

GRDC Grains Research Update



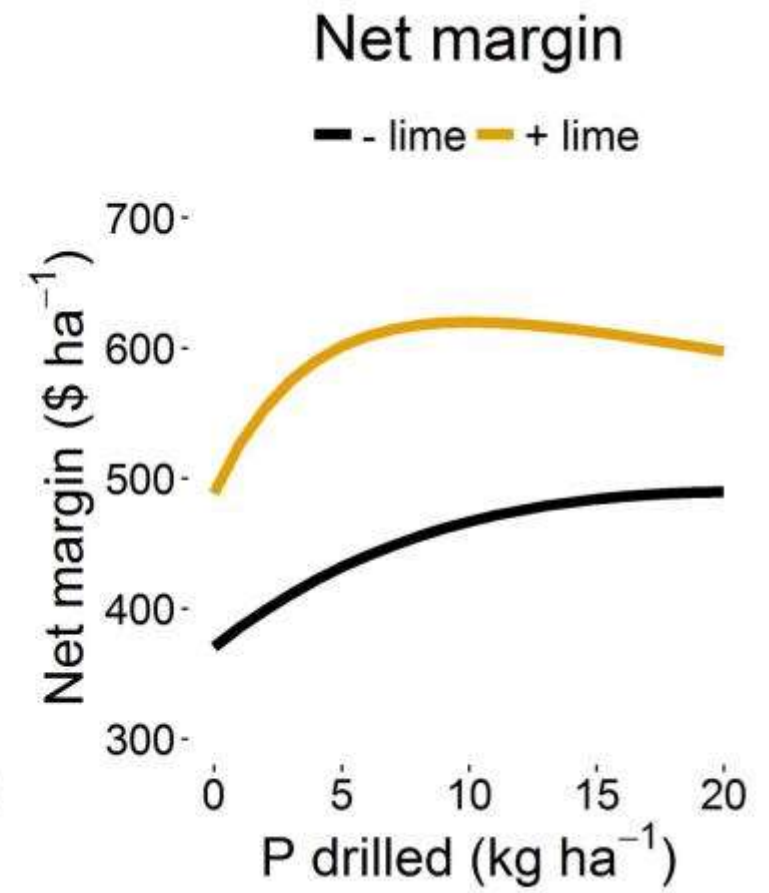
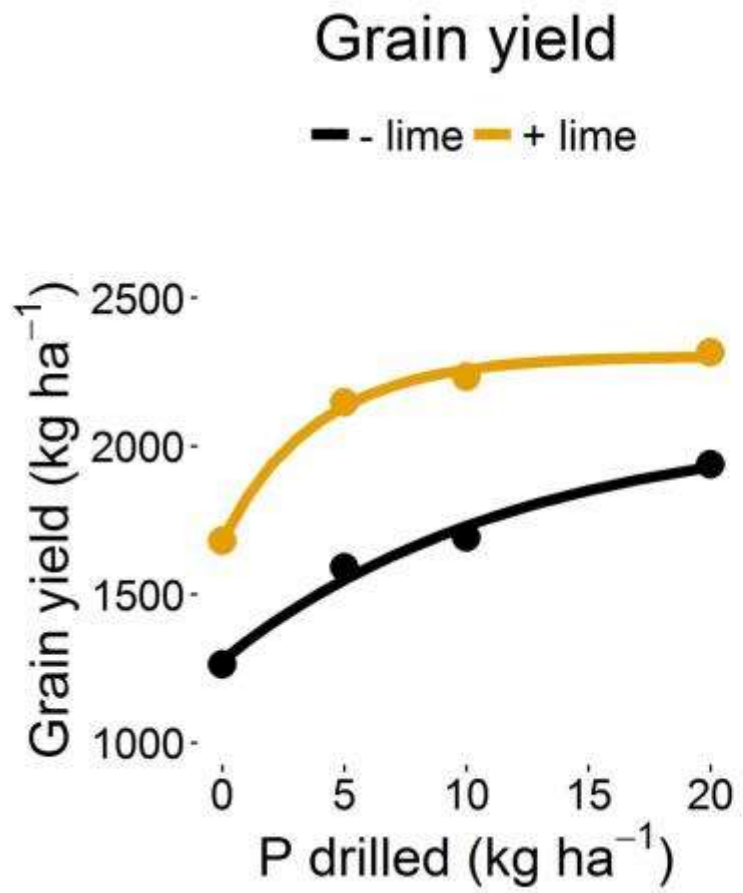
Large increases in soil pH can improve the availability of soil phosphorus if the supply of other nutrients is adequate

Craig Scanlan

Lime treatment changed the profit response to P fertiliser for wheat at Wongan Hills in 2012.

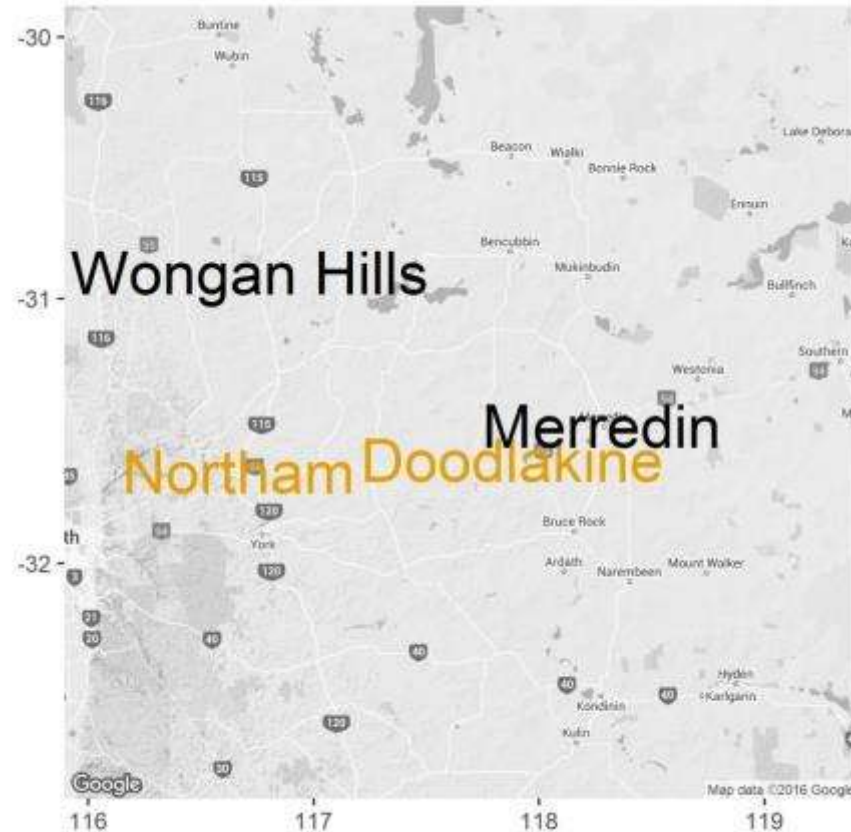
Soil pH (CaCl₂)

Depth (cm)	-lime	+lime
0 - 10	4.5	5.5
10 - 20	4.1	4.6



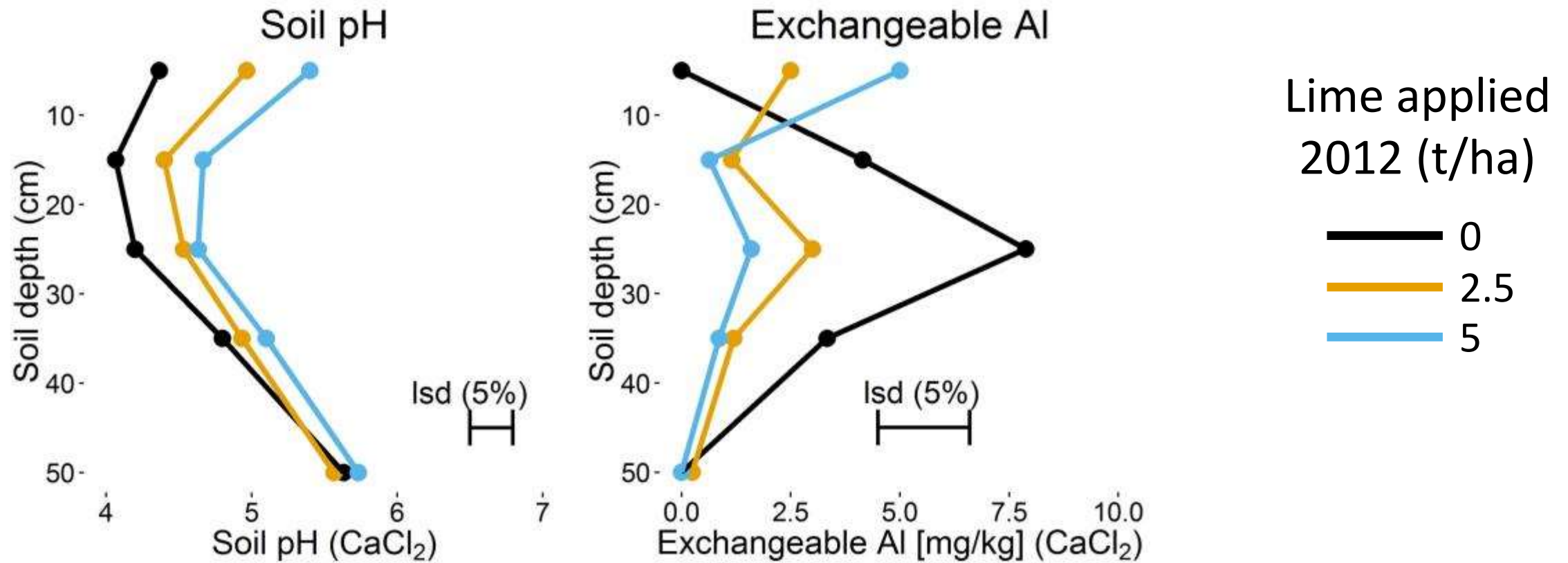
LaTrobe barley was grown in 4 experiments on soil pH and phosphorus in 2015.

Lime x P x K

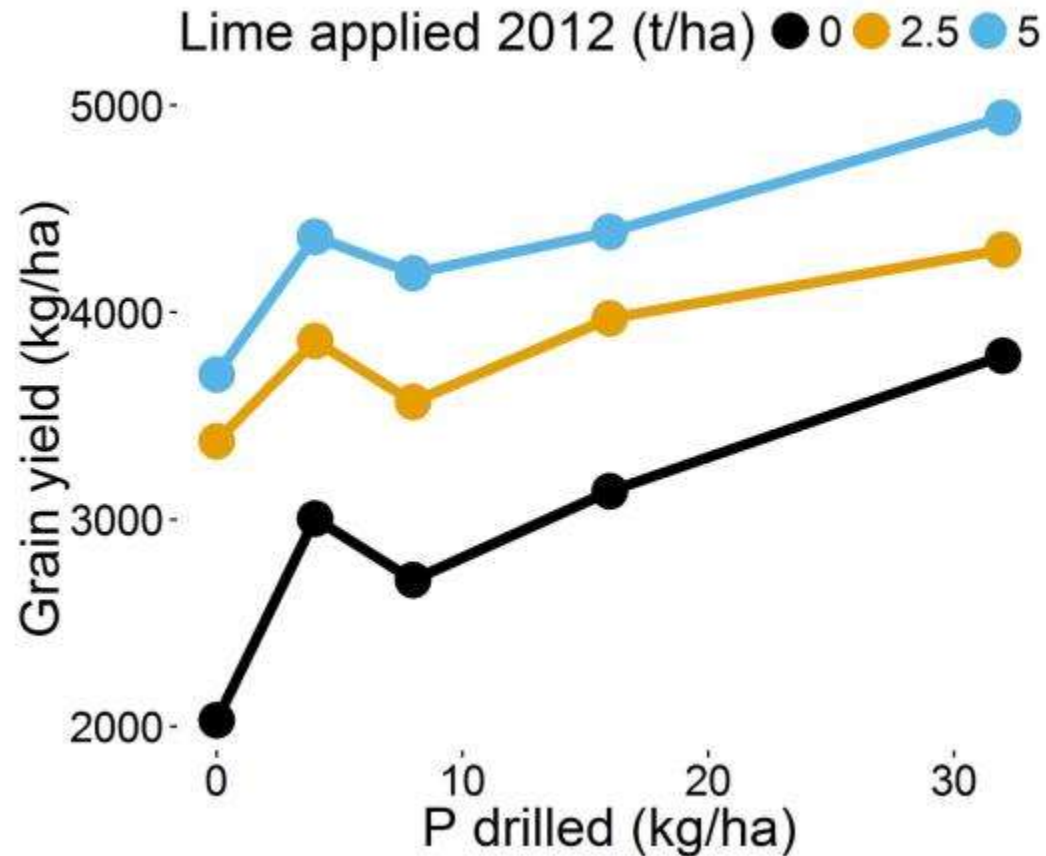


Lime x P

Lime treatments had significant effects on pH and Al at Wongan Hills in 2015.

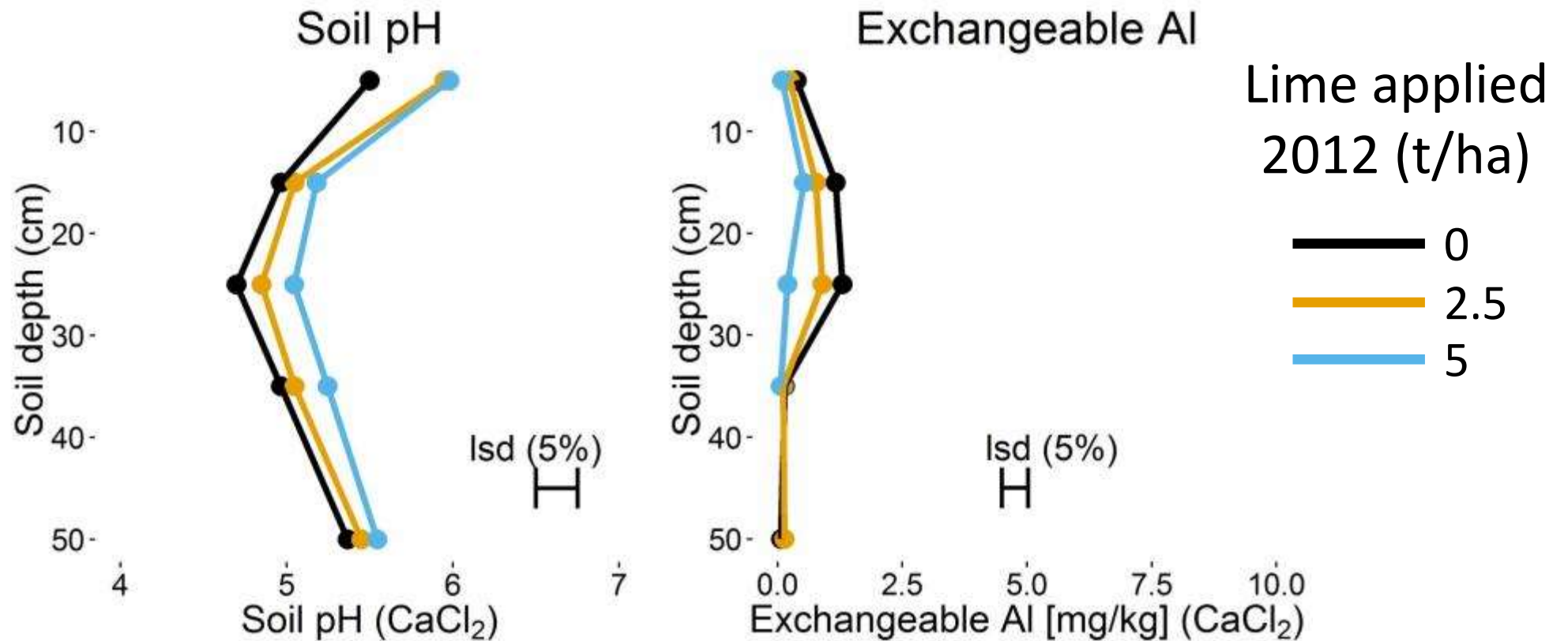


A significant lime x P interaction for grain yield occurred at Wongan Hills in 2015.

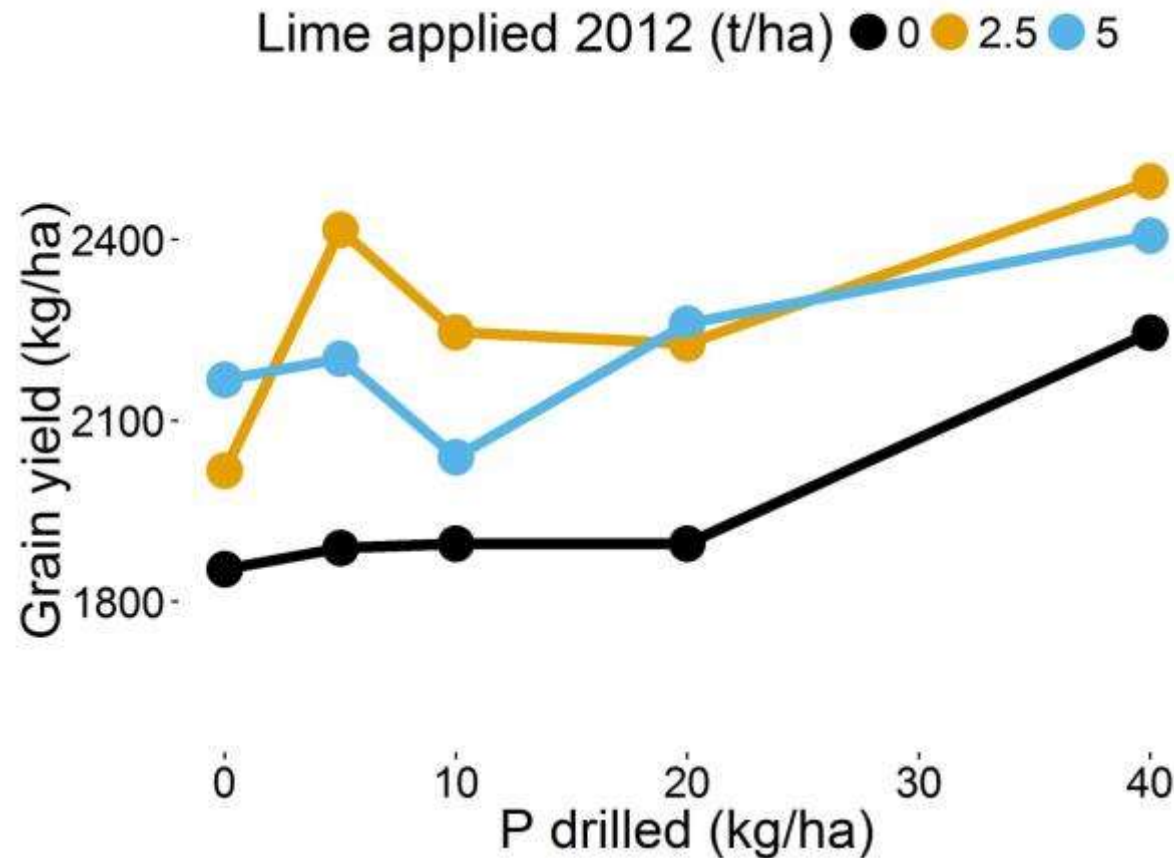


Shoot nutrient concentrations were all above critical level

Lime treatments had significant effects on pH and Al at Northam in 2015.

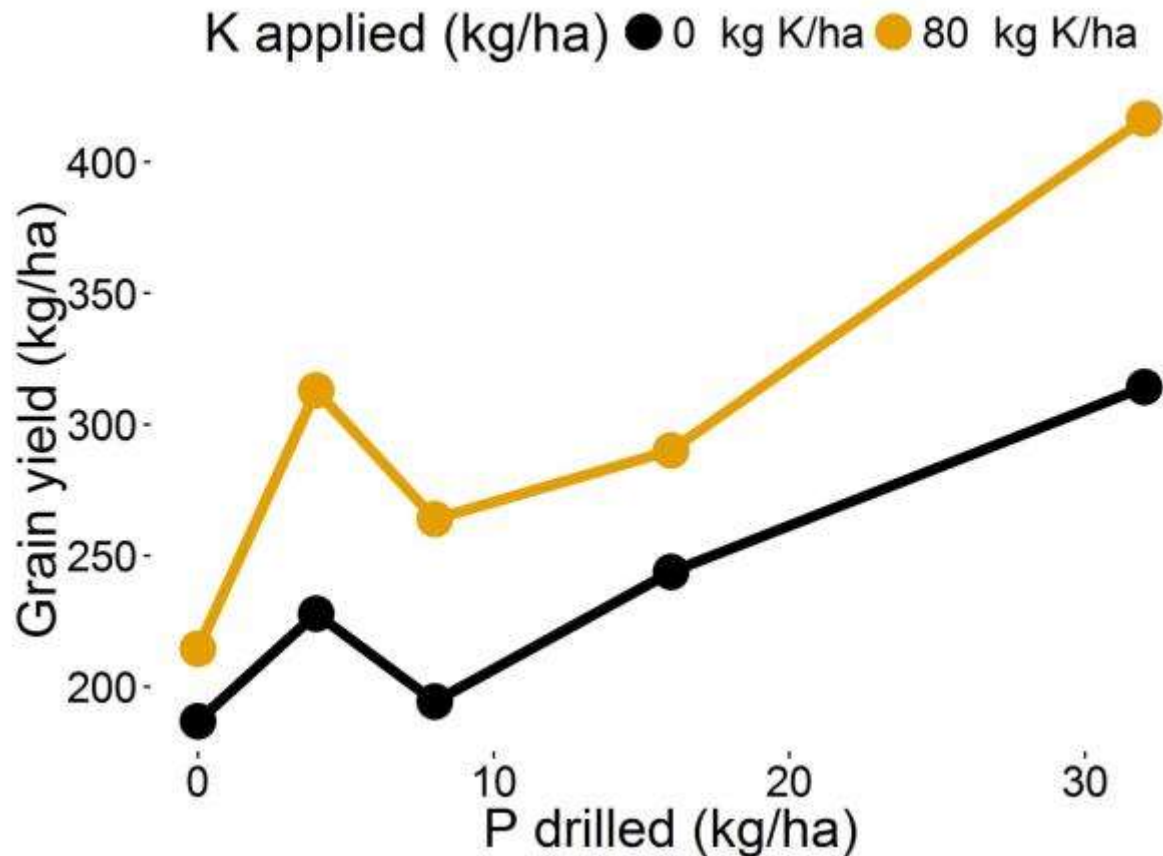


Yield responses to lime and P but no interaction at Northam.



Conc. at anthesis	Lime applied 2012 (t/ha)		
	0	2.5	5
N (%)	1.1	1.1	1.0
Zn (mg/kg)	12	11	11

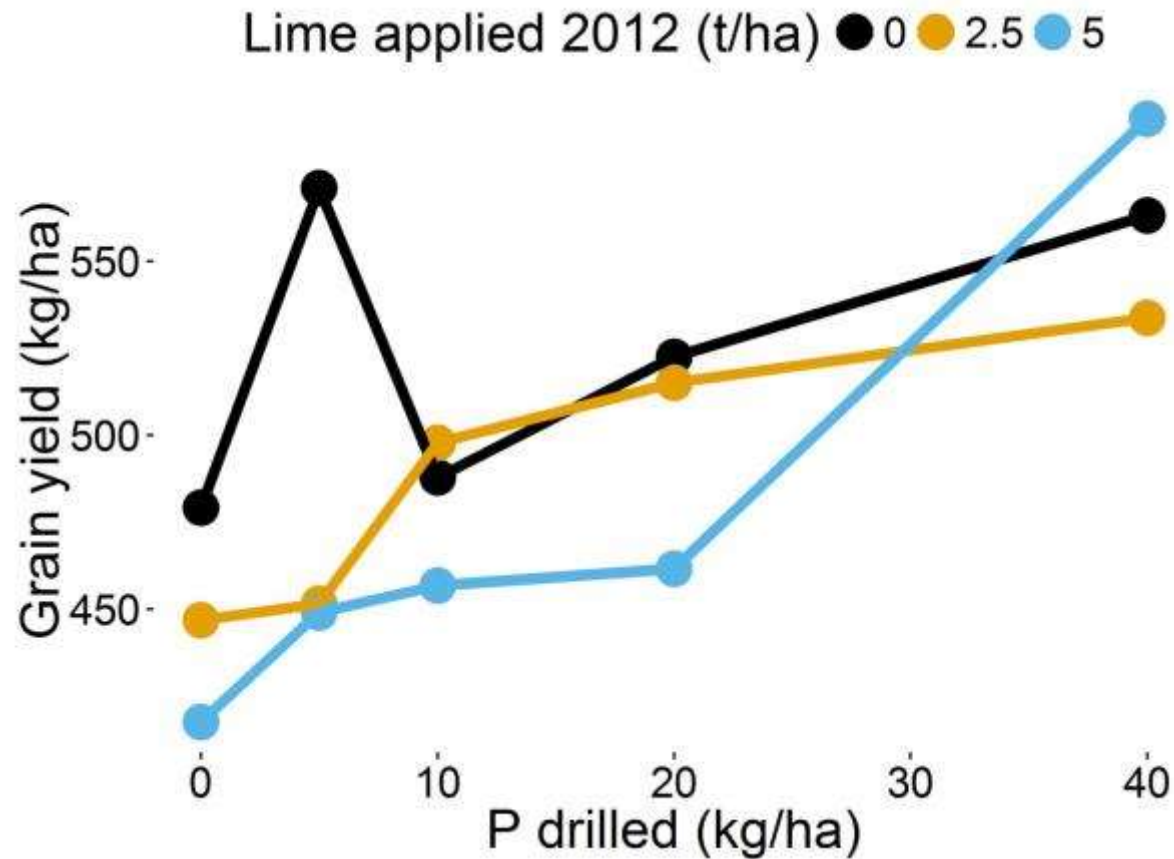
The P x K interaction was significant at Merredin but lime interactions were not.



Limiting nutrients

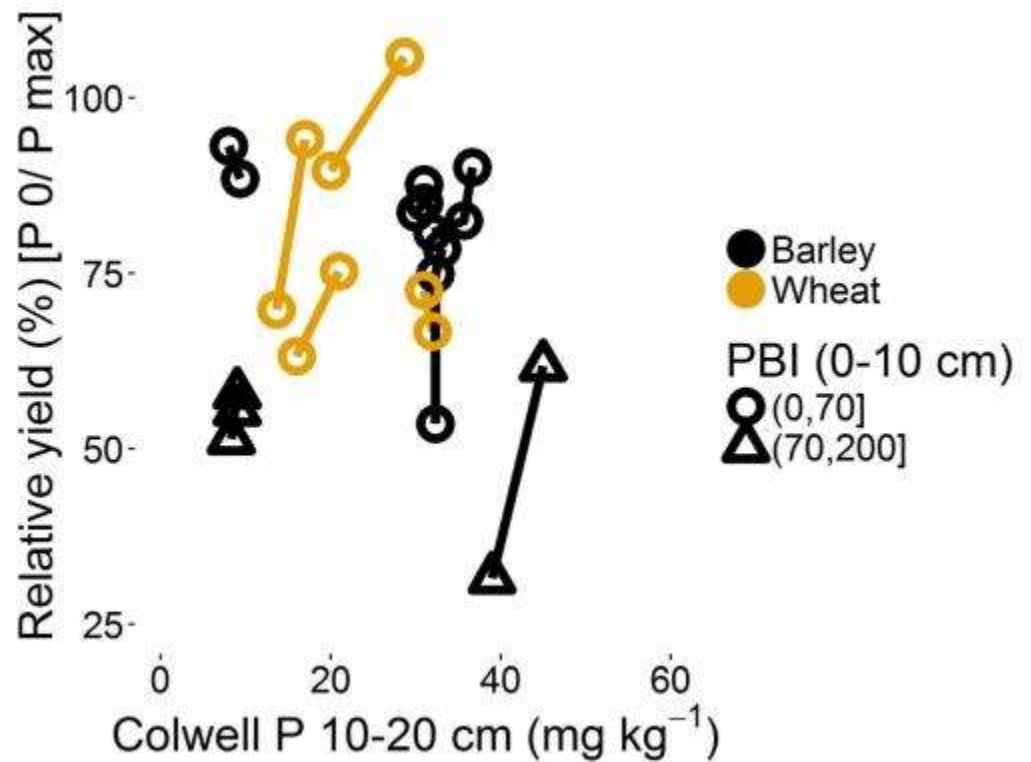
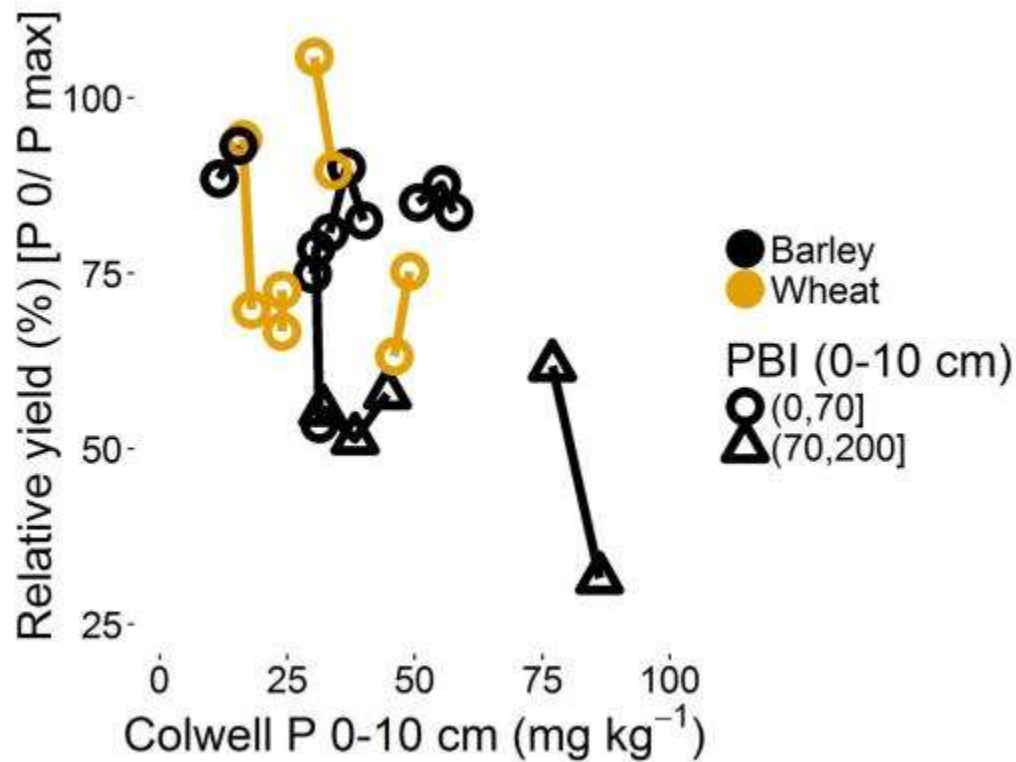
Conc. at anthesis	Lime applied 2012 (t/ha)		
	0	2.5	5
N (%)	1.5	1.4	1.4
K (%)	1.2	1.2	1.2

A significant response to P at Doodlakine but no interaction with lime.

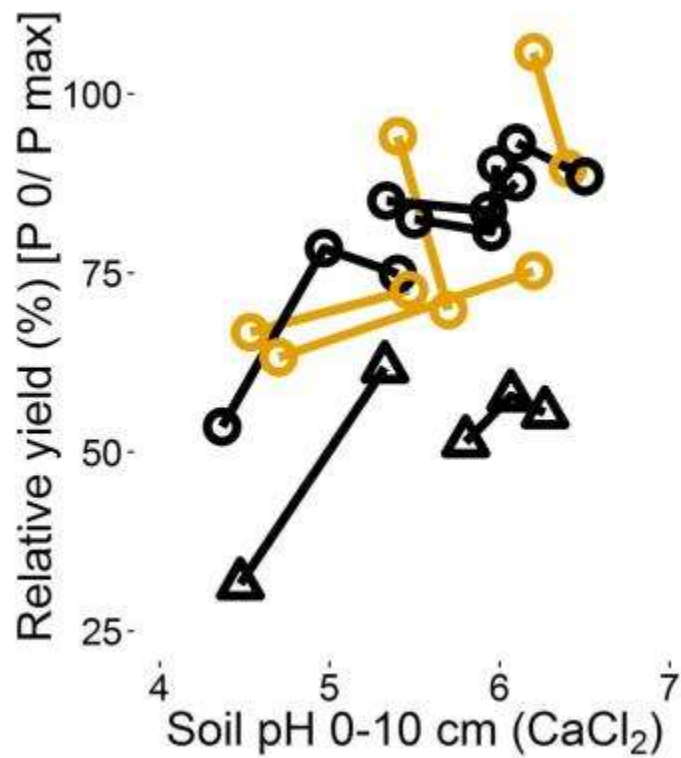


Conc. at anthesis	Lime applied 2012 (t/ha)		
	0	2.5	5
N (%)	1.3	1.2	1.2
Cu (mg/kg)	1.9	1.8	1.8

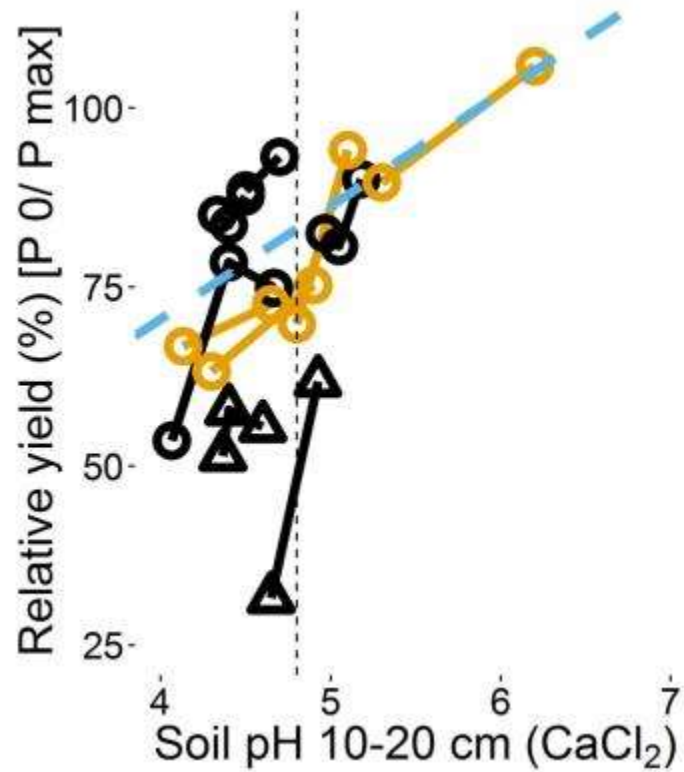
Relative yield was not well explained by Colwell P.



Relative yield showed a positive relationship with soil pH.



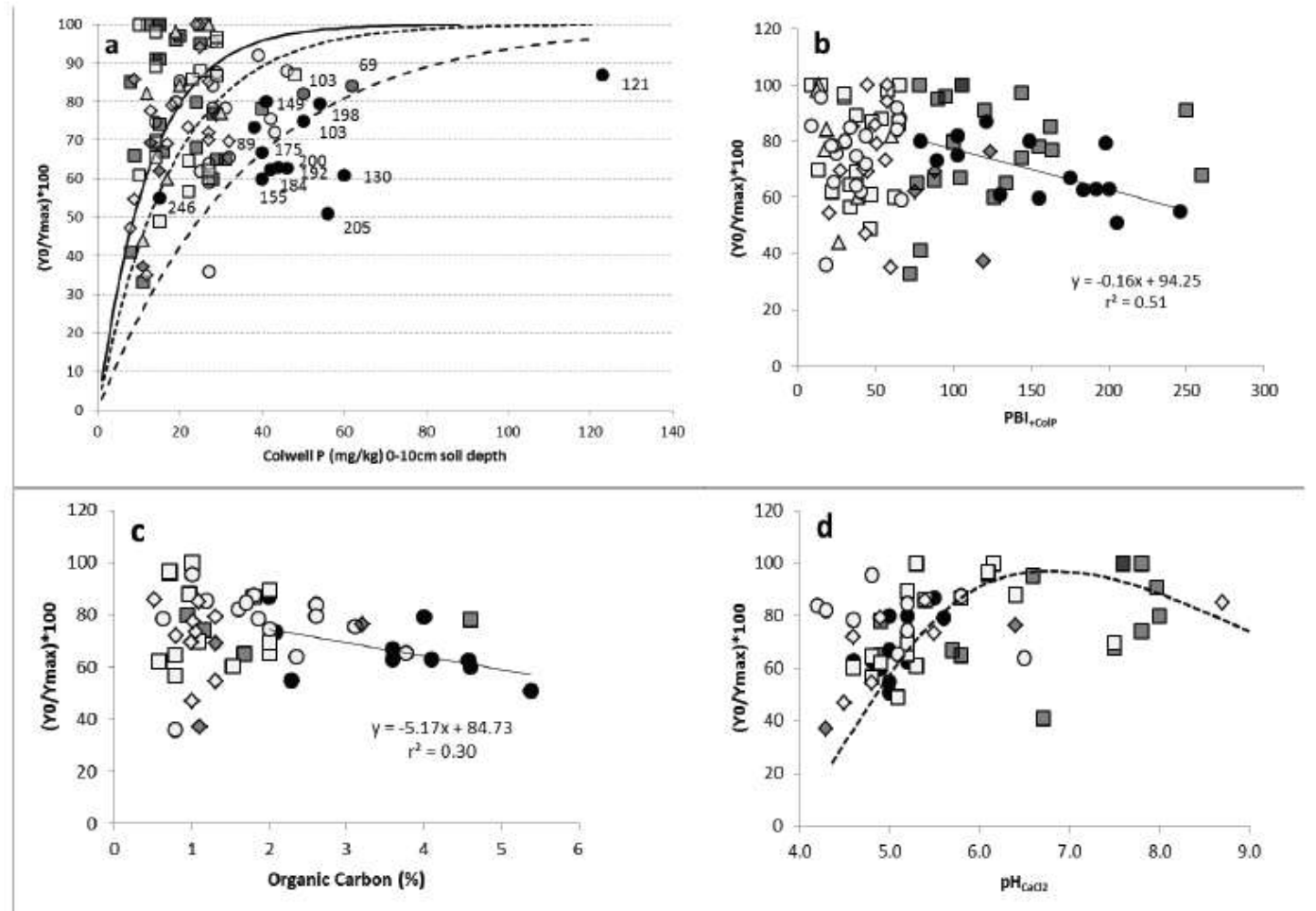
● Barley
● Wheat
PBI (0-10 cm)
○ (0,70]
△ (70,200]



● Barley
● Wheat
PBI (0-10 cm)
○ (0,70]
△ (70,200]

Multiple factors explain relative yield for P.

Organic carbon
PBI
Colwell P
Gravel content
pH (CaCl₂)
Previous crop
Soil texture



Key point 1: the level of complexity is high.

- High number of interactions between soil pH, soil properties and crop sequence.
- Our observations are a snapshot of site x management x season interactions.

Key point 2: some clarity is emerging.

- Relative yield (P_0/P_{max}) shows a positive relationship with pH from ~ 4 to 7.
- Large (>0.5) increases in subsoil pH required to achieve a meaningful change in relative yield.
- ‘Critical’ values are a useful guide:
 - 10 to 20 cm pH_{Ca} 4.8
- Tissue testing valuable for diagnosing constraints to yield response to lime or P fertiliser.

Acknowledgements



WEST MIDLANDS
GROUP



Department of
Agriculture and Food



GRDC Grains Research &
Development Corporation
Your GRDC working with you

GRDC Project DAW00222: More Profit from Crop Nutrition – Regional soil testing and nutrient guidelines - West

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Questions?