APPN

Austrian Plant Phenotyping Network

Enhancing the Austrian Plant Phenotyping community . . .

Jakub Jez

APPN
Austrian Plant Phenotyping Network

Jakub Jez, Head, Plant Sciences Facility, Vienna Biocenter Core Facilities GmbH (VBCF)

Substitute: Stefanie Koemeda, Phenotyping Specialist, Plant Sciences Facility, VBCF

Stefanie Wienkoop, Ass. Prof., Faculty of Life Sciences, University of Vienna

Ilse Kranner, Univ.-Prof., Institute of Botany, University of Innsbruck

Substitute: Thomas Roach, Ass. Prof., Institute of Botany, University of Innsbruck

Gernot Bodner, Priv.-Doz., Division of Agronomy, University of Natural Resources and Life Sciences

Substitute: Boris Rewald, Ass. Prof., Institute of Forest Ecology, University of Natural Resources and Life Sciences

VBCF VIENNA BIOCENTER CORE FACILITIES

universität wien

universität innsbruck

BOKU University of Natural Resources and Life Sciences, Vienna

INITIATIVE COMMITTEE

To coordinate and unite the Austrian Plant Phenotyping community

To develop national plant phenotyping infrastructure and methods

To facilitate joined research collaborations

To support the ESFRI EMPHASIS project

To facilitate staff training and staff exchange

APPN
Austrian Plant Phenotyping Network

Organization of yearly meetings and workshops

To develop PR and lobbying strategies

Set-up a Memorandum of Understanding (MoU)

GOALS & ACTIVITIES

1st Austrian Plant Phenotyping Network (APPN) Meeting

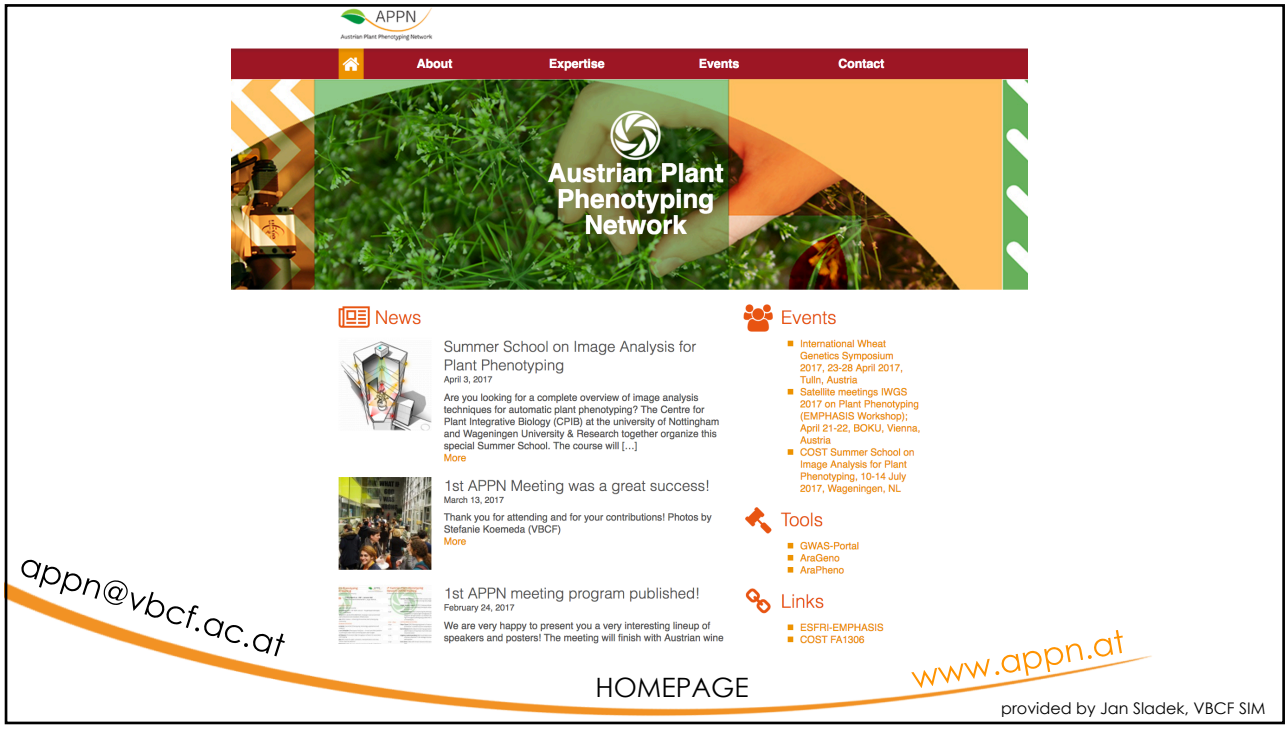
Enhancing the Austrian plant phenotyping community

Program

Friday March 10 - IMP - Lecture Hall
Campus-Vienna-Biocenter 1, 1030 Vienna

08:00 - 09:00	REGISTRATION & COFFEE
09:00	**Jakub Jez** (VBCF) Welcome words
09:10	**Magnus Nordborg** (GMI) - KEY NOTE Lecture - *The genotype-phenotype map in Arabidopsis*
09:50	**Ulrich Schurr** (FZ Jülich) ESFRI-EMPHASIS: *European multi-environment plant phenomics and simulation infrastructure*
10:30	**Jakub Jez** APPN Initiative - *Enhancing the Austrian plant phenotyping community*
11:00 - 11:30	COFFEE BREAK & POSTERS
	CHAIR: Gernot Bodner
11:30	**Marcus Jansen** (LemnaTec) Phenotyping: *technology, applications and research*
11:40	**Philipp von Gillhaußen** (Phenospex) *FieldScan – A novel semi-field platform to phenotype water traits controlling plant water budget*
11:50	**Philippe Blasquez** (Phenoware) *High-throughput software for automated phenotyping*
12:00	**Jiri Fajkus** (PSI) *Tools for plant cultivation, characterization and early stress response detection*
12:10	**Erich Birngruber** (GMI) *The past, present and future of high-performance computing in life sciences*
12:30	**Kareem Elsayad** (VBCF) *Advanced optical microscopy and spectroscopy for plant phenotyping*
12:50	**Edmundo R. Sánchez Guajardo** (VBCF) *Light sheet fluorescence microscope for long-term live imaging studies of nuclear dynamics in Arabidopsis*
13:10 - 14:10	LUNCH
	CHAIR: Thomas Roach
14:10	**Gernot Bodner** (BOKU) - KEY NOTE Lecture - *Looking beyond the visible: hyperspectral imaging and modelling to extend phenotyping insights into the plant root zone*
14:50	**Stefanie Wienkoop** (UniVie) *Subcellular phenotyping: Establishment of a Proteomics based approach linking quantitative subcellular protein and organelle distribution analyses of P. sativum cultivars*
15:10	**Veronika Balakhonova** (CEITEC) *Non-invasive real-time imaging of chlorophyll biosynthesis during early stages of Arabidopsis deetiolation*
15:30	**Abigail Rubiato Cuyacot** (CEITEC) *Studying ethylene effects in chambers for Arabidopsis seedlings phenotype analyses under defined atmosphere*
15:50	**Stefanie Koemeda** (VBCF) *Improving the phenotyping data variability: A comparison of spatial light homogeneity of different custom designed LED light panels in a chamber-integrated, high-throughput phenotyping system and its phenotypic effects on Arabidopsis.*
16:10 - 16:40	COFFEE BREAK & POSTERS
	CHAIR: Stefanie Wienkoop
16:40	**Pieter Clauw** (GMI) *Phenotyping growth of natural Arabidopsis thaliana accessions in Swedish autumn temperatures*
17:00	**Boris Rewald** (BOKU) *Machine learning approaches allow for determination of important root traits and enhance cultivar characterization*
17:20	**Angelika Czedik-Eysenberg** (GMI) *Automated visual phenotyping and infection prediction in the Ustilago bromivora - Brachypodium spp. pathosystem*
17:40	**Ümit Seren** (GMI) *GWA-Portal: Genome wide association studies made easy*
18:00	CONCLUDING REMARKS

WINE and live MUSIC by Doug Andrews

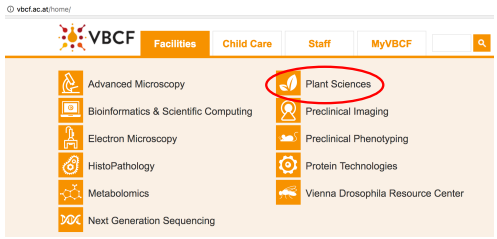


HOMEPAGE

provided by Jan Sladek, VBCF SIM

Vienna Biocenter Core Facilities GmbH (VBCF)

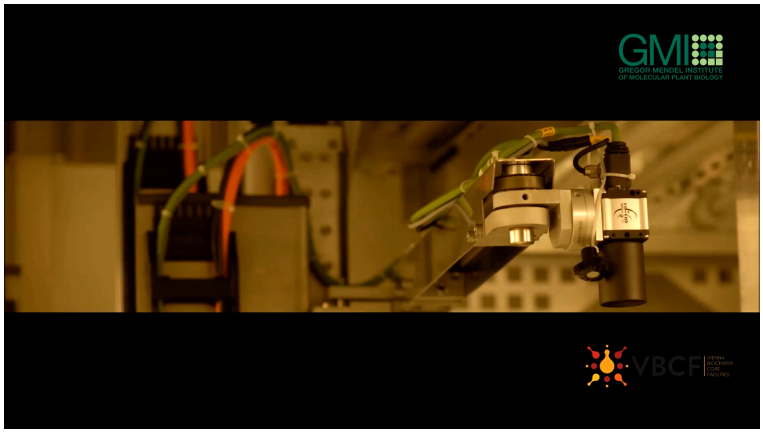
VBCF PlantS: HT RGB phenotyping platform



Environmental simulation & HT phenotyping

23 state-of-the-art phytotrons:

- 4 Frost phytotrons (-15C - +50C)
- 3 LED phytotrons
- 2 CO2 phytotrons
- 1 pathogen phytotron
- 1 HT phenotyping phytotron



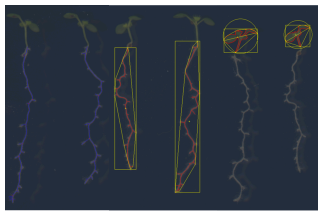
PHENOTYPING LANDSCAPE AT

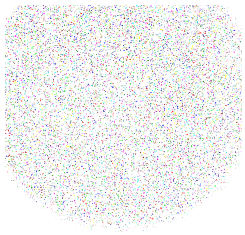
www.vbcf.ac.at/plants

Vienna Biocenter Core Facilities GmbH (VBCF)

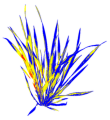
Custom phenotyping and image analysis

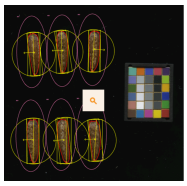

Seedlings

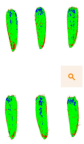

Roots




Side-view RGB




Seeds




Microscopy

Contact:
Stefanie Koemeda, MSc, MA

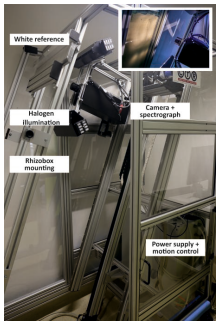
VBCF GmbH, PlantS
Dr. Bohr Gasse 3
1030 Vienna
stefanie.koemeda@vbcf.ac.at
Tel: +43 1 7962324 - 7090

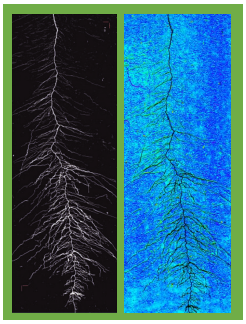
PHENOTYPING LANDSCAPE AT

www.vbcf.ac.at/plants

University of Natural Resources and Life Sciences (BOKU)

Platform Bodner: Hyperspectral Root Phenotyping





Rhizobox size: 30 x 100 x 1 (-3) cm
Rhizobox number: 30
Illumination: Atum Horti 600 LED (450 mmol m^{-2} s^{-1})
Environmental control: Temperature, rH, ligh

Spectral range: 900-1700 nm
Spectral resolution: 3 nm
Spatial resolution: 100 mm
Illumination: Halogen spots
Scan duration: 16 min
Software: Matlab scripts
Image size: 14 GB

- Spectral based root segementation (left)
- Water mapping (right)
- Exploration of other spectral features in roots (e.g. root age) and soil
- Combination with aboveground measurements (non-destructive: leaf area, stomata conductance, SPAD)

Universität für Bodenkultur Wien
University of Natural Resources and Applied Life Sciences, Vienna

Contact:
Priv.-Doz. Gernot Bodner

Division of Agronomy
Konrad Lorenz-Straße 24
3430 Tulln an der Donau
gernot.bodner@boku.ac.at
Tel: +43 1 47654-95115

PHENOTYPING LANDSCAPE AT

University of Natural Resources and Life Sciences (BOKU)

Platform Rewald: Manual Root Phenotyping

APPN
Austrian Plant Phenotyping Network

- Greenhouse & Phytotron

- Seedlings to mature crop plants
- Root morphology, symbiont-root interactions, physiological parameters
- Machine learning trait analysis approaches

BOKU
EUROLEGUME 2014-2017

Contact:
Ass.Prof. Boris Rewald

Institute of Forest Ecology
Peter-Jordan-Straße 82
1190 Vienna
boris.rewald@boku.ac.at
Tel: +43 1 47654-91219

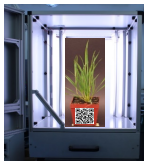
PHENOTYPING LANDSCAPE AT

Gregor Mendel Institute of Molecular Plant Biology (GMI)

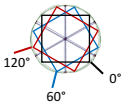
"Phenobox"

APPN
Austrian Plant Phenotyping Network

Angelika Czedik-Eysenberg
Sebastian Seitner



Identify plant by QR-Code (data retrieved from server)



Images taken (e.g. six images from 60° angles)

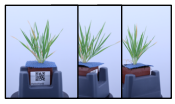
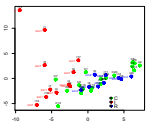


Image conversion and preperation for feature extraction

LemnaTec
or
IAP

Segmentation and feature extraction

GMI
GREGOR MENDEL INSTITUTE
MENDEL CLUSTER



Compare classes and/or predict phenotype

GMI
GREGOR MENDEL INSTITUTE
OF MOLECULAR PLANT BIOLOGY

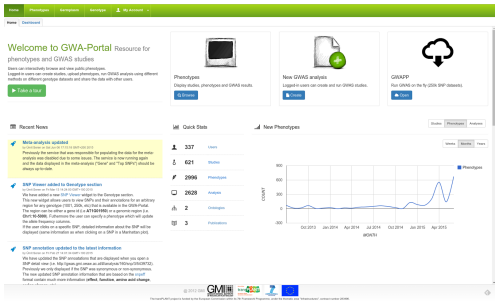
Contact:
Dr. Armin Djamei

Gregor Mendel Institute of
Molecular Plant Biology GmbH
Dr. Bohr Gasse 3
1030 Vienna
armin.djamei@gmi.oeaw.ac.at
Tel: +43 1 79044-9812

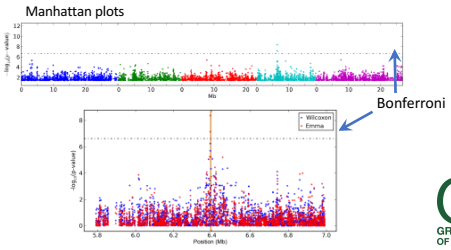
PHENOTYPING LANDSCAPE AT

Gregor Mendel Institute of Molecular Plant Biology (GMI)

GWA-Portal by Ümit Seren:
Resource for phenotypes, GWAS results, genotypes and germplasm



Example: Sodium concentration measured in *A. thaliana* leaves.



https://gwas.gmi.oeaw.ac.at

- 660 registered users
- 8000 phenotypes
- 35M Top SNPs

Other Tools:
AraGeno
ArePheno
Links on www.appn.at

Contact:
Ümit Seren

Gregor Mendel Institute of Molecular Plant Biology GmbH
Dr. Bohr Gasse 3
1030 Vienna
uemit.seren@gmi.oeaw.ac.at
Tel: +43 1 79044-9510

PHENOTYPING LANDSCAPE AT

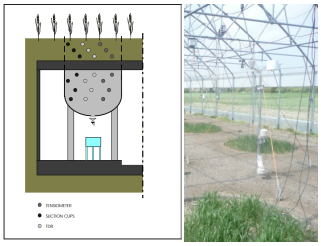
Austrian Agency for Health & Food Safety (AGES)

Experimental Facilities and Field Trials

SARANHOUSE

- 265 m²
- Outdoor conditions
- Pots or trays in all sizes
- Protected from vectors
- Frost-proof floor

LYSIMETER PLATFORM



- 18 lysimeters
- 3 different soil types
- Rain shelter
- Sprinkler system
- Tipping bucket
- Suction cups
- Pressure transducer Tensiometer (incl. temperature)
- Time-Domain Reflectrometry (TDR)

MOVABLE GREENHOUSE

- 600 m²
- Field conditions
- Soil cultivation with machinery (e.g. tractor)
- Moveable shelter (rain)

Contact:
Mag. Bernhard Föger

Austrian Agency for Health & Food Safety
Spargelfeldstraße 191
A-1220 Wien
Tel. +43 (0) 50555-34200
bernhard.foeger@ages.at
Tel: +43 1 79044-9510

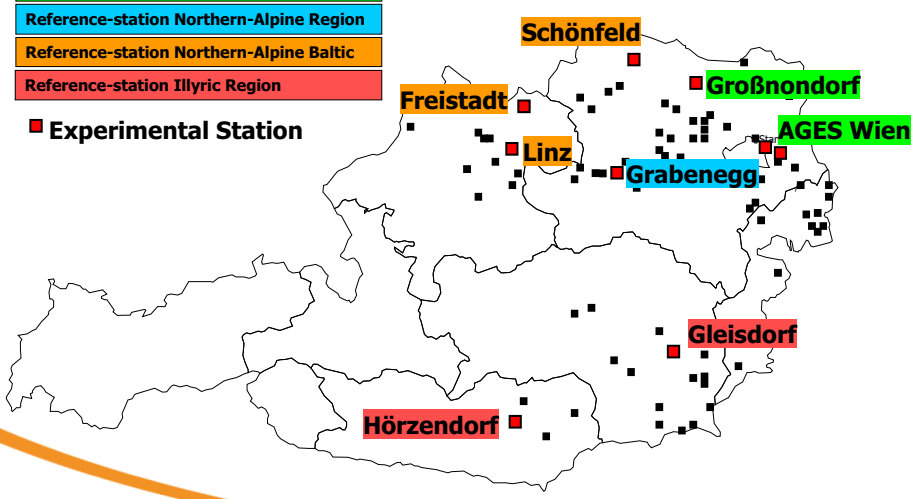
PHENOTYPING LANDSCAPE AT

Austrian Agency for Health & Food Safety (AGES)

Field Trials and Experimental Facilities

APPN
Austrian Plant Phenotyping Network

- Reference-station Pannonic Region
- Reference-station Northern-Alpine Region
- Reference-station Northern-Alpine Baltic
- Reference-station Illyric Region
- Experimental Station



AGES
Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH

Contact:
Mag. Bernhard Föger

Austrian Agency for Health
& Food Safety
Spargelfeldstraße 191
A-1220 Wien
Tel. +43 (0) 50555-34200
bernhard.foeger@ages.at
Tel: +43 1 79044-9510

PHENOTYPING LANDSCAPE AT

APPN
Austrian Plant Phenotyping Network

THANK YOU FOR YOUR ATTENTION!

Jakub Jez
Head, Plant Sciences Facility
Vienna Biocenter Core Facilities GmbH

Dr. Bohr Gasse 3
1030 Vienna
jakub.jez@vbcf.ac.at
www.vbcf.ac.at/plants
www.appn.at
@VBCF_PlantS

EMPHASIS

cost
EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY
EU COST ACTION FA 1306

PhenomenAll COST

AGES
Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH

VBCF Vienna BioCenter Core Facilities

universität wien

universität innsbruck

BOKU University of Natural Resources and Life Sciences, Vienna

RI AT CZ

Interreg Austria-Czech Republic
European Regional Development Fund

LemnaTec

PHENOSPEX

Phenoware
phenoware.fr

Photon Systems Instruments

campus vienna BIOCENTER

2nd APPN MEETING @BOKU MARCH 2018!

www.appn.at


APPN
Austrian Planet Phenotyping Network
1st Austrian Plant Phenotyping Network Meeting
APPN
IMP
EMPHASIS
JÜLICH
UNI GRAZ
TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology
universität wien
VBCF
BOKU
universität innsbruck
PALACKÝ UNIVERSITY OLOMOUC
WPI
GMI
GREGOR MENDEL INSTITUTE OF MOLECULAR PLANT BIOLOGY
IST AUSTRIA
Institute of Science and Technology
SAATZUCHT DONAU
CEITEC
Central European Institute of Technology
BRNO | CZECH REPUBLIC
IAEA
International Atomic Energy Agency
AGES
Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH
AIT
AUSTRIAN INSTITUTE OF TECHNOLOGY
campus vienna BIOCENTER
Sponsors
RI AT CZ
Interreg
Austria-Czech Republic
European Regional Development Fund
LemnaTec
PHENOSPEX
Phenoware
phenoware.fr
Photon Systems Instruments