

High throughput phenotyping for assessment of bacterial blight in field pea

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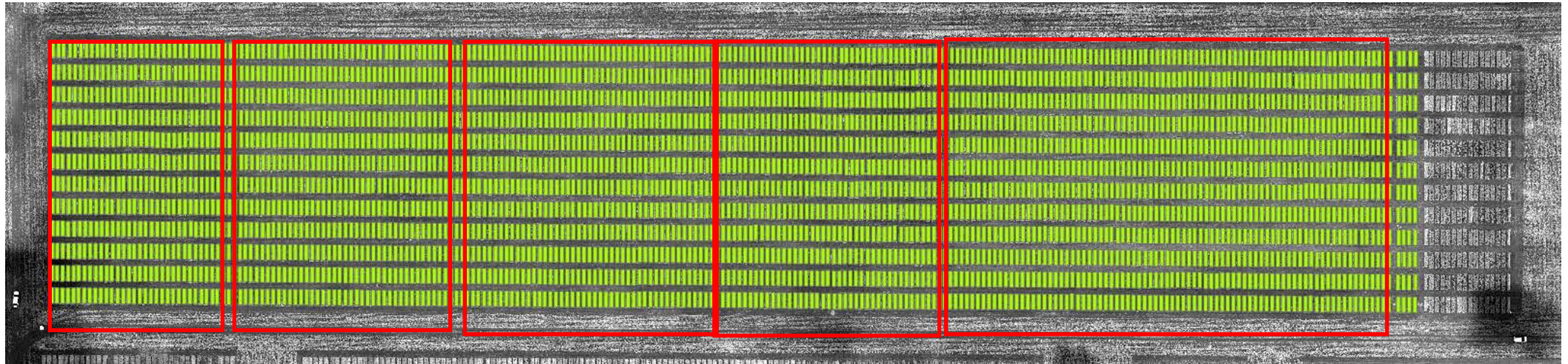
Grains Innovation Park, 110 Natimuk Road, Horsham VIC 3400

Introduction

- 2018 field pea trials at Horsham
- Severe natural epidemic of bacterial blight
- High throughput phenotyping
 - 1 unmanned aerial vehicle (UAV), NDVI, from 5 trials
 - 18 NDVI scores using CropCircle from 2 trials
- Visual scoring of the disease 1-10 scale, 1=R; 10=VS
- Plot yield data from the 5 trials



The Field Trials

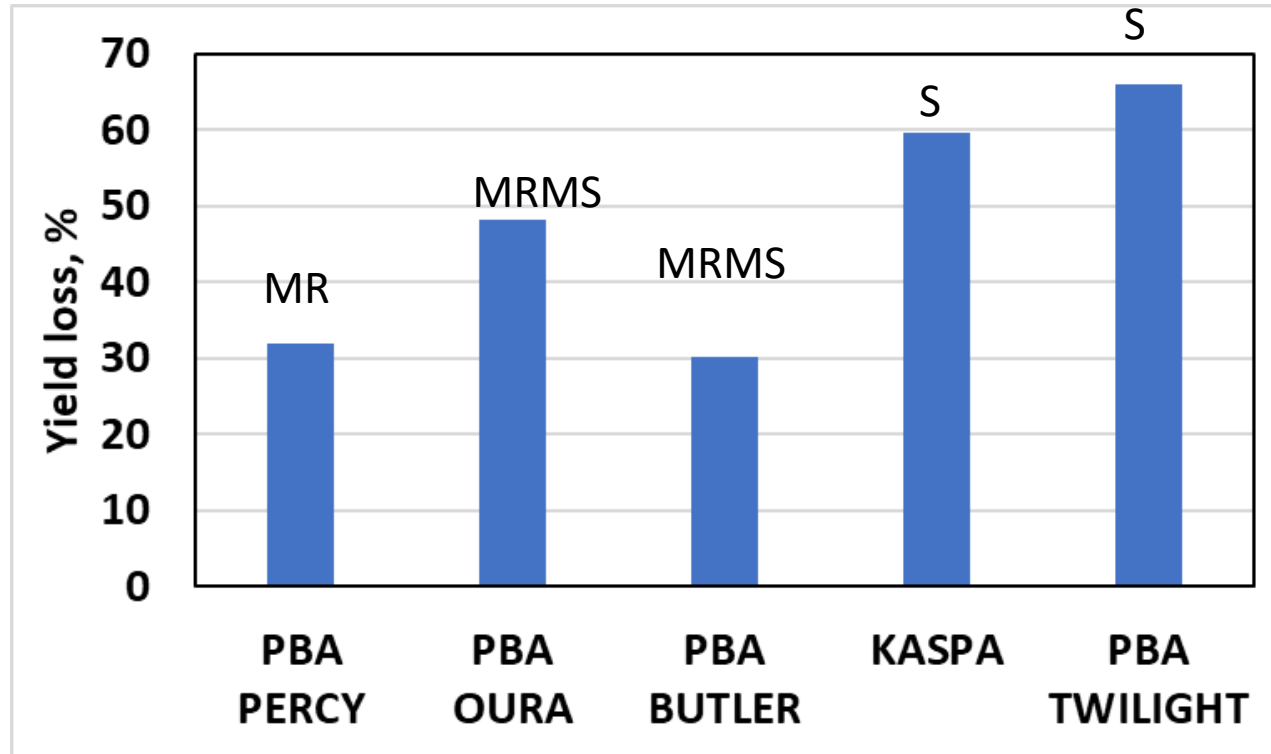


	stage3	Stage2	Stage1	PHIST	Stage0
Plots	288	480	840	132	960
Aerial NDVI	1	1	1	1	1
Handheld NDVI	0	18	0	18	0
Visual scores	2	2	2	2	2

Total 2,700 plots

Results

Effects on yield



Varieties S to bacterial blight suffered much higher yield losses than MR and MRMS varieties

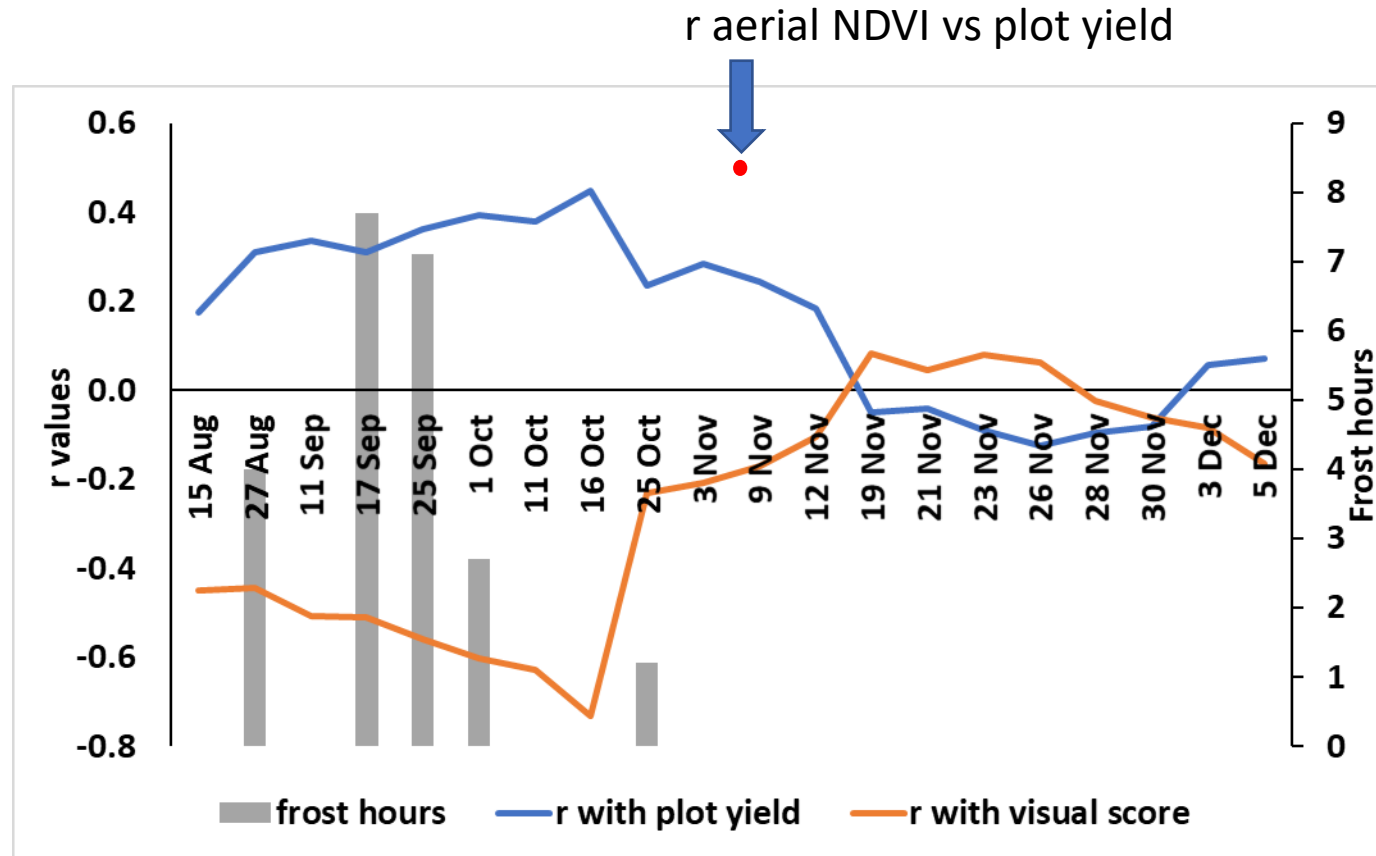
Correlations

Trial	Aerial NDVI vs plot yield
P0HO18	0.778**
PHISTHO18	0.504**

Trial	Visual score vs Plot yield
P0HO18	-0.622**
PHISTHO18	-0.324**

Aerial NDVI had stronger r with plot yield than visual scores did.

Correlations of NDVI with plot yield and visual scores of disease



NDVI captured bacterial blight followed by frost events.

Critical r (0.05) = 0.144

Discussion and Conclusion

- Significant yield losses in varieties S to bacterial blight
- NDVI could be used to assess bacterial blight in field pea under natural conditions.
- Application of HTP technologies with UAV improved efficiency and accuracy of disease assessment.
- Other indices?

Tar spot complex vs yield of maize (Loladze et al. 2019)

Index	R ²
NDVI	0.76*
Renormalized DVI	0.79*
Opt. soil adj. VI	0.79*
MCARI1	0.79*
MCARI2	0.81*
Canopy temp.	0.81*

