

Reduce acidity and choose a suitable wheat variety, Dandaragan

Christine Zaicou-Kunesch and Chad Reynolds, DAFWA
GRDC and WMG

Purpose: 1. Identify impact of amelioration on maintaining productivity of adapted varieties in a district.
2. Compare effect of amelioration on soil pH

Location: Peter Negus, "Cooligee", Dandaragan Rd, Dandaragan

Soil Type: Deep yellow sand

Rotation: 2012 pasture, 2011 wheat, 2010 pasture, 2009 wheat, 2008 pasture

Growing Season Rainfall (April- October 2013): 522.2mm

Soil Test Results:

soil pH(CaCl₂)- (0-10cm):5.41; (10-20cm):4.5; (20-30cm):4.37 and (30-40cm):4.33.

Summit soil test:

Al (CaCl ₂) (mg/kg)	PBI	P (Colwell) (mg/kg)	K (Colwell) (mg/kg)	S (KCL-40) (mg/kg)	EC (dS/m)	OC (%)	NO ₃ (KCl) (mg/kg)
0.4	30	17	78	6	0.08	1.65	18

NH ₄ (KCl) (mg/kg)	Cu (DTPA) (mg/kg)	Zn (DTPA) (mg/kg)	Ex Ca (BaCl ₂ /NH ₄ Cl) (meq/100g)	Ex Mg (BaCl ₂ /NH ₄ Cl) (meq/100g)	Ex Na (BaCl ₂ /NH ₄ Cl) (meq/100g)	Ex K (BaCl ₂ /NH ₄ Cl) (meq/100g)
1	0.25	0.72	4.29	0.45	0.17	0.2

BACKGROUND SUMMARY

Acidity is a major constraint to economic development. Varieties tolerance is not a 'fix' to soil acidity, but an opportunity to maintain productivity on paddocks constrained by acidity while a liming program is being developed.

Spading and liming are options to reduce soil acidity quickly and synergy of the combination of the two may provide an economic response through increase root exploration.

TRIAL DESIGN

Randomised block design

Plot size: 2m x 20m

Machinery use: 3m wide spader and 1.54m cone seeder

Repetitions: 3

Wheat varieties used: Bonnie Rock, Calingiri, Cobra, Corack, Emu Rock, Mace, Magenta, Westonia, Wyalkatchem

Seeding rates and dates: Approx. 65 kg/ha (TPP 150) on 28th May 2013

Fertilizer rates and dates: 100 kg/ha Agstar Extra on 28th May
40 L/ha Flexi N on 2nd and 18th June.

Other applications/ treatment rates and dates:

1. a) No spading, b) Spading on 14th May
 2. Liming (0 t/ha and 3 t/ha) on 17th April
- Harvested on the 13th November

RESULTS/STATISTICS

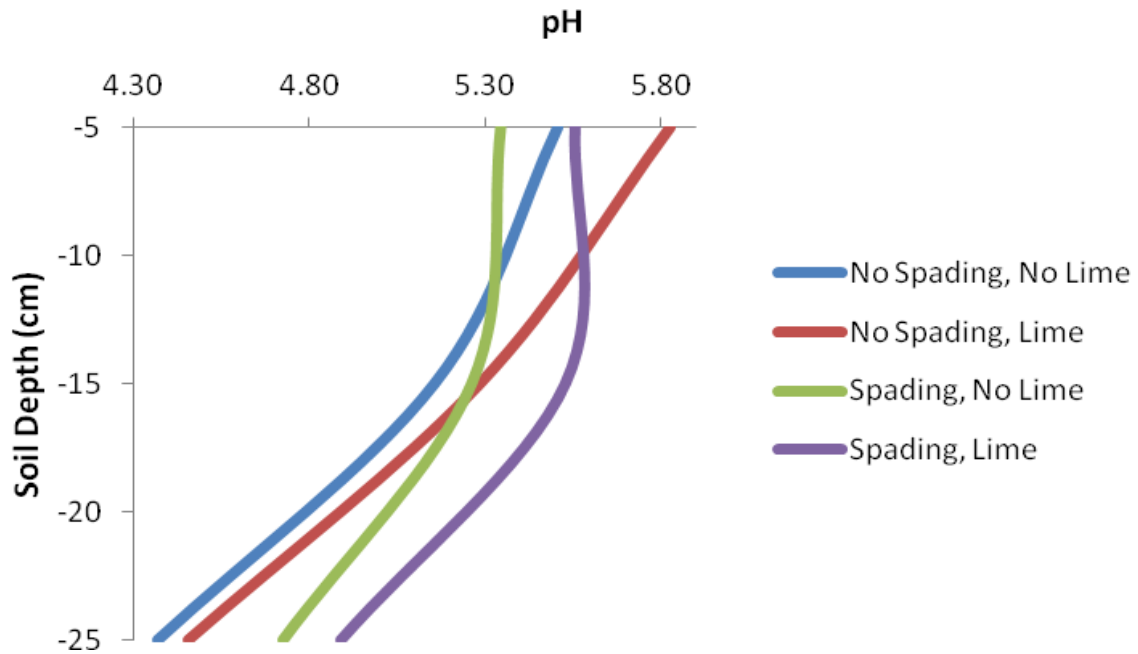


Figure 1. Influence of spading and liming on soil pH down the profile at Dandaragan.

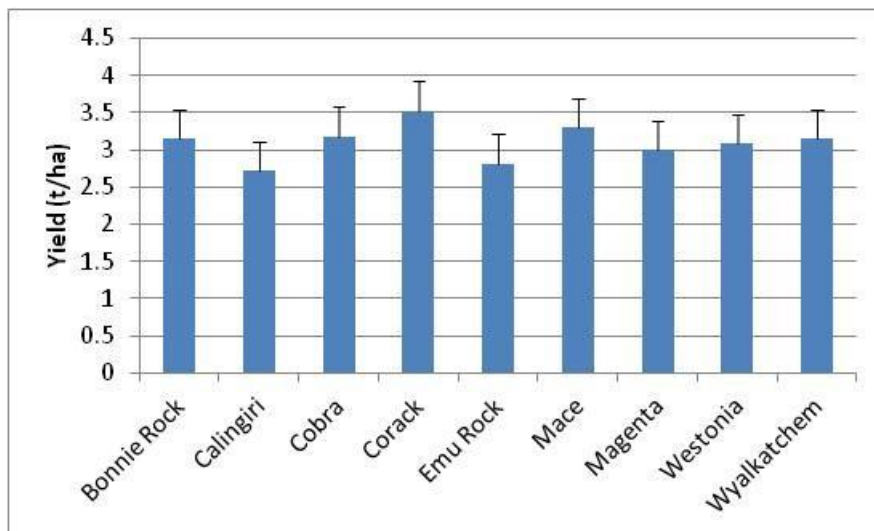


Figure 2. Grain yield (t/ha) of wheat varieties (averaged across soil amelioration).

OBSERVATION/ DISCUSSION/ MEASUREMENTS

Compare effect of amelioration on soil pH

Liming and spading had a significant effect on soil pH (Figure 1). The untreated plots (no spading and no lime) had a soil pH that declined from 5.5 to 4.3 down the soil profile. Simply spading the soil, without lime application, lowered the soil pH of the topsoil to because acidic subsoil is mixed with the top soil. Liming, without spading, has significantly increased pH levels on topsoil to 5.8 but no effect at depth. Liming together with spading has improved the soil pH at depth.

Identify impact of amelioration on maintaining productivity of adapted varieties in a district

Due to variability at seeding and weed control the impact of soil amelioration on productivity of the wheat varieties is not conclusive (CV = 16%). Liming (averaged across variety and spading), reduced yield from 3.2 t/ha to 2.9 t/ha ($p=0.009$, $LSD=0.2$). Spading treatments affected seeding depth. This resulted in variable and poor emergence in the spaded treatments. Wheat plant densities established were 85 plants / m² in the spaded treatment and 105 plants / m² in the un- spaded treatment. Brome grass control was not highly effective and variable across the site. These factors will have influenced the large variability in treatment effects. However future cropping across the trial area may indicate the treatment effects.

Corack and Mace were significantly higher yielding than Emu Rock (Figure 2) however black point is a risk factor for Corack. The other varieties performed similarly (Figure 2).

Spading treatments were carried out within a short period prior to seeding and plots were not rolled. This will have had a large influence on the variability of grain yield at the site. To improve future trial research liming and spading need to be carried earlier in the year for soil to settle before seeding or roll soil after spading to prevent machinery from sinking in soft soil.

PEER REVIEW

Chris Gazey

ACKNOWLEDGEMENTS/ THANKS

Acknowledge West Midlands Group for support with trial planning and extension opportunities, Peter Negus and Family for access to the property, Joel Andrew from Precision SoilTech for soil sampling and pH testing, Anne Smith, Jo Walker, Steve Smith and Trevor Bell, Technical Services Team, DAFWA for excellent technical support.