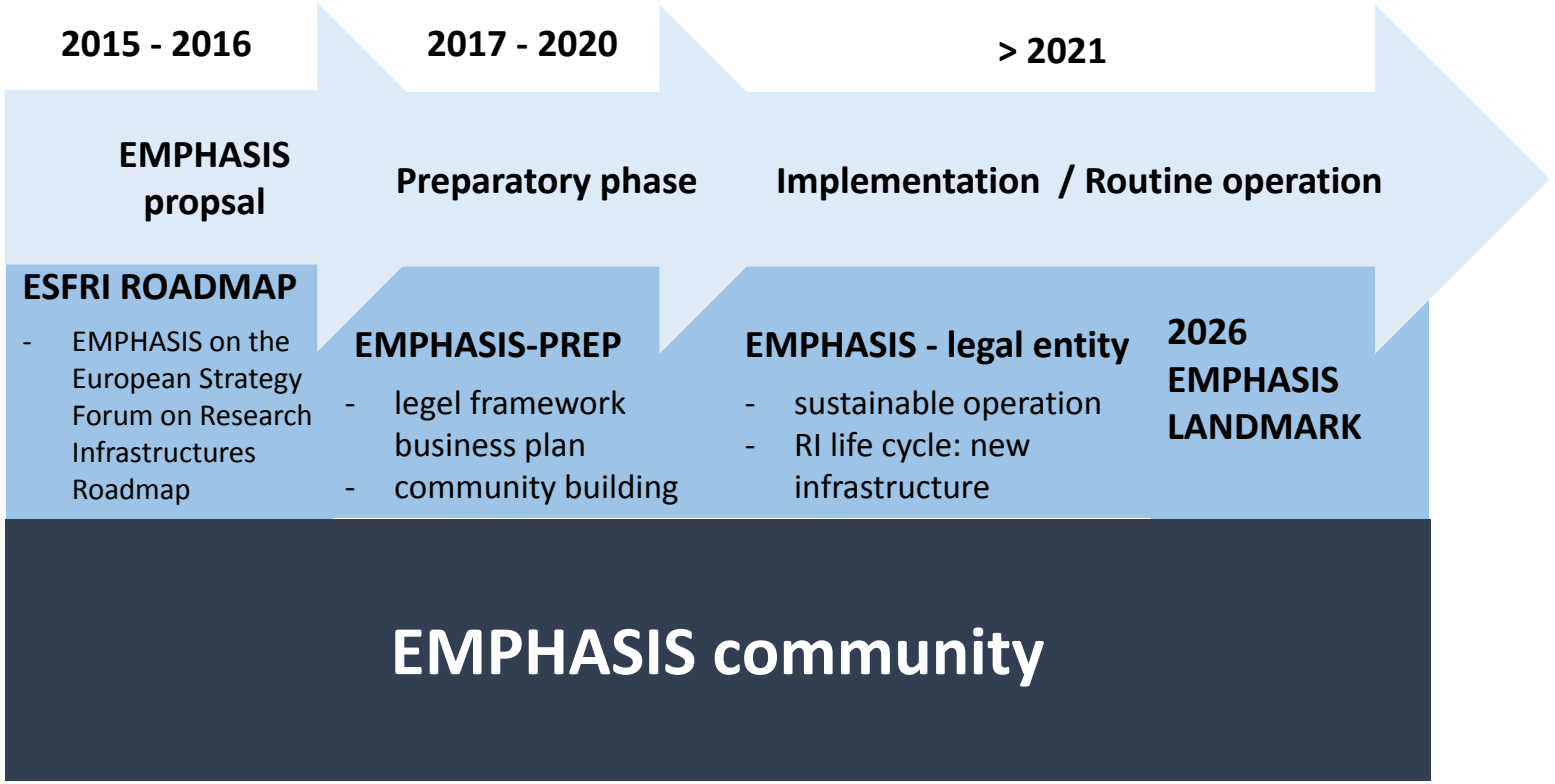
Semi-controlled field systems for high throughput phenomics

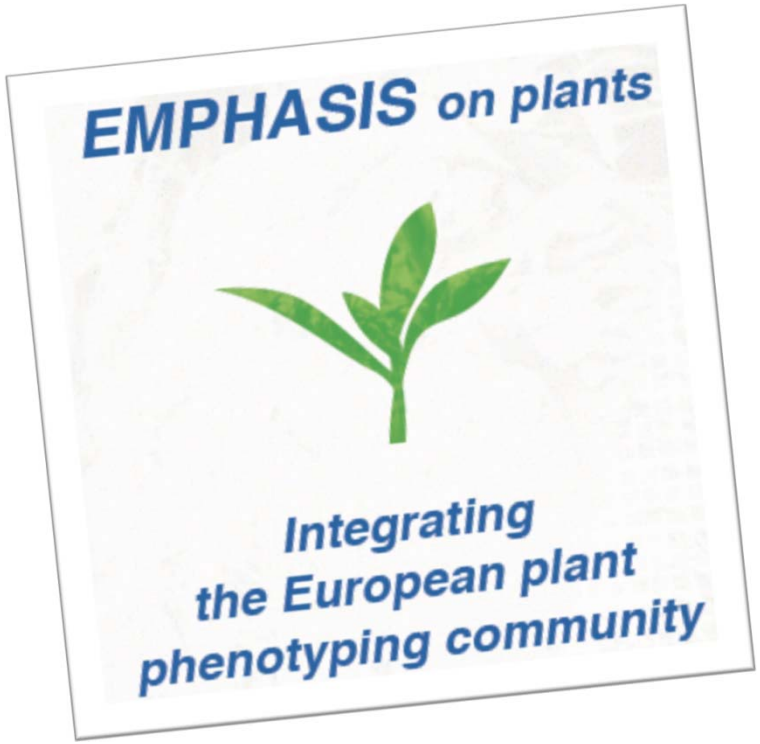
Network of practical field experiments for lean-phenotyping

Modelling platforms

Joint data management and e-infrastructure

Representatives Sweden: Erik Alexandersson and Aakash Chawade


2015 - 2016
2017 - 2020
> 2021
EMPHASIS propsal
Preparatory phase
Implementation / Routine operation
ESFRI ROADMAP
- EMPHASIS on the European Strategy Forum on Research Infrastructures Roadmap
EMPHASIS-PREP
- legel framework business plan
- community building
EMPHASIS - legal entity
- sustainable operation
- RI life cycle: new infrastructure
2026 EMPHASIS LANDMARK
EMPHASIS community



https://emphasis.plant-phenotyping.eu/

Public Private Partnership - Plant Phenotyping Project (6P2) – plant breeding

- Home
- About
- Partners
- Research
- Upcoming Events
- Past Activities
- Contact
- Networks
- Resources

NordGen

norden

Welcome to the Nordic Plant Phenotyping Network (NPPN)

The NPPN aims to become the center of Nordic Plant Phenotyping activities through the facilitation and promotion

NOVA
UNIVERSITY NETWORK

PhD course series
Phenotyping technologies in plant environment interactions: -imaging based phenotyping 10.-14.6.2019

NOVA teachers:

Erik Alexandersson SLU Alnarp Sweden

Aakash Chawade SLU Alnarp Sweden

Kristiina Himanen UHEL Finland

Hamid Khazaei

Morten Lillemo NMBU Norway

Invited teacher:

Markku Keinänen UEF Finland

PhD course series "Phenotyping Technologies in Plant-environment Interactions" 2018-2021

NOVA PhD course series "Phenotyping Technologies in Plant-environment Interactions" which is scheduled for 2018-2021:

- **2018: Integrated Analysis of Omics Data [completed]**
  Swedish University of Agricultural Sciences
- **2019: Image Based Phenotyping**
  University of Helsinki, Faculty of Agriculture and Forestry
- **2020: High Throughput Field Phenotyping**
  Norwegian University of Life Sciences
- **2021: Omics Technologies in Phenotyping**
  Agricultural University of Iceland

NOVA
UNIVERSITY NETWORK

NordPlant

Alex Koc

Ali Malik, from 3 September