3.4.7 New fertiliser options for Australian agriculture - Inverleigh, Vic

Location:
Inverleigh Research Site.

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Background/Aim:
Adveco Fertilisers is a new entrant into the Australian fertiliser market and aims to develop fertilisers which contribute to soil and plant health. Adveco Fertilisers (through its parent Featherston Resources Limited) owns a large fertiliser grade diatomite deposit in the south island of New Zealand. Our diatomite source contains about 80% Silicon (Si), a nutrient considered beneficial in some plant species and has been shown to improve a plant's tolerance to insects and disease. It is often present in plants at levels similar to that of macronutrients calcium, magnesium and phosphorus.

Research across various crops including wheat, rice and sugarcane has shown Silicon can suppress the effects of disease and pests, improve plant growth and reduce soil toxicities. These beneficial effects are likely due to an improvement in soil quality, facilitation of uptake of beneficial minerals by the plant, suppression of uptake of toxic compounds or by direct uptake and incorporation of Silicon by the plant.

Adveco Fertilisers is developing a range of fertiliser and soil conditioners suitable for broadacre grain which deliver disease and pest resistance through our effective levels of Silicon and Carbon. The aim of this trial was to test our naturally derived fertiliser formulations against industry standards.

Take home messages:
- Adveco D, DZ and MAX all recorded grain yield higher (3-5%) than MAP at 50 kg/ha.
- At three rates of MAP (50, 100, 150 kg/ha) grain yield was higher in MAP plus Adveco Type W treatments compared to MAP without Adveco Type W.
- Plant vigour at Z31 and Z39 of Adveco D, DZ and MAX was similar to MAP at 50 kg/ha.
- Adveco® products had no detrimental effect on plant establishment and are safe to use on wheat.

Trial information:
A randomised block design compromising of four replicates was conducted. Derrimut wheat was sown at 71 kg/ha on the 5 June using a no-till sowing system. The trial was located on a fine textured clay loam soil. Soil test results showed the site had N 22 mg/kg, P 82 mg/kg and K 210 mg/kg. Soil Silicon was 28 mg/kg. Soil Silicon at other sites sampled in 2009 by Adveco Fertilisers ranged from 8 mg/kg on the coarse textured soil in WA to 70 mg/kg on the self mulching clays in Northern New South Wales.

Fertiliser application was as per protocol. MAP (Mono-ammonium phosphate) at 50 kg/ha was selected as a competitive comparison. Urea was topdressed on 2 September at 50 kg/ha. The trial was harvested on the 29 December. Data collected was subject to analysis of variance (ANOVA). Least significant difference (LSD) values were calculated at the 95% probability level.

Results and discussion:
Positive impacts on plant vigour
Significant differences between treatments were recorded for vigour at Z31 and biomass at Z39 (Table 1). The vigour of the Control (2.4) was significantly below MAP at 50 kg/ha and Adveco PLUS. Adveco PLUS recorded vigour equal to MAP at 100 kg/ha. The vigour of Adveco MAX (3.1) was significantly below Adveco PLUS (3.9). There was a rate response to increasing rates of Adveco Type W; Adveco Type W at 150 kg/ha (3.5) had higher vigour than MAP at 50 kg/ha (3.3). MAP + Adveco Type W did not record improved vigour compared to MAP alone.

At Z39 MAP at 100 kg/ha recorded the highest biomass (83), significantly higher than the Control (68), Adveco D (63), DZ (68) and Adveco Type W at 50 (63) and 100 (65) kg/ha. The biomass of Adveco PLUS and MAX tended to be below MAP at 50 kg/ha. There was an increase in biomass in relation to increasing rates of Adveco Type W. MAP + Adveco Type W did not record improved biomass compared to MAP alone.

Adveco® is safe to use on wheat
Significant differences were recorded between treatments for plant and tiller counts (Table 1). Plant counts varied from 123-155 plants/m^2 for MAP + Adveco Type W at 50 kg/ha and Adveco D, respectively. Plants/m^2 for Adveco PLUS and MAX tended to be slightly below MAP at 50 kg/ha. Tiller counts varied between 412-542/m^2 for Adveco MAX and MAP at 100 kg/ha, respectively. Tiller counts for Adveco PLUS (450) and MAX (412) were both significantly well below MAP at 50 kg/ha.

Yield gains using Adveco® products
Grain yield varied between 3.75-4.43 t/ha for the Control and MAP + Adveco Type W at 150 kg/ha, respectively (Table 1). Adveco DZ was the highest yielding Adveco® product at 4.15 t/ha followed Adveco D (4.08 t/ha) and Adveco MAX (4.07 t/ha). Adveco PLUS recorded grain yield equal to MAP at 50 kg/ha. There is a trend showing higher yield under MAP + Adveco Type W compared to MAP at equivalent rates.

Table 1. Vigour, plant counts, biomass, tiller counts and grain yield results from the trial conducted with Southern Farming Systems at Inverleigh in 2009.

	Assessment	Vigour	Plant Counts	Vigour	Biomass	Tillers	Grain Yield	Grain Yield
	Scale	1-5	/m²	0-100	0-100	/m²	t/ha	% MAP @ 50 kg/ha
Treatment	**Growth Stage**	**Z31**	**Z31**	**Z39**	**Z39**	**Z39**	**Maturity**	
Control - No Fertiliser		2.4	144	75	68	525	3.75	95
Adveco Type W	50 kg/ha	3.0	148	75	63	516	3.92	99
Adveco Type W	100 kg/ha	3.1	128	78	65	461	3.77	95
Adveco type W	150 kg/ha	3.5	135	78	73	483	3.88	98
MAP	50 kg/ha	3.3	145	78	78	496	3.97	100
MAP	100 kg/ha	3.9	148	73	83	542	4.27	108
MAP	150 kg/ha	3.6	125	80	78	484	4.14	104
MAP	50 kg/ha	3.0	123	78	70	510	4.24	107
Adveco Type W	50 kg/ha							
MAP	100 kg/ha	3.3	131	80	78	494	4.29	108
Adveco Type W	100 kg/ha							
MAP	150 kg/ha	3.5	132	80	70	445	4.43	112
Adveco Type W	150 kg/ha							
Adveco PLUS	100 kg/ha	3.9	137	75	73	450	3.97	100
Adveco D	100 kg/ha	3.0	155	78	63	479	4.08	103
Adveco DZ	100 kg/ha	3.4	150	80	68	492	4.15	105
Adveco MAX	100 kg/ha	3.1	134	80	73	412	4.07	103
LSD		**0.8**	**15**	**NSD**	**11**	**50**	**0.35**	

Summary:
Adveco Fertilisers made large gains in product development in 2009. In addition to Inverleigh the same protocol was conducted at four other sites throughout Australia in an effort to gain data on product performance in other environments. When the results were analysed they were similar to the results recorded at Inverleigh. We were encouraged by this and have again made a large commitment to R&D in 2010. Our focus in 2010 will be on testing a new range of formulas aimed at improving fertiliser efficiency, a long-term trial examining the soil amelioration potential of diatomite and further investigation on the impact of Silicon on broadacre crops. Adveco Fertilisers is committed to scientific, replicated trialling of all products, conducted by independent trial providers to deliver growers accurate data on product performance. Limited quantities of product are available for sale in 2010 with commercial orders available in 2011.

Silicon Research References:

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