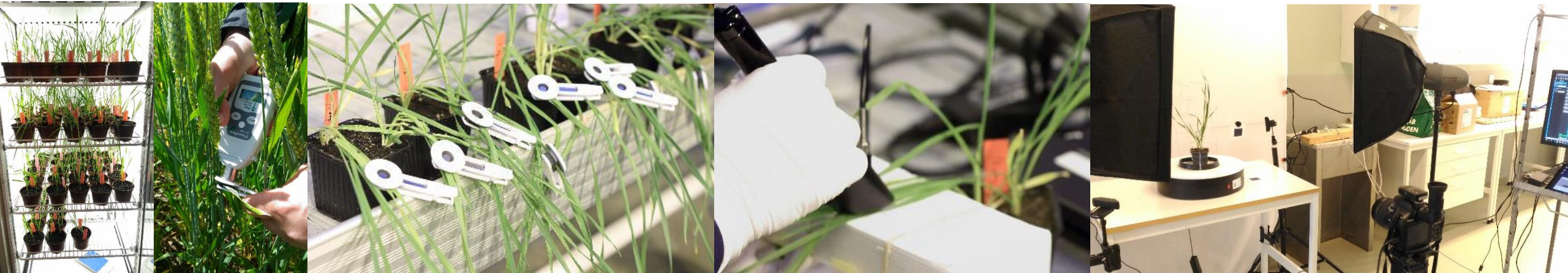


Biotron and low-cost phenotyping

Aakash Chawade

Department of Plant Breeding
SLU, Alnarp





NordPlant

NordPlant partner universities and infrastructure



Större SLU-orter

- 1 UPPSALA
- 2 SKARA
- 3 ALNARP
- 4 UMEÅ

Orter med utbildning

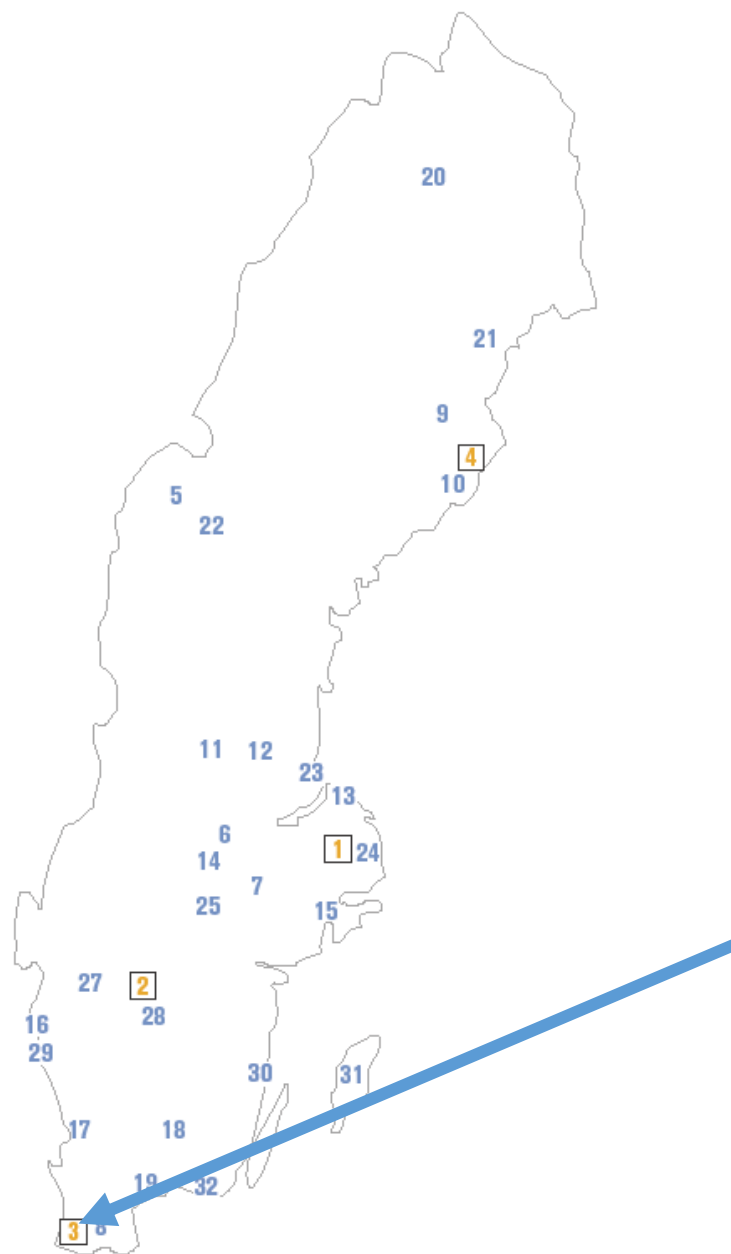
- 5 Wången
- 6 Skinnskatteberg
- 7 Strömsholm
- 8 Flyinge

Orter med forskningsaktiviteter

- 9 Vindeln
- 10 Röbbäcksdalen
- 11 Siljansfors
- 12 Jädraås
- 13 Öregrund
- 14 Grimsö
- 15 Drottningholm
- 16 Lysekil
- 17 Tönnersjöheden
- 18 Åsa
- 19 Balsgård

Forskningsstationer och gårdar

- 20 Ätnarova
- 21 Öjebyn
- 22 Ås
- 23 Älvkarleby
- 24 Funbo-Lövsta
- 25 Örebro
- 27 Lanna
- 28 Götala
- 29 Väröbacka
- 30 Simpevarp
- 31 Stens tugu/Hallfreda
- 32 Karlskrona



Swedish University of Agricultural Sciences (SLU)

Campus Alnarp



The Biotron: Highly controlled growth facility

Climate Rooms

Lighting

Metal ceramic 75-600 $\mu\text{mol m}^{-2} \text{s}^{-1}$

LED 50-600 $\mu\text{mol m}^{-2} \text{s}^{-1}$

Temperature

-5-45 °C \pm 0.1-0.2 °C

Humidity:

30-90 %

Daylight Rooms

Assimilation lighting available

Temperature

6-35 \pm 0.1-0.3 °C

Humidity

30-90 %

Greenhouse Rooms

Assimilation lighting available

Temperature: Upto +20 °C at -20 °C outside

Climate Rooms with LED lights

Growth Rooms

Lighting

T5 fluorescent tubes
50 – 250 $\mu\text{mol m}^{-2} \text{s}^{-1}$

Temperature

5-35 °C \pm 0.5 °C

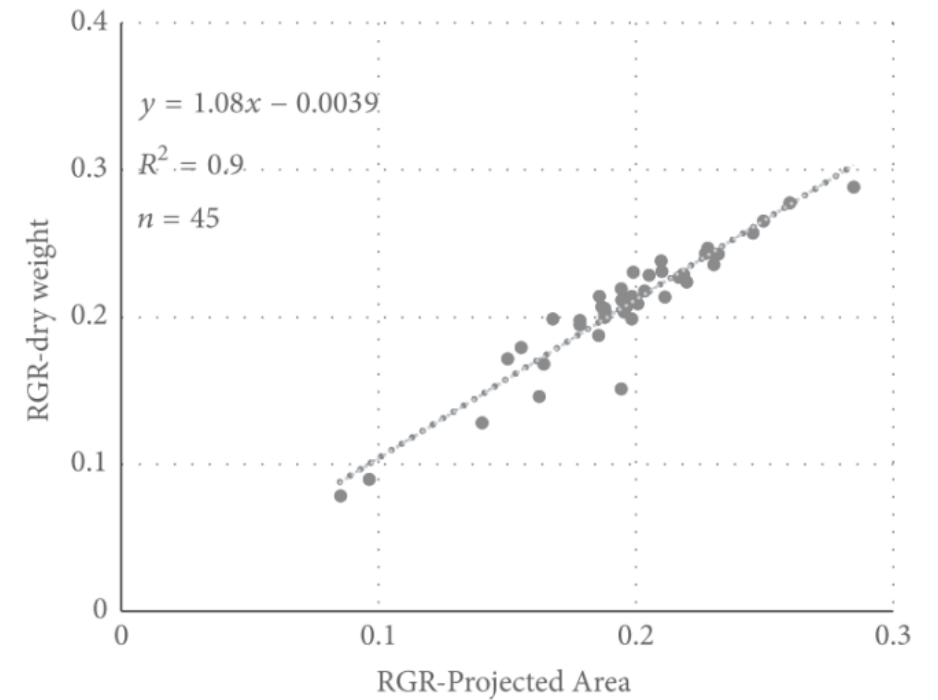
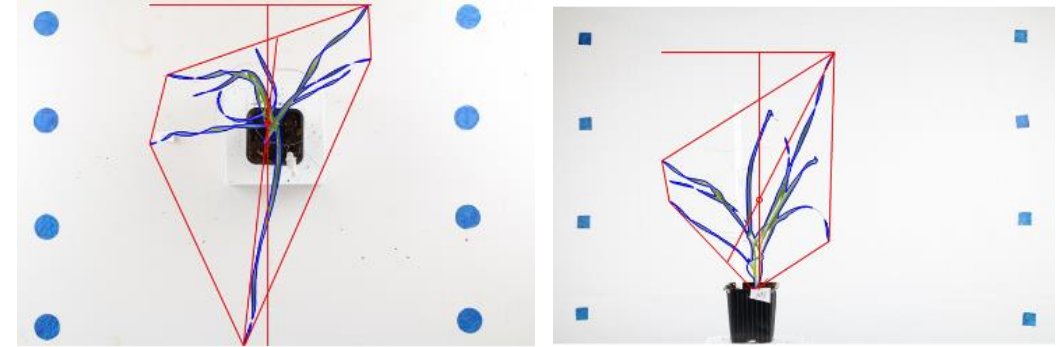
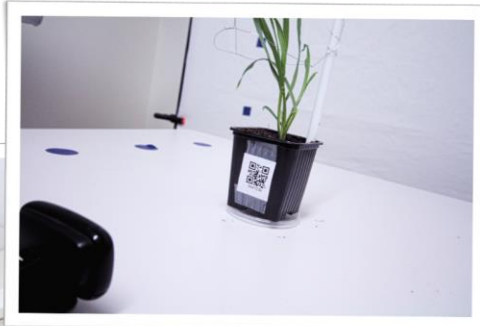


How is Biotron used in the NordPlant project?

1. Controlled plant infections – wheat, potato
2. Early vigour of roots and shoots in wheat
3. Drought stress in wheat
4. Correlation with field studies
5. More projects to be initiated.....

Indoor Low-cost imaging for small scale experiments

Imaging system
+
Data analysis pipeline



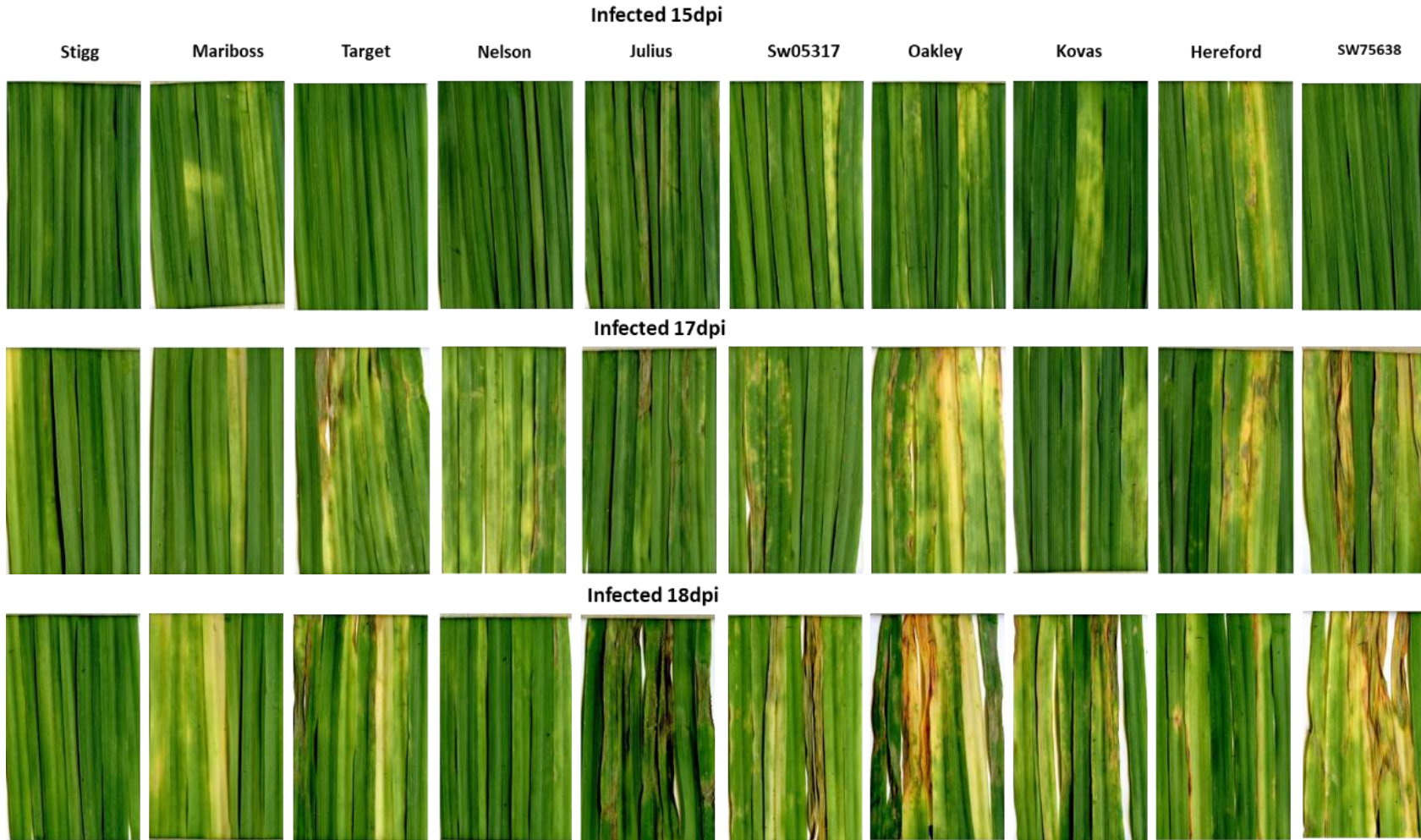
Armoniené et al. (2018)



Biotron: Growth Rooms

Phenotyping STB with sensors

- Infection of 10 winter wheat cultivars under controlled conditions



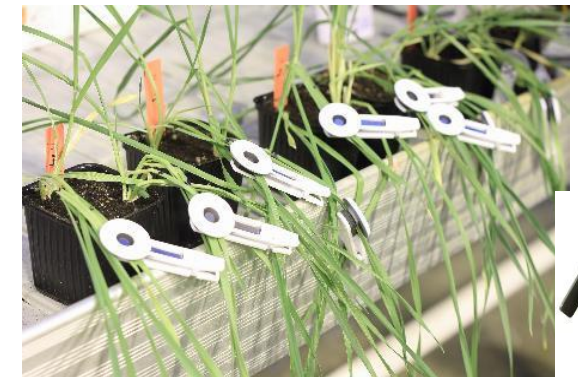
Surface temperature



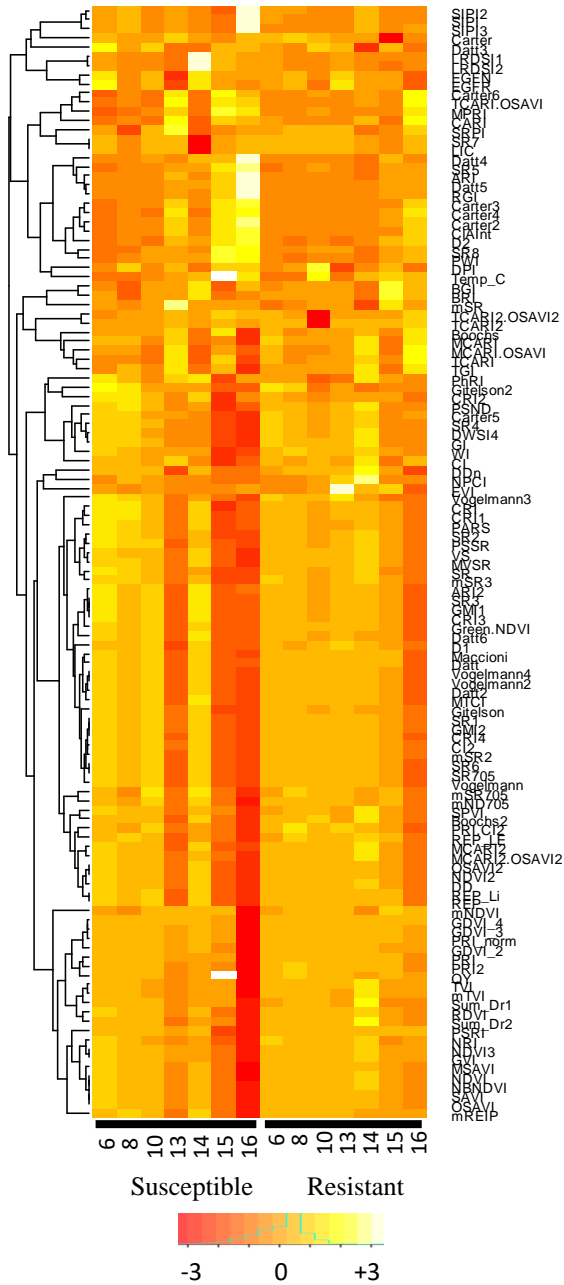
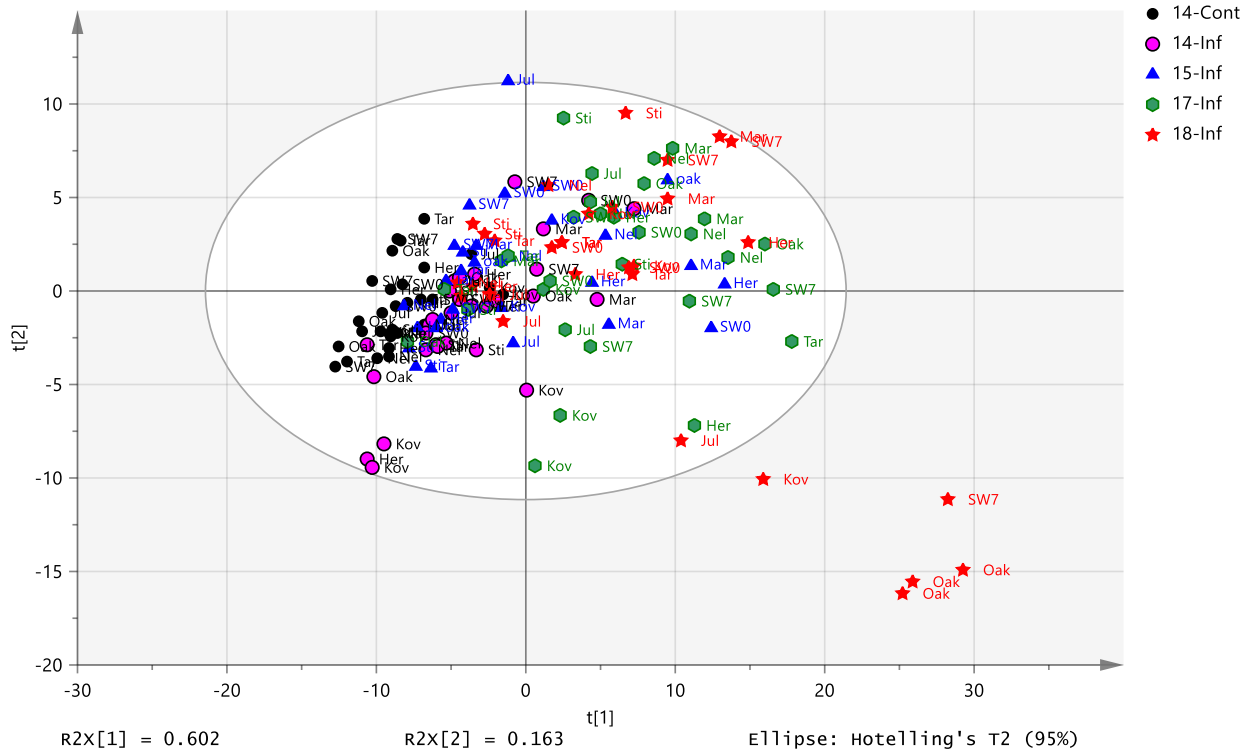
Spectroradiometer (400 – 1000 nm)



Chlorophyll Fluorescence



PCA 10 varieties



Odilbekov et al. 2018

www.specalyzer.org: Visualizing phenotypic data in the field

Spectral Plots

www.specalyzer.org

- Calculates 120 vegetation indices
- Multivariate analysis
- User friendliness
- Open-source
- Target users:
breeders, biologists, agronomists

