Trait stability across the paddock: Closely related wheat varieties in on-farm trials

Sandra Tanz, Matthew Nguyen, Zhanglong Cao, Kai Bagley, Julia Easton, Adam Sparks, Mark Gibberd
Centre for Crop and Disease Management, Curtin University | In collaboration with InterGrain

ABSTRACT

Growers need to know whether a new variety holds up in every part of a paddock, not just on average. We compared InterGrain's new wheat variety *Dale* with commercial benchmarks in 2025 on-farm trials across Western Australia, using spatial mixed models to estimate the difference in each paddock zone. *Dale* yielded at least as much as the benchmark in all zones, but its advantage varied within paddocks. This project extends current OFE-style experiments to investigate trait stability.

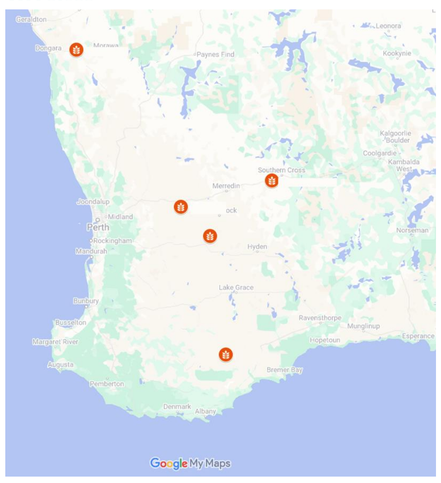
Five trials, one question

Wheat yield varies considerably within WA paddocks.

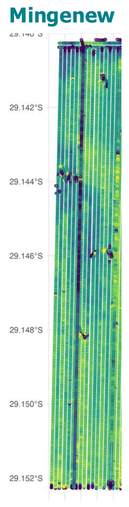
Question: How stable are traits between across heterogeneous paddocks and does the stability vary among varieties?

Five strip trials in 2025 (pilot study).

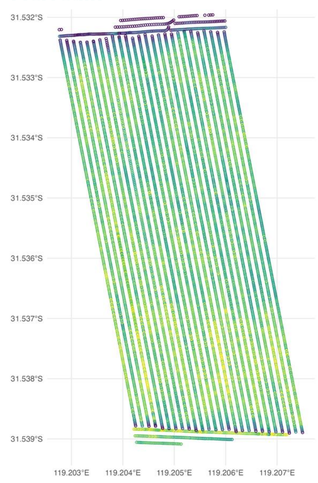
WA sites



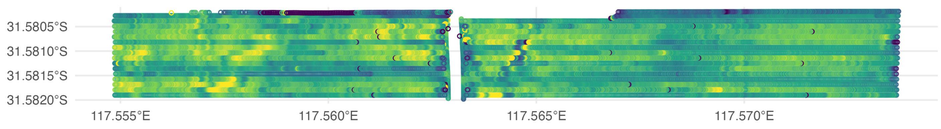
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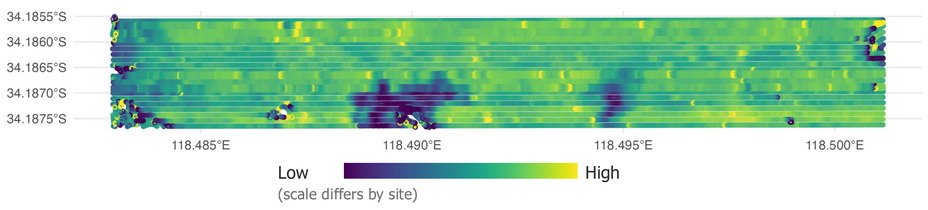
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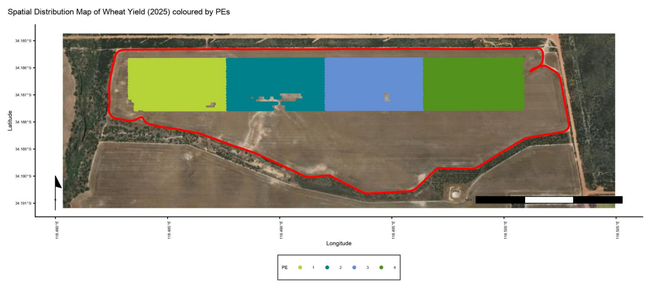


Borden



Yield stability in a heterogeneous environment

1. Clean and grid the yield data
2. Split each paddock into zones (PEs)
3. Fit a spatial model: *Dale* vs benchmark per zone

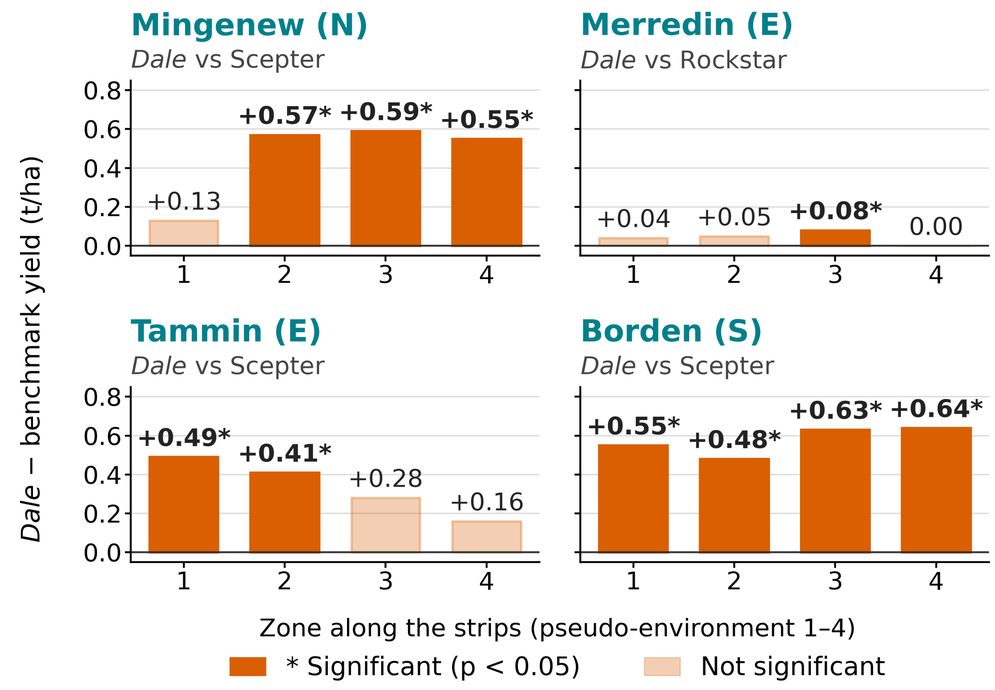


Borden: four zones (PEs = pseudo-environments) along the strips

Take-home messages

- ***Dale* ≥ benchmark** in all zones analysed so far
- **Not uniform:** from +0.00 to +0.64 t/ha across zones and sites
- **Next:** develop OFE pipeline / R package, reanalyse trials, incorporate drone NDVI, trait stability

Dale's advantage, zone by zone



4 of 4
sites with a significant *Dale* advantage in at least one zone

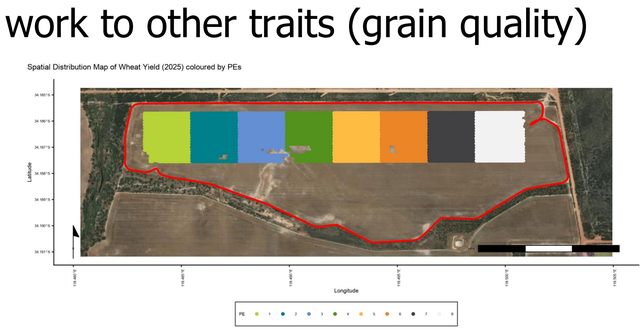
16 of 16
zones where *Dale* yielded at least as much as the benchmark

10 of 16
zones with a significant *Dale* advantage

Predicted-mean difference between Dale and the benchmark in four zones per trial (spatial linear mixed models, Wald tests; initial analysis).

Next steps: understanding trait stability

- Investigate yield stability across different zones
- Extend the work to other traits (grain quality)

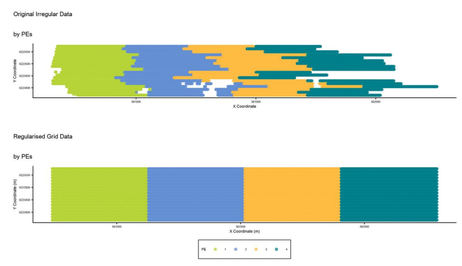


Borden: eight zones (PEs = pseudo-environments) along the strips

Side product: OFE pipeline → R package

Clean → **Rotate** → **Grid** → **Zones** → **Model**

ofe_clean() *ofe_rotate()* *ofe_grid()* *ofe_pe_assign()* *ASReml LMM*



Previous: zones shift



New ofe_grid(): zones aligned

144 grid × zone combinations (**821** models) tested at Borden
Promising: 12 × 12 m cells, 8 near-square zones

Acknowledgement

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