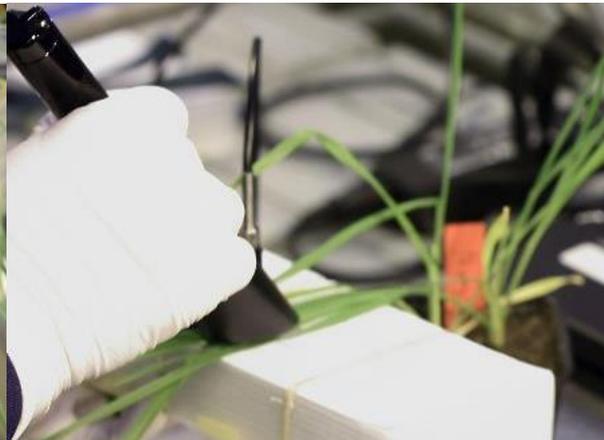
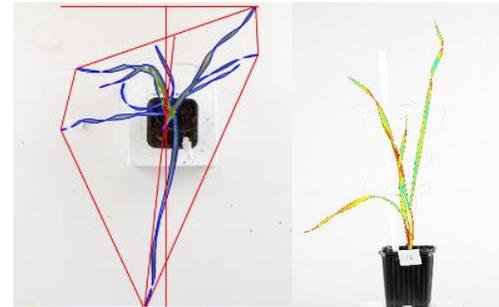


Proximal phenotyping

Activities within 6P2

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Department of Plant Breeding
SLU, Alnarp



Summary of activities:

- A review article on high-throughput field phenotyping methods for plant breeding and farming (Chawade et al. 2019)
- Phenotyping for drought tolerance in wheat under field and controlled conditions (Kumar et al. 2020)
- Three-year field trial with Nordgen winter wheat genotypes (2018-2020), 1-4 locations/year. Collaborating partners KU, SLU, LAMMC, ETKI, AU, Lantmännen and Nordgen.
 - Phenotyping with Phenocart and drones
 - Data analysis ongoing
 - Disease detection done in trials from Sweden



SLU

Gintaras Brazauskas, LAMMC



The Phenocart Project In a Nutshell

- Two **winter wheat** populations:
 1. 176 Nordic winter wheat cultivars, and landraces from Nordic genebank (Nordgen)
 2. Lantmännen's winter wheat advanced breeding material
- Traditional visual disease score assessments for two foliar wheat diseases: **Yellow rust** and **Septoria tritici blotch**
- Digital sensor data collected using the **phenocart**
 - RGB and NIR-modified DSLRs
 - Non-imaging spectroradiometer (320 – 840nm)

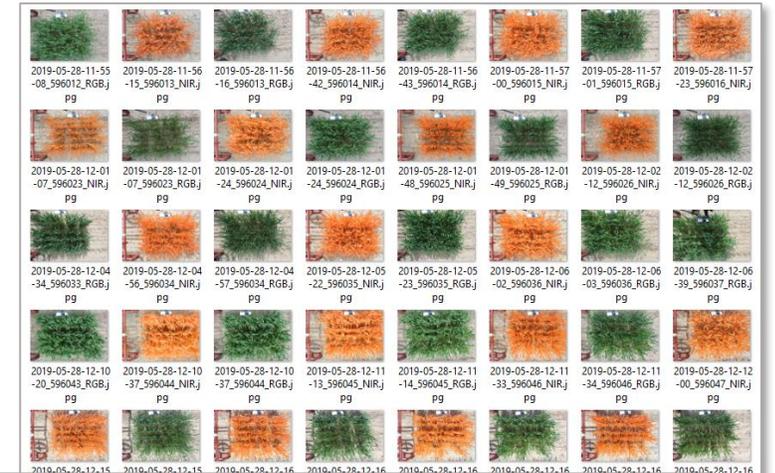


Datum	Försök	Lokalitet	RGB	NIR	Spectral	3D
2019-04-12	Nordgen	Svalöv	X			
2019-04-17	Nordgen	Tystofte	X	X		
2019-04-24	Nordgen	Svalöv	X	X		
2019-04-30	Nordgen	Tystofte	X	X		
2019-05-07	Nordgen	Svalöv	X	X		
2019-05-08	JFobs	Svalöv	X	X		
2019-05-23	Nordgen	Svalöv	X	X		
2019-05-24	JFobs	Svalöv	X	X		
2019-05-28	Nordgen	Svalöv	X		X	
2019-05-29	JFobs	Svalöv	X	X		
2019-05-29	Nordgen	Svalöv	X		X	
2019-06-07	Nordgen	Svalöv	X	X		
2019-06-08	Nordgen	Svalöv			X	
2019-06-20	JFobs	Svalöv			X	
2019-06-26	Nordgen	Svalöv	X	X	X	
2019-06-28	JFobs	Svalöv	X	X	X	
2019-07-02	Nordgen	Svalöv	X	X	X	
2019-07-03	JFobs	Svalöv	X	X	X	
2019-07-11	Nordgen	Svalöv				X



Work done so far

- Two year's worth of data collection concluded in July 2020
- Management of large data set largely done
 - Work remaining on processing imaging data collected in 2020
- Ongoing model evaluation for within-date and across year predictions of yellow rust disease severity based on spectral sensor data

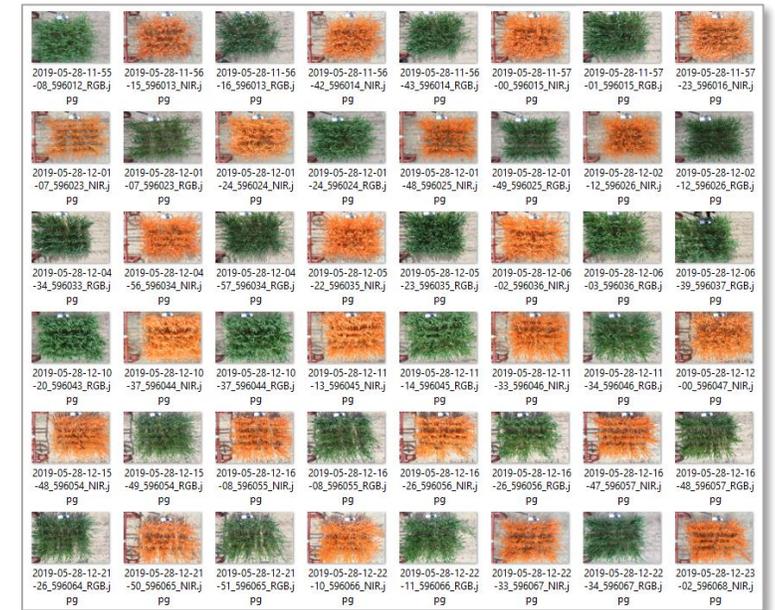


```
Console Terminal Jobs x
C:/Alexander/Projects/05-FieldDataAnalysis-2019/
> "data/2019-08-14_spectral-data.csv" %>%
+ read_csv(col_types = "ciccc") %>%
+ filter(trial == "Nordgen") %>%
+ filter(date == "2019-06-26")
# A tibble: 425 x 5
  path                                identifier_2019 trial date location
  <chr>                                <int> <chr> <chr> <chr>
1 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596001.csv 596001 Nordgen 2019-06-26 Svalov-SE
2 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596002.csv 596002 Nordgen 2019-06-26 Svalov-SE
3 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596003.csv 596003 Nordgen 2019-06-26 Svalov-SE
4 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596004.csv 596004 Nordgen 2019-06-26 Svalov-SE
5 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596005.csv 596005 Nordgen 2019-06-26 Svalov-SE
6 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596006.csv 596006 Nordgen 2019-06-26 Svalov-SE
7 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596007.csv 596007 Nordgen 2019-06-26 Svalov-SE
8 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596008.csv 596008 Nordgen 2019-06-26 Svalov-SE
9 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596009.csv 596009 Nordgen 2019-06-26 Svalov-SE
10 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596010.csv 596010 Nordgen 2019-06-26 Svalov-SE
# ... with 415 more rows
```



Remaining work

- Bring imaging data from this year into models
- Evaluate performance of models when predicting scores from different years
 - 2019 ↔ 2020



```
Console Terminal Jobs
C:/Alexander/Projects/05-FieldDataAnalysis-2019/
> "data/2019-08-14_spectral-data.csv" %>%
+ read_csv(col_types = "ciccc") %>%
+ filter(trial == "Nordgen") %>%
+ filter(date == "2019-06-26")
# A tibble: 425 x 5
  path identifier_2019 trial date location
  <chr> <ints> <chr> <chr> <chr>
1 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596001.csv 596001 Nordgen 2019-06-26 Svalov-SE
2 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596002.csv 596002 Nordgen 2019-06-26 Svalov-SE
3 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596003.csv 596003 Nordgen 2019-06-26 Svalov-SE
4 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596004.csv 596004 Nordgen 2019-06-26 Svalov-SE
5 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596005.csv 596005 Nordgen 2019-06-26 Svalov-SE
6 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596006.csv 596006 Nordgen 2019-06-26 Svalov-SE
7 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596007.csv 596007 Nordgen 2019-06-26 Svalov-SE
8 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596008.csv 596008 Nordgen 2019-06-26 Svalov-SE
9 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596009.csv 596009 Nordgen 2019-06-26 Svalov-SE
10 hyperspectral/svalov-SE/Nordgen/2019-06-26/2019-06-26_Nordgen_596010.csv 596010 Nordgen 2019-06-26 Svalov-SE
# ... with 415 more rows
```

Thank you for your
attention!

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