

Tillage – variety interactions

- a. Varieties are selected for high input, high soil disturbance by breeders and in RL
- b. Varieties can respond differentially to low soil disturbance (/reduced inputs)
- c. We need to a) identify such varieties, b) find out why they respond differently, c) breed and d) assess varieties for different 'on-farm' conditions
- d. Certain varieties are more resilient under stress conditions
- e. Likely to relate to root characteristics and other traits

Direct

Plough

Direct

Plough

Direct

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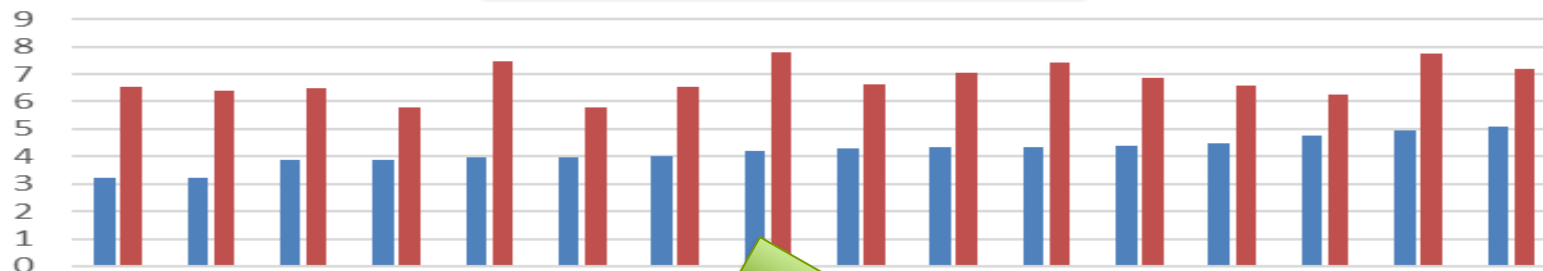
2018

Yield ranking of varieties under different tillage



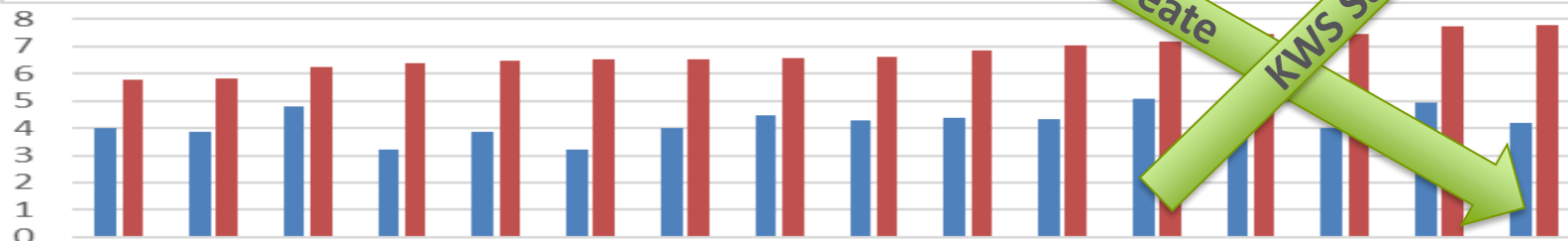
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Ordered by direct drill yield:
BLUE bars



■ direct ■ plough

Ordered by plough yield:
RED bars

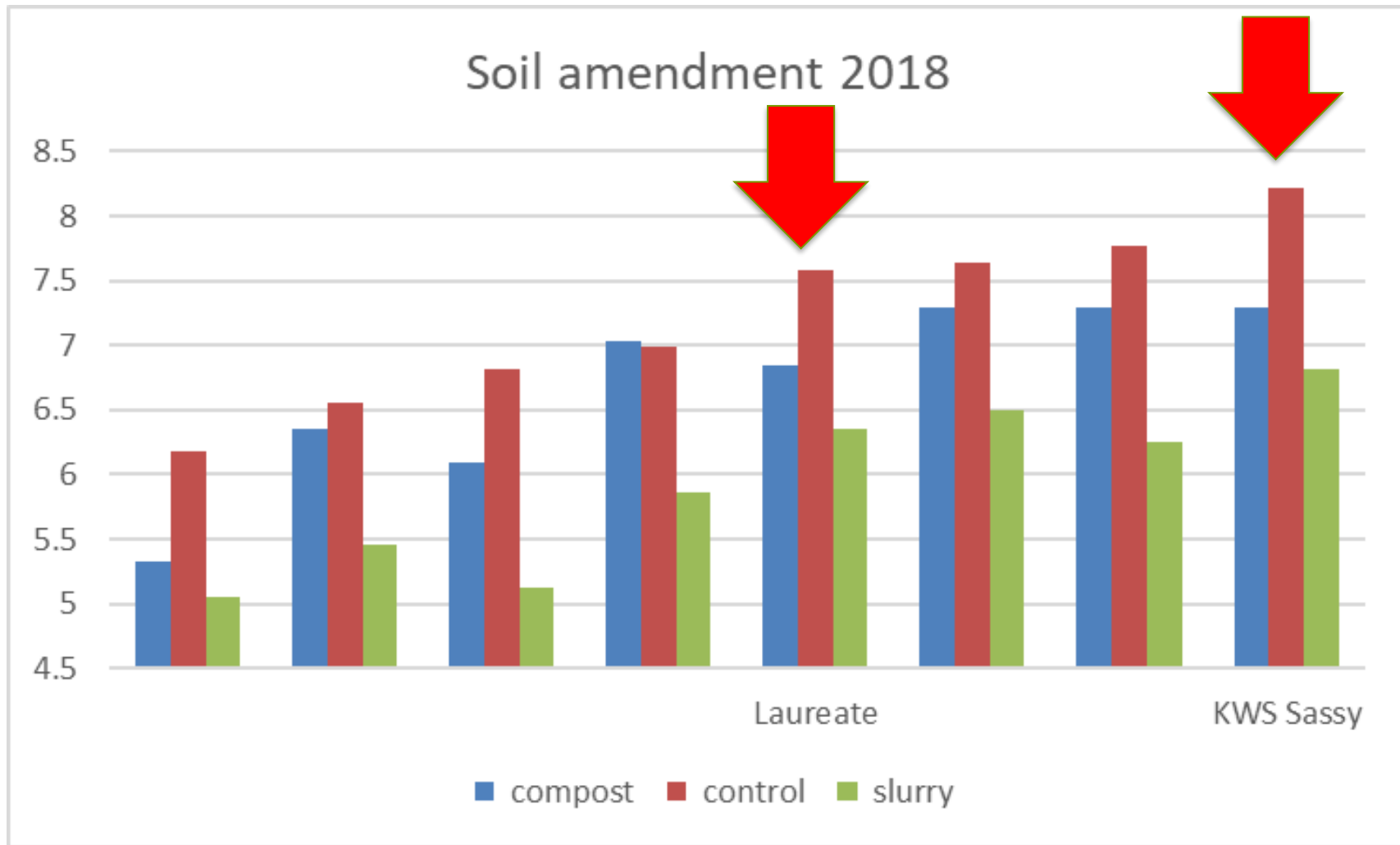


Variety yield rankings change depending on tillage methods. E.g. KWS Sassy and Laureate have contrasting adaptation. Consistent across several sites and two years.

Soil amendment min tillage ~10 years

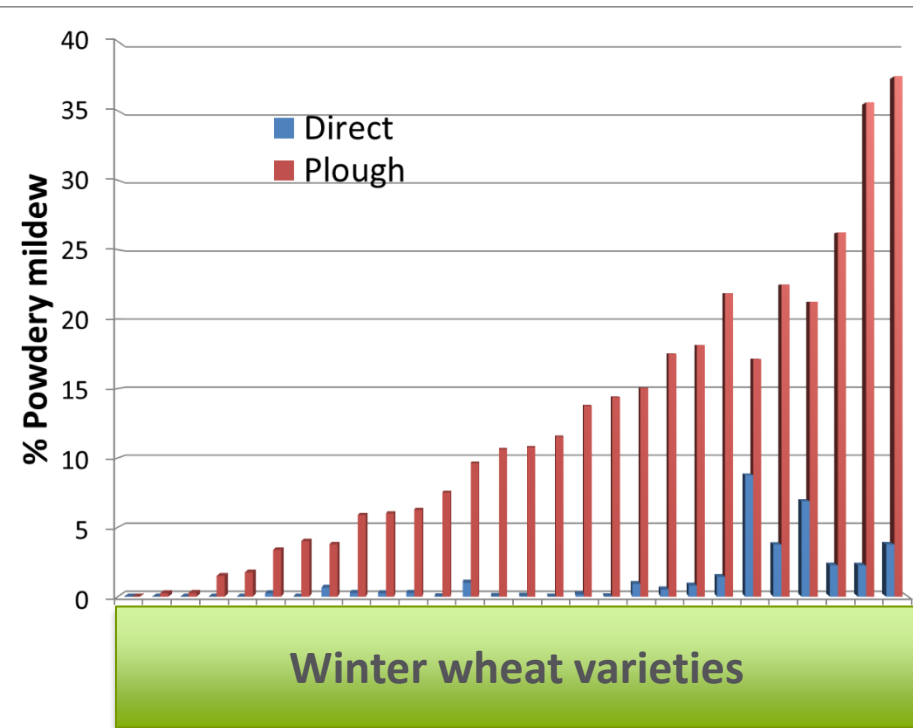
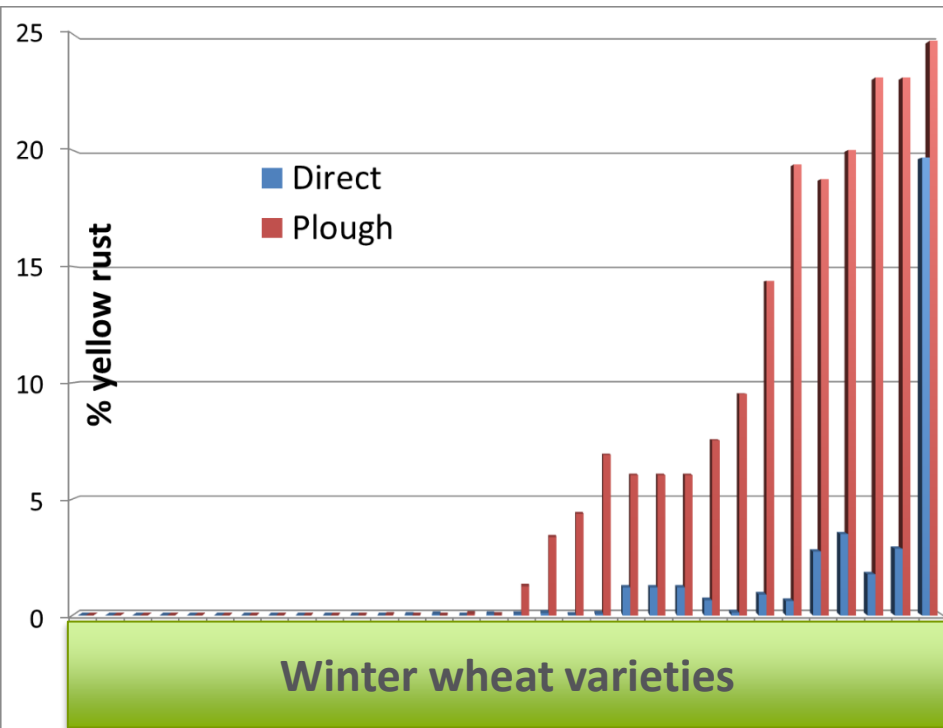


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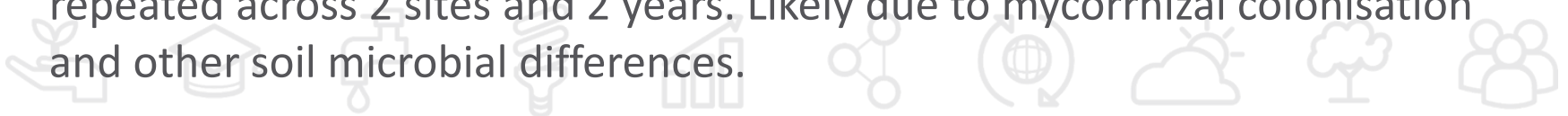


Consistent adaptation of varieties across soil differences under minimum tillage + stress conditions. Ploughed + optimum conditions Laureate would out-yield KWS Sassy.

Effect of tillage on yellow rust on winter wheat and powdery mildew on winter barley



Also mildew on winter wheat and powdery mildew on spring barley and repeated across 2 sites and 2 years. Likely due to mycorrhizal colonisation and other soil microbial differences.



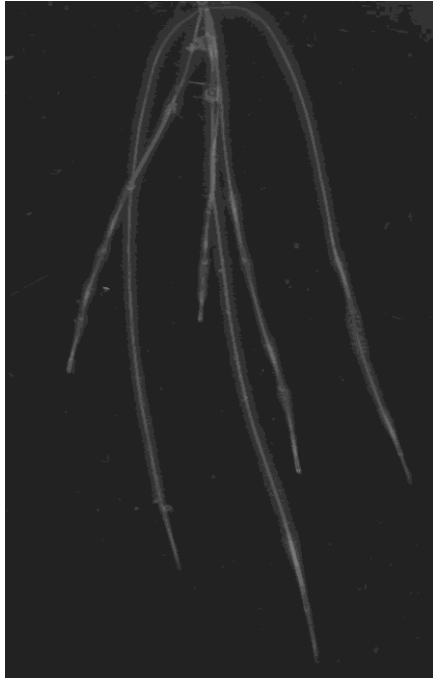
Root & Soils



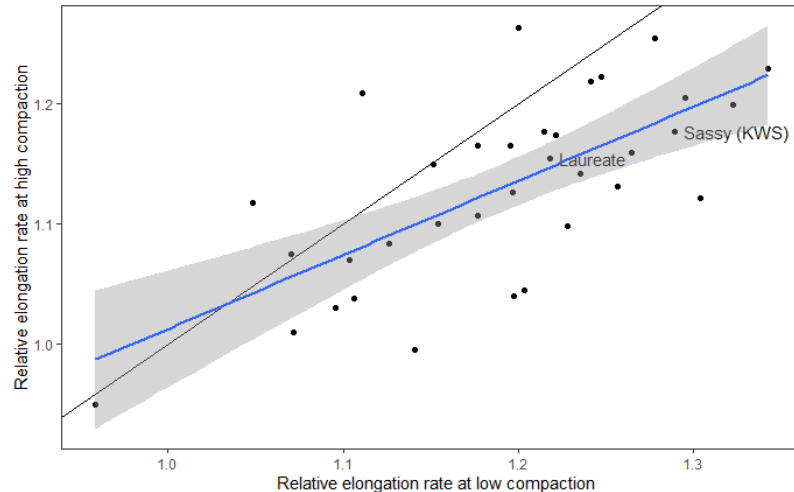
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Changes in tillage practices lead to differences in soil environments (strength, pore structure and biology)

Root traits are being explored in *ex-situ* experiments: Growth rates in different soil strengths, root system architecture in different soil systems, root micro-traits e.g root hairs.



Some varieties are heavily impacted by increases in soil strength while others are less so. However KWS Sassy and Laureate in this test behaved similarly.



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