AAGI
Analytics for the Australian Grains Industry

Centre for Crop and Disease Management

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

Curtin University

Where Varieties Meet the Paddock

A Pilot Study on Spatial Variability in Wheat Performance

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What are On-Farm Experiments?

- Research trials conducted directly on commercial farms, within real paddocks.
- Use farmers' own machinery, practices, and management zones.
- Typically involve large strip plots rather than small research plots.
- Designed to capture real-world performance under commercial conditions.

Why use OFEs?

- Complement small-plot trials with practical, paddock-scale insights.
- Reflect true farm environments → more relevant results.
- Allow large-scale comparisons (e.g., new vs commercial variety).
- Capture spatial variability (soil, moisture, topography).
- Support faster adoption by involving farmers directly.
- Provide high-resolution spatial data from modern machinery.

What is this project about?

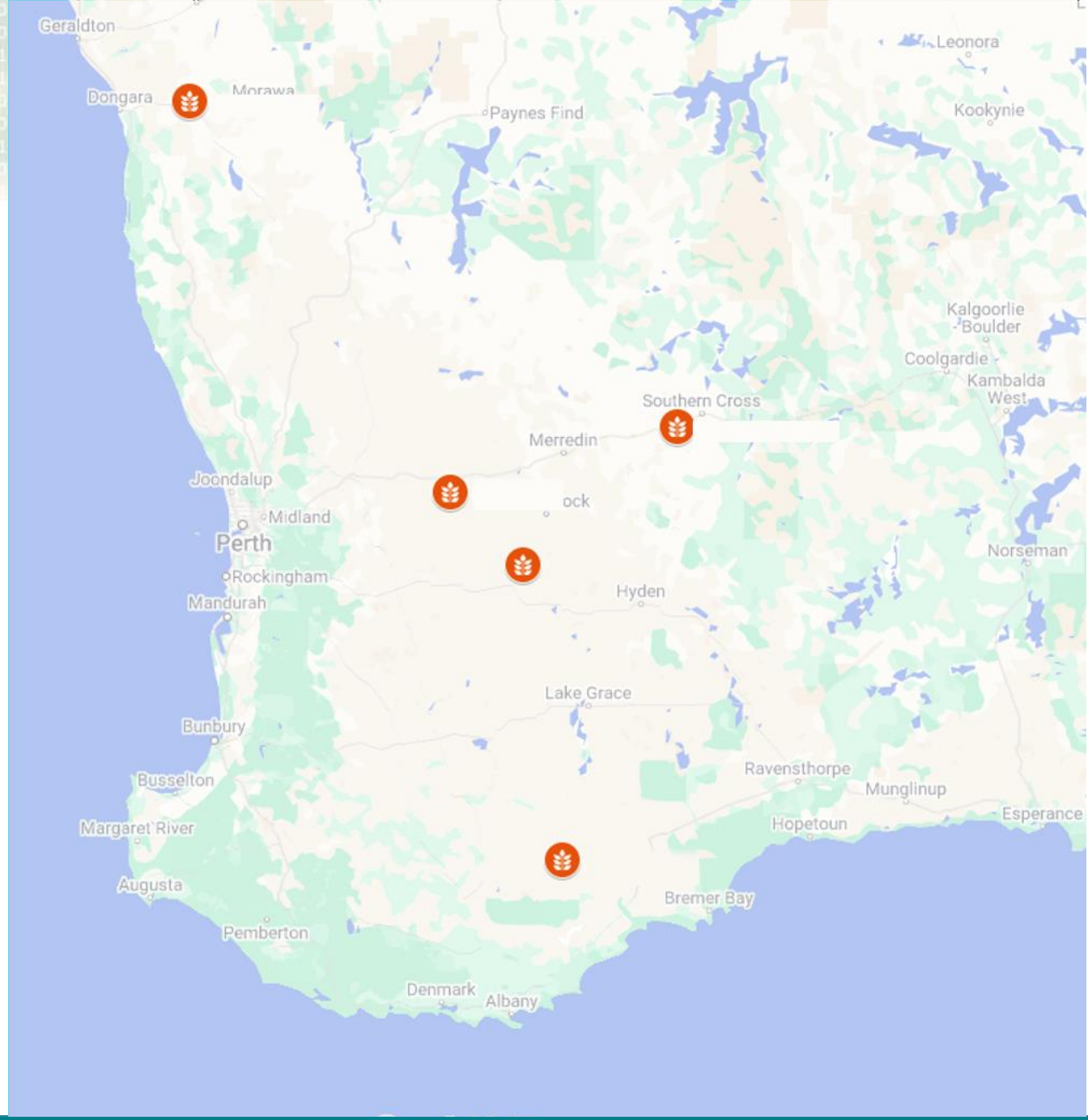
- Collaboration between InterGrain and AAGI/CCDM.
- Pilot study using OFE strip trials comparing a near-release InterGrain wheat variety (Dale) with popular commercial wheat varieties (Scepter, Rockstar, Tomahawk).
- Conducted across multiple WA farms.
- Integrates harvest data, drone imagery, and spatial analytics.

Why are we doing this?

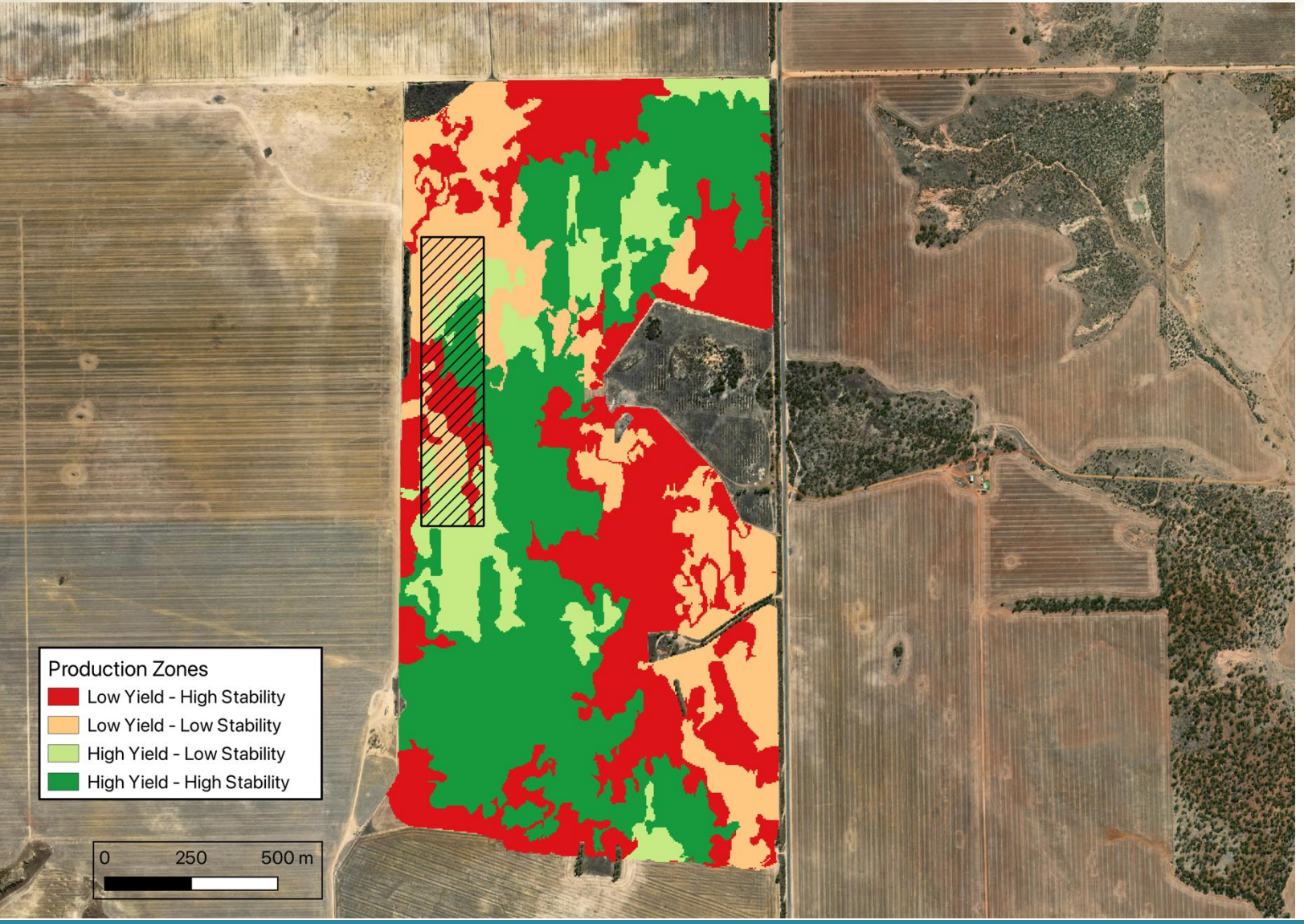
- To understand how closely related varieties perform across real paddock variability.
- To assess commercially important traits and test whether these traits are stable and consistent across real paddock environments.
- To develop advanced statistical methods to explore performance variability.
- To support evidence-based recommendations for growers and breeding decisions.

OFE Trial Sites

- Five OFE trial sites established.
- Located across diverse regions of WA.
- Designed to capture a range of environmental conditions and assess Dale's paddock-scale performance against commercial wheat varieties.



Historical Yield Data and Production Zones



LH: consistently low yields across seasons.

LL: variable performance, generally trends toward low yield.

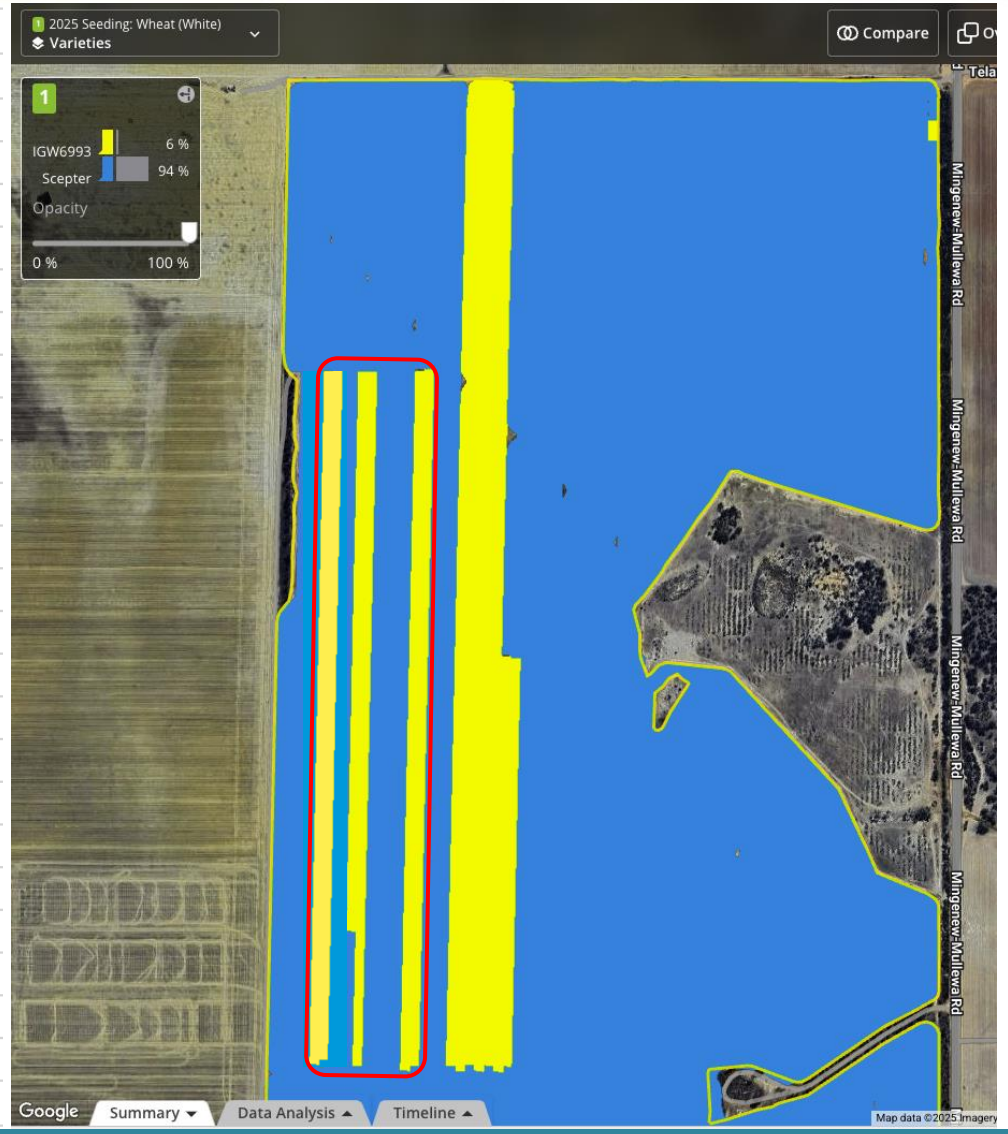
HL: potential for high yield, but results are inconsistent.

HH: consistently high yields with reliable performance.

Position trial sites across all four zones.

Trial Design and Seeding Map

	REP 1		REP 2		REP 3	
RUN LINE	1	2	3	4	5	6
Length ~1480 m	Dale	Scepter	Dale	Scepter	Scepter	Dale

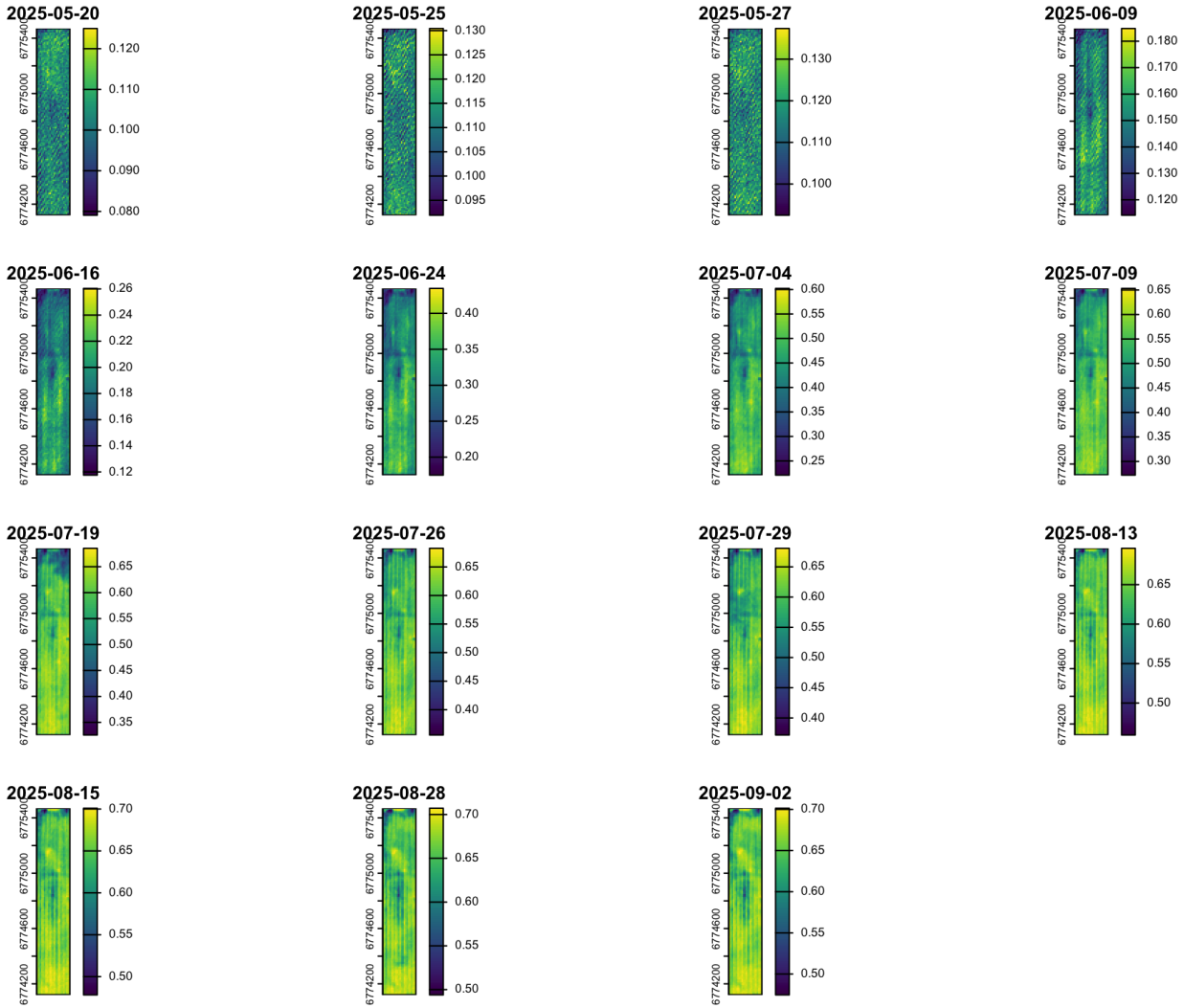


- Varieties: Dale (InterGrain) and Scepter, Rockstar or Tomahawk
- Variety order has been randomised and is unique for each grower.
- Six strips, each 36 m wide
- Trial width and length: 216 m x 800-1800 m

Images of Emerging Crops - 2 weeks and 5 days after sowing (8 Jun 2025)

Images of Crops - 2 months and 3 weeks after sowing (10 Sep 2025)

NDVI Images (Sentinel-2)



- NDVI = *Normalised Difference Vegetation Index*
- **Quantifies green vegetation** using:
  - Near-infrared reflectance (from leaves)
  - Red light absorption (by chlorophyll)
- **Value range** from -1 to 1
  - Low values (–0.1 to 0.1): bare soil, rock, sand
  - High values (approaching 1): dense, green vegetation
- **Seasonal change visible:**
  - May: blue-green, low NDVI (~0) → little or no vegetation
  - September: light green-yellow, NDVI up to ~0.7 → active plant growth

Target Traits and Analytical Approaches

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Key Agronomic Traits

- Yield
- Protein
  - Quantity (percentage of protein)
  - Quality (gluten strength and baking functionality)
- Soil type/texture

Data Analysis Methods

- Linear Mixed Models (LMMs)
- Multiple Factor Analysis (MFA)
- Multi-Environment Trial analysis (MET)

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THANK YOU!

INTERGRAIN

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