

# Cereals seed coats with wetters for non-wetting soils



# Authors and Funding

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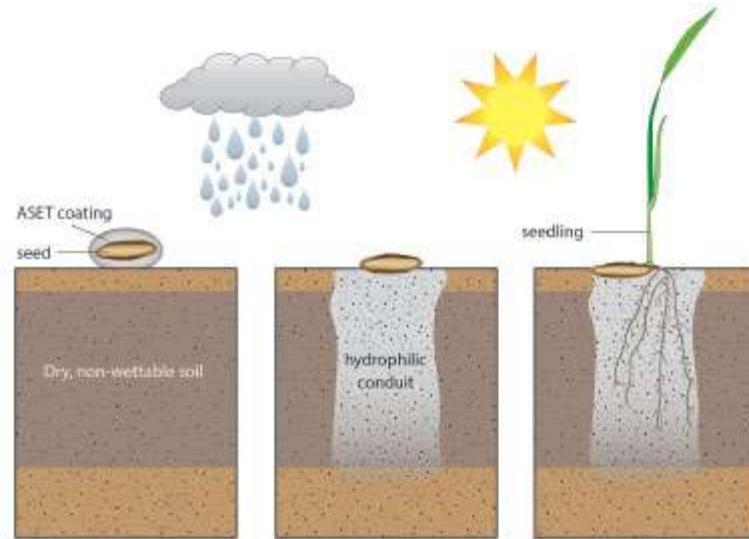
BGPA Botanic Gardens and Parks Authority

DPIRD Project Number: FFPJ04. Additional support for field research was provided through collaboration with the GRDC soil water repellence project DAW00244. Living Farm managed the experimental site, this is greatly appreciated.

# Background

- **Aim** - Examined the agronomic efficiency of wetter placement through comparisons of seed coatings and furrow applications.
- **Current practice** – Place soil wetters banded on top of and in the furrow.
- Coating seeds with wetters to improve establishment is a **new field** of research.
- **Matt Madsen** (Brigham Young University Utah USA) has developed the wetter seed coating technique and shown the improved establishment of grasses on water repellent soils.
- **Todd Erickson** is using similar coating techniques to improve native grass establishment in the Pilbara region of Western Australia.

# Mechanism for surface applied seeds (Matt Madsen)



Moisture releases the surfactant in the special coating. The surfactant then creates a protective hydrophilic conduit out and down from the seed. This conduit holds the moisture long enough for the seed to germinate and the seedling to establish.

# Surface applied grasses

- Tests were performed with tall fescue and perennial ryegrass.
- Surfactant was applied directly to the seed using a rotary seed coater at **0.1%** by weight of seed.
- Perennial ryegrass - **46-48%**.
- Tall fescue density - **22-28%**.
- Improvement in density, cover, and aboveground biomass from the seed coating compared to the untreated seed.

Madsen *et al.* (2016) Low-dose Application of non-ionic alkyl-terminated block copolymer surfactant enhances turf grass seed germination and plant growth. HortTechnology 26, 379-385.

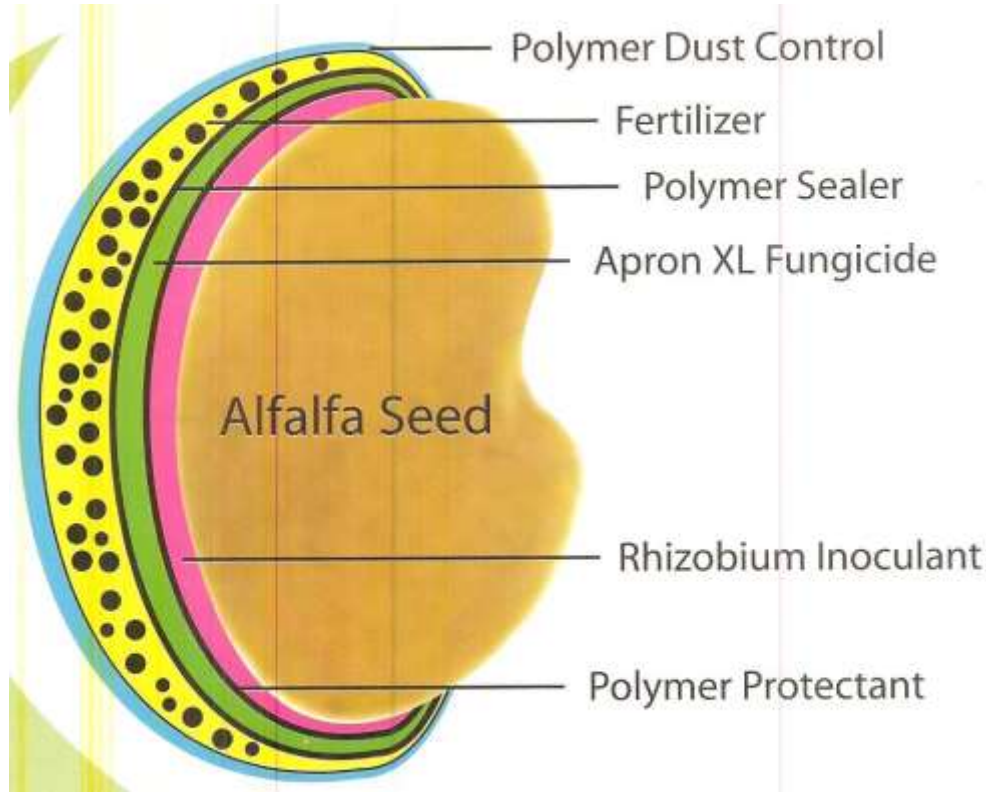
# Barenbrug - Heritage Seeds



# Seed coating machine



# Seed coating





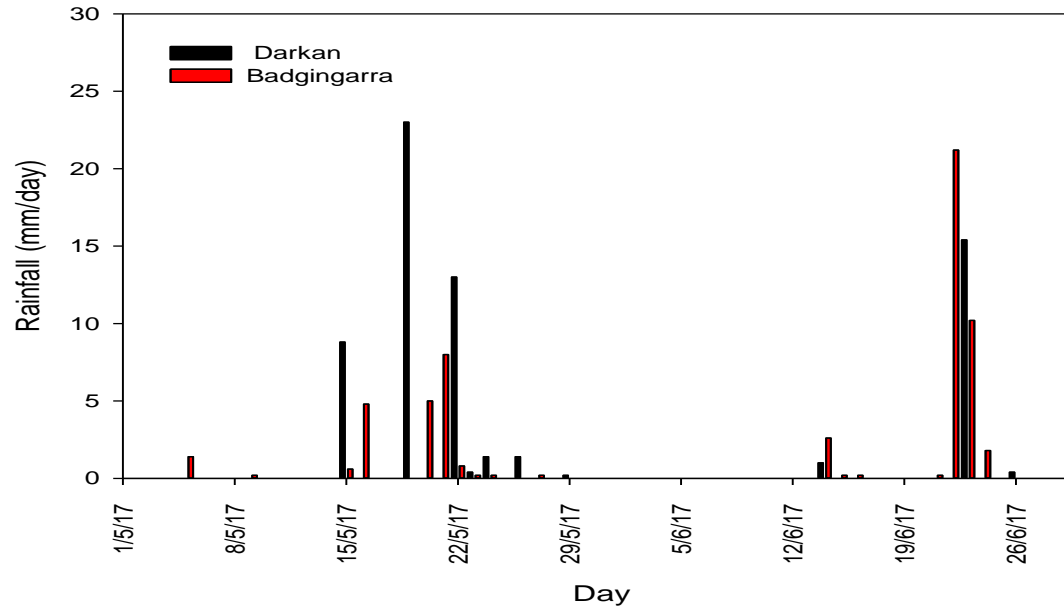
# 2017 experiments

- Sandy gravel with a molarity of ethanol droplet test or MED=5.0 (very severe repellence) located 18 km south of **Darkan**.
- Grey sand with a MED = 2.0 (moderate repellence) located 11 km northeast of **Badgingarra**.
- Barley was used at the Darkan site and wheat at the Badgingarra site.

# Treatments

- Control – no wetter
- Wetter 1 - coated to seeds at 1, 2 and 4 L/t seed
- Wetter 2 - coated to seeds at 1, 2 and 4 L/t seed
- SE14™ - applied on top of furrow at 1, 2 and 5 L/ha
- SE14™ - applied in-furrow near the seeds at 1, 2 and 5 L/ha
  
- Seed rate = 65 kg seed/ha
- Wetter rate = 0.06, 0.13 and 0.26 L/ha or wetter cost 0.42-1.68 \$/ha
- Wetter 2 at Badgingarra = 0.08, 0.16 and 0.32 L/ha

# Rainfall

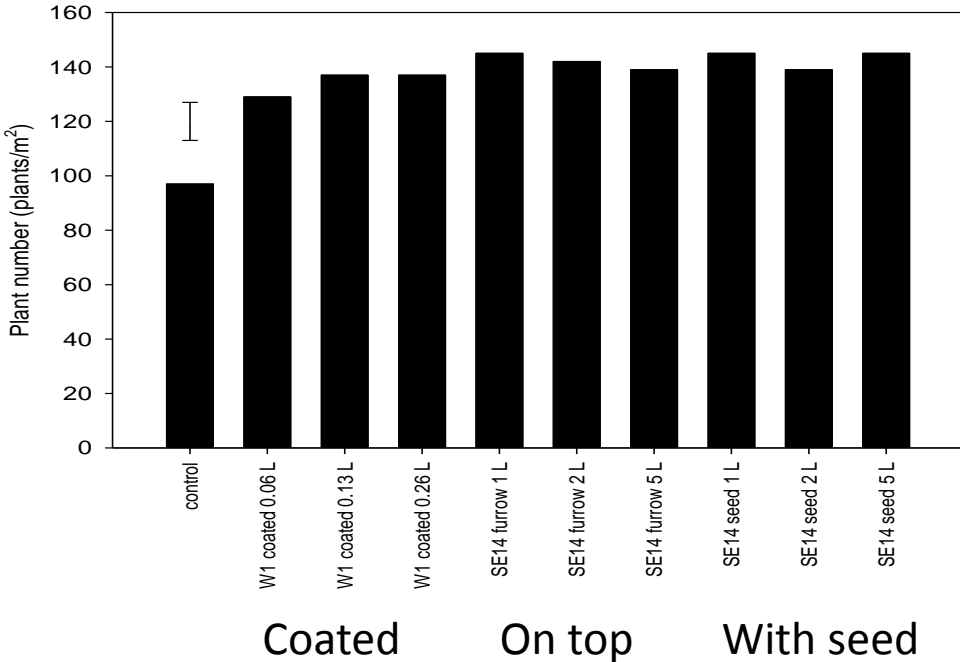


Darkan - sown dry on 12 May with **40 mm** 14-21 May 2017

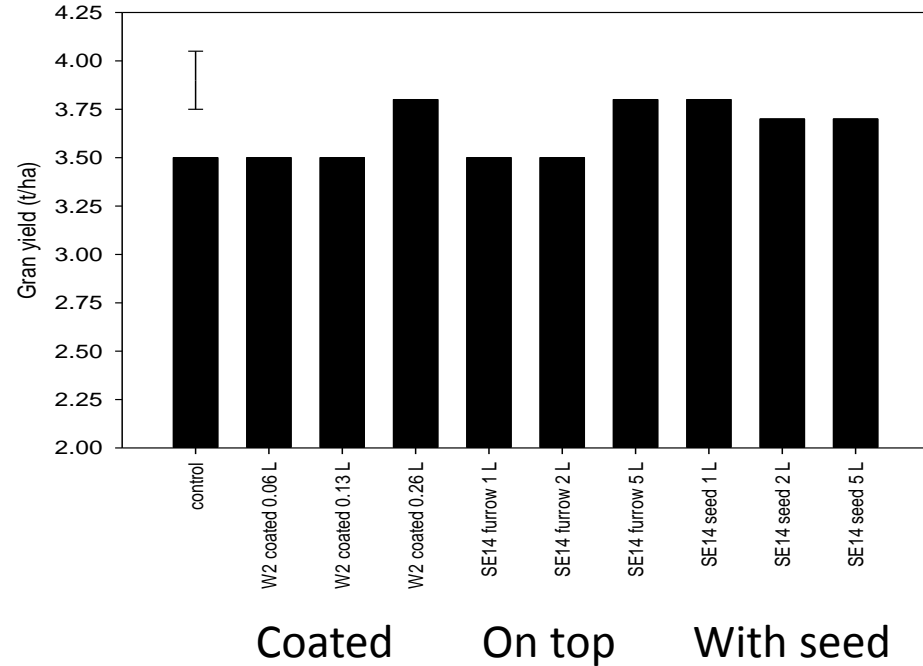
Badgingarra - sown dry on 19 May with **12 mm** 20-22 May 2017

# Darkan

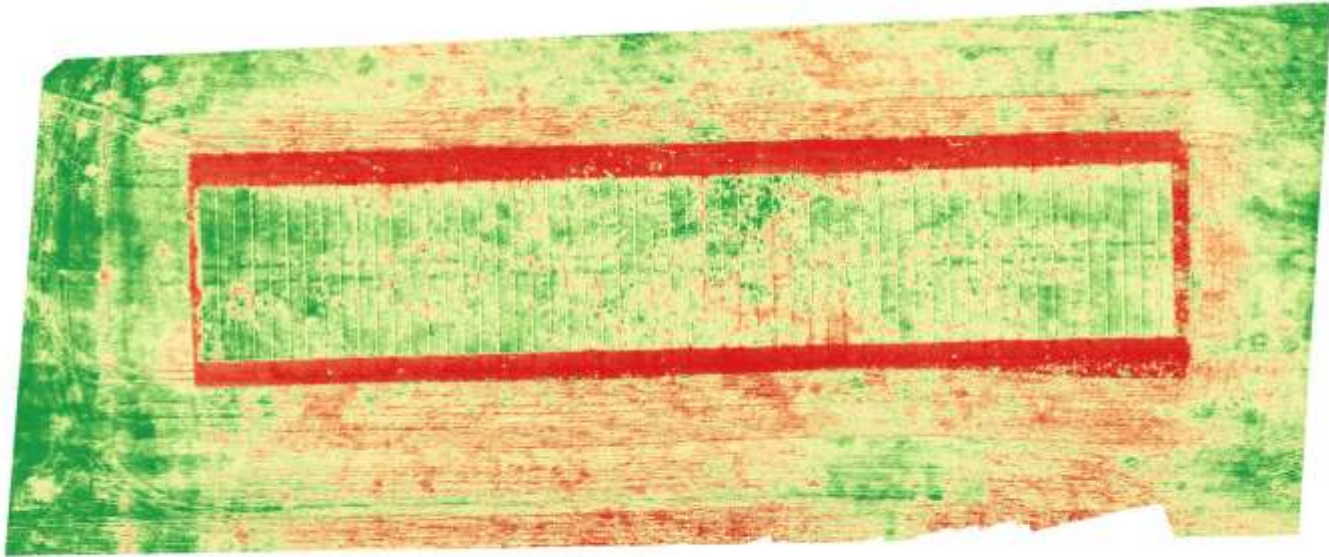
## Plant numbers (plants/m<sup>2</sup>)



## Grain yield (t/ha)

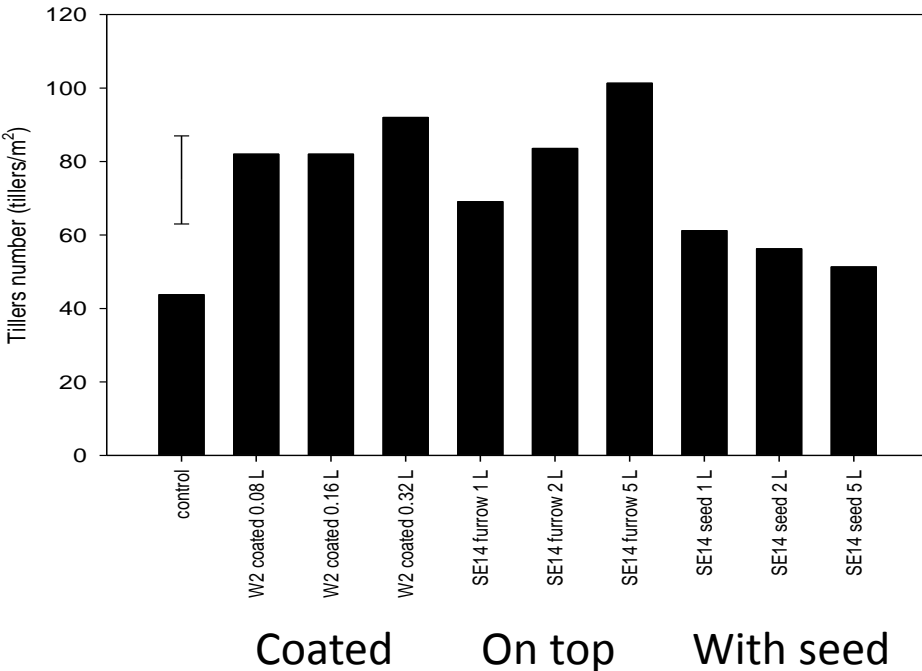


# Drone image NDVI of the Darkan experiment

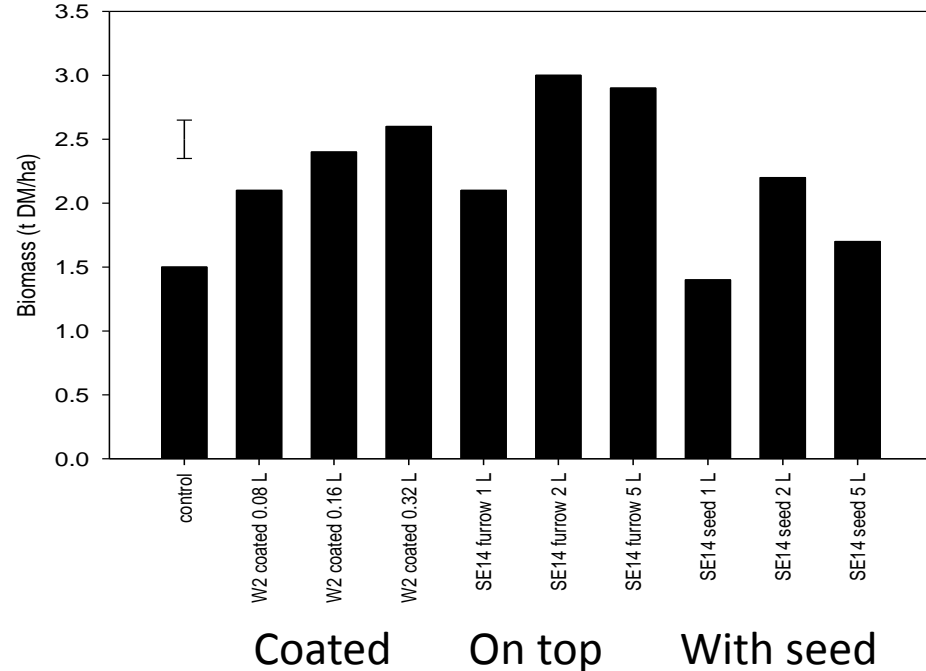


# Badgingarra

## Tiller number (tiller/m<sup>2</sup>)

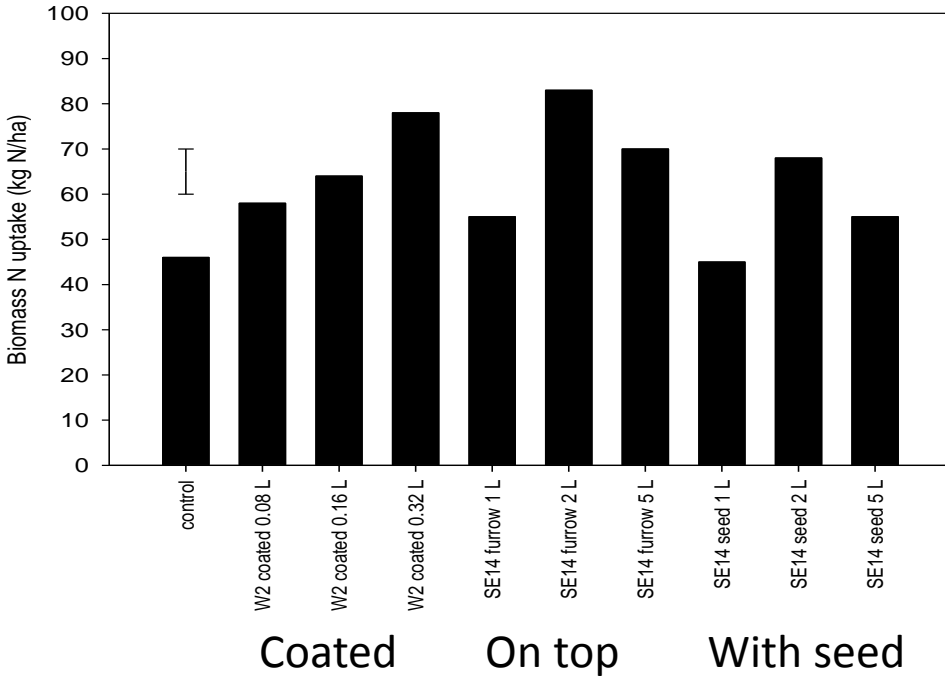


## Biomass (t/ha)

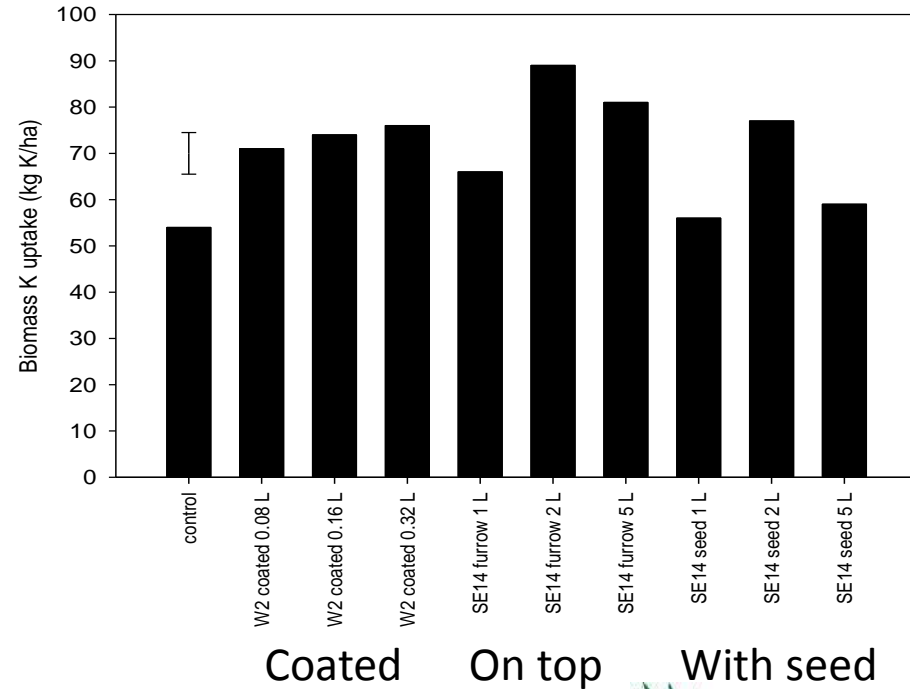


# Badgingarra

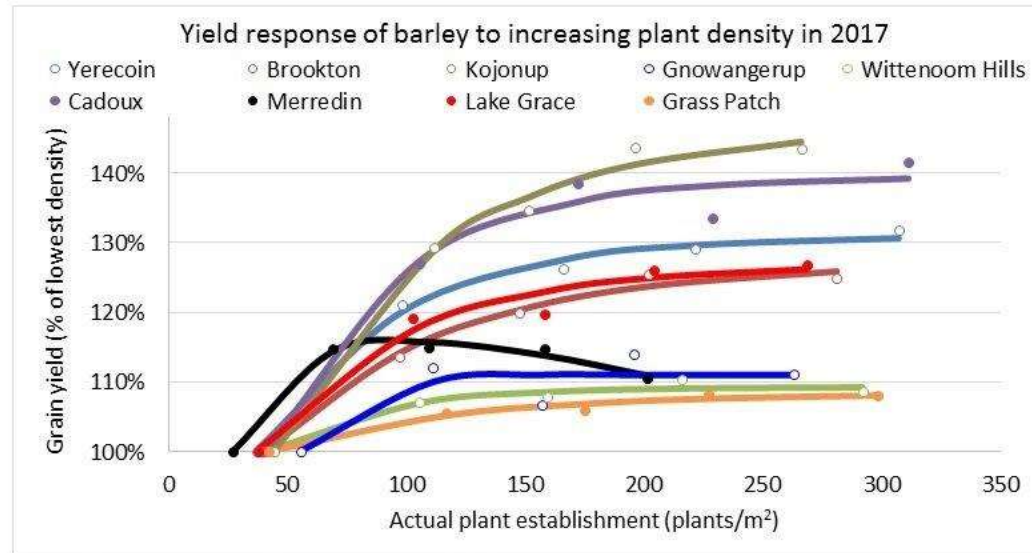
## N uptake (kg N/ha)



## K uptake (kg K/ha)



# Yield response of barley to increasing plant density



Source: Blakely Paynter, Raj Malik and Jeremy Curry - DPIRD

Data is the average grain yield of four varieties (Compass, IGB1305, La Trobe and RGT Planet) to increasing plant density  
Barley agronomy research is co-funded DPIRD and GRDC (DAW00224)



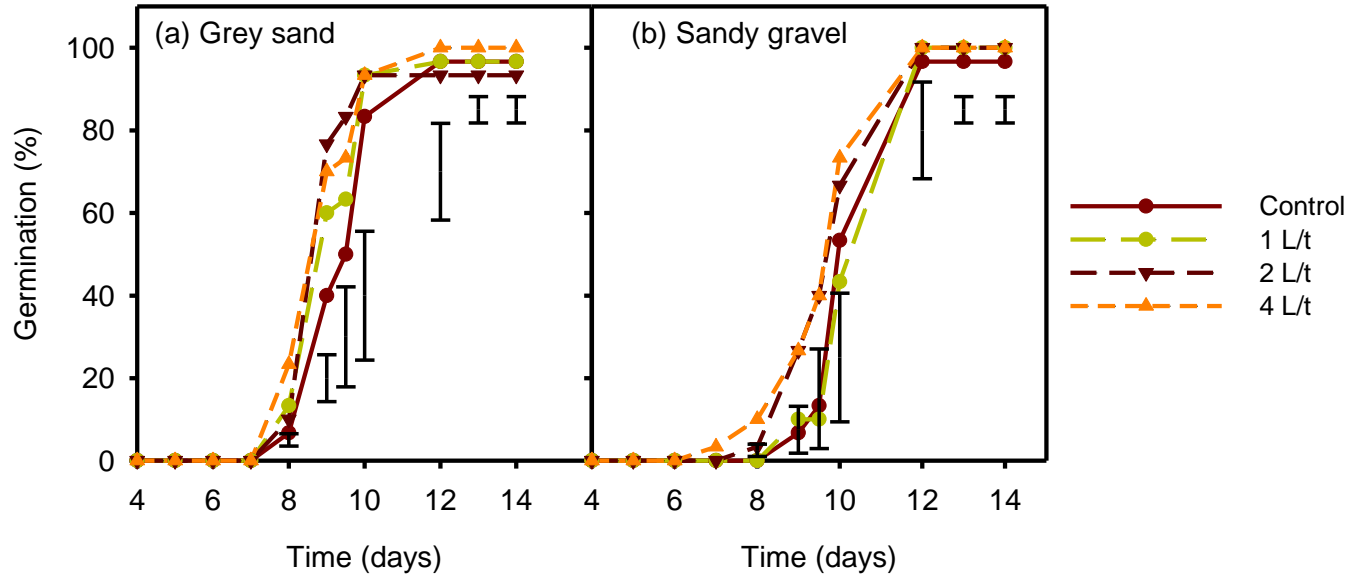
# Mechanism for seeds below the soil surface



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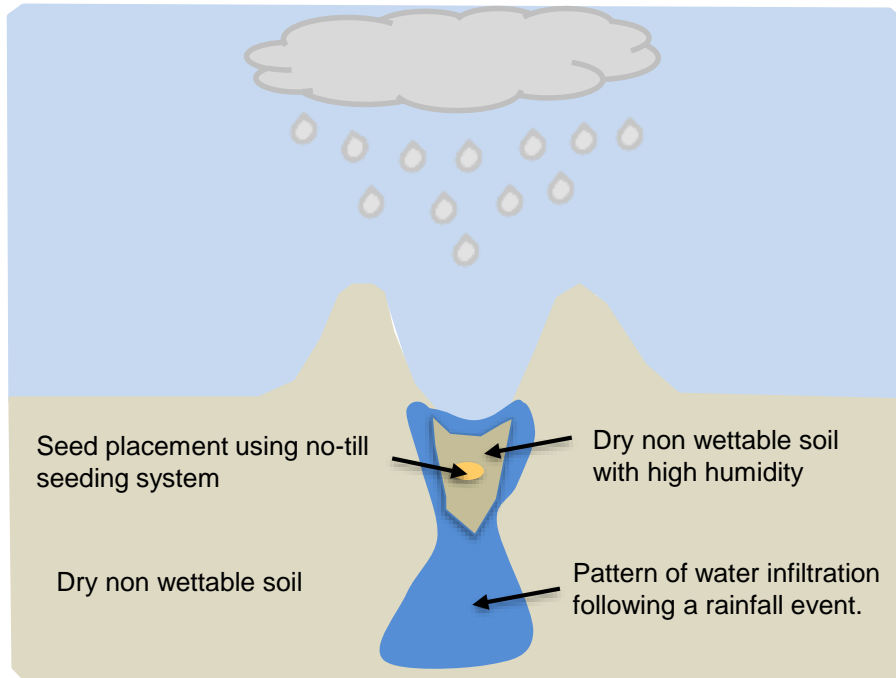
# Grey sand (7.5% water) and Sandy gravel (12% water)



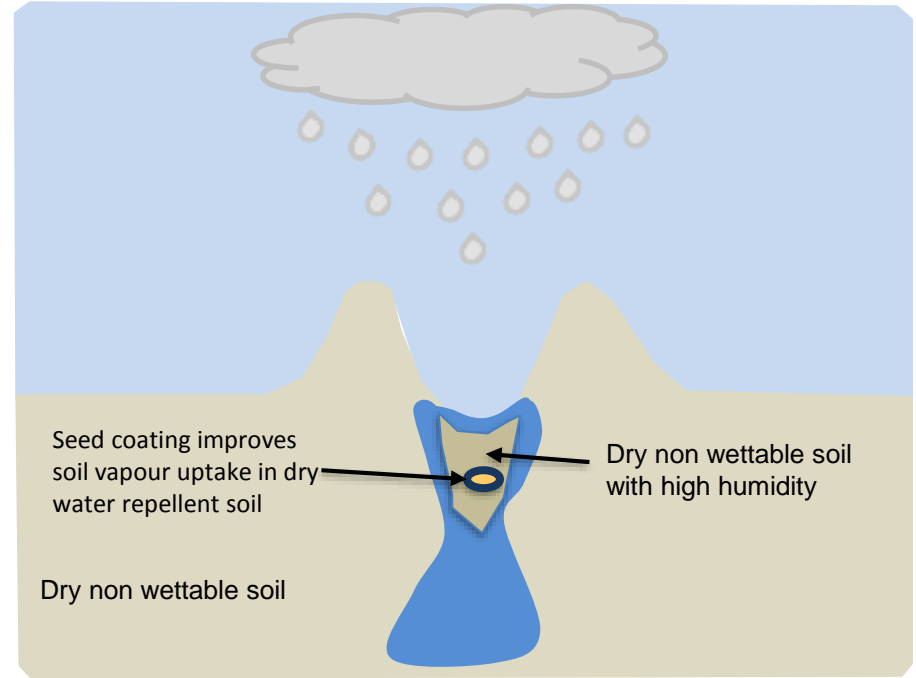
At 5.2% and 6.3% water to dry – incomplete germination with no effect of seed coat  
At 9.8% and 18.8% water to wet – complete germination with no effect of seed coat

# Mechanism for seeds below the soil surface

## Uncoated seed



## Coated seed



Wuest *et al.* 1999 Vapor Transport vs. Seed–Soil Contact in Wheat Germination. *Agron. J.* 91, 783–787.

# Conclusion

- Seed coated wetters can improve cereal crop establishment on water repellent soils similar to the response observed as banded wetters.
- Possible mechanism is the seed coated wetter improve water uptake in dry non wettable soil with high humidity.
- Germination response to banded wetters in 2017 at the Badgingarra site was generally larger than observed in previous studies due to the very dry seasonal conditions.
- Seed coated wetters need to professionally coated as the method of seed coating can influence the seeds performance.
- Low rates of wetter are coated to seed because they can be toxic to seed germination.

# This year experiments

## Experiment 1

- Canola - paddock similar treatments to this year experiment (Darkan).

## Experiment 2

- Wheat – different seed coating techniques and wetters (Northam or Darkan).

## Other experiments

- Summit fertiliser interaction of wetter seed coating and N nutrition (Binnu).
- DPIRD and South East Premium Wheat Growers Association (Esperance).
- Pasture seed - ryegrass and clover (Frankland).

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