Hopetoun 2006: surprising yield responses to zinc enriched fertiliser

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Take Home Messages

Previous trials and demonstrations have highlighted zinc deficiencies in both cereals and pulses, which could produce substantial profits over the cost of zinc. A trial conducted on wheat at Hopetoun in 2006, on a zinc responsive soil type with a good zinc history defined responses to zinc and demonstrated that responses to phosphorus or nitrogen cannot be achieved if zinc is deficient, in a drought year.

This trial also endorsed the conclusions from previous studies undertaken in 1999 and 2000 of trials, where regular applications of zinc enriched granular fertiliser were shown to be advantageous on these particular sites.

Background

Most of the Mallee soils are highly responsive to zinc fertiliser as they are alkaline, low in organic matter and have free limestone present. More regular applications of zinc in recent years have been necessary as the use of fertilisers with less zinc (1% compared with traditional 2%) are more commonly applied, particularly on crops sown at wider row spacing with less soil disturbance.

The general recommendation in previous years to regularly apply 2-3kg of zinc/ha with granular fertilisers over a 3-5 year period could now be revised to recommending 0.5 –0.75 kg of zinc applied each year, to ensure adequate levels.

Aim

To investigate the yield response of wheat to zinc enriched fertiliser, MAP and no fertiliser control.

Method

Four fertilisers Incitec Pivot Granulock Supreme Z, HiFert Zincstar 10, Australian Barley Board (ABB) MAP 1% Zinc, and MAP were sown at a rate of 12kg/ha of phosphorus.

The paddock history (See table 1) and a zinc soil test result (See table 2) of 1.5 (ETDA) indicate that this was not a zinc responsive site.

Table 1: paddock fertiliser history

Year	Fertiliser	Rate kg/ha	Kg P/ha	Kg Zn/ha
2005	MAP Zn 2%	30	6	0.64
2004	MAP Zn 2%	50	10	1.06
2003	MAP Zn2%	25	5	0.53

Table 2: Soil type and laboratory test results

	Status	**Comment**
Soil Type	Calcareous Sand Clay Loam	
Nitrate nitrogen	12.5mg/gk	55kgN/ha available (moderate)
Colwell P	18.5 mg/kg	Moderate
Zinc (ETDA)	1.5	Adequate
pH water	8.7	Very alkaline

Table 3: Fertiliser treatments and Results

Treatment	**Kg Zn/ha @sowing**	**Yield t/ha T/ha**	**Net return**	**Fert. Cost $/t**	**Fert. Cost per ha**	**Value of grain $ /ha**
Control	0	0.85	$212.50	0	0.0	212.5
MAP	0	0.901	$196.48	525	28.8	225.25
Granulock Supreme Z	0.55	1.121	$247.03	609	33.2	280.25
HiFert ZincStar 10	0.55	1.096	$241.33	599	32.7	274
ABB MAP Zn 1%	0.55	1.057	$235.61	525	28.6	264.25
	l.s.d.(0.05)	0.2686				

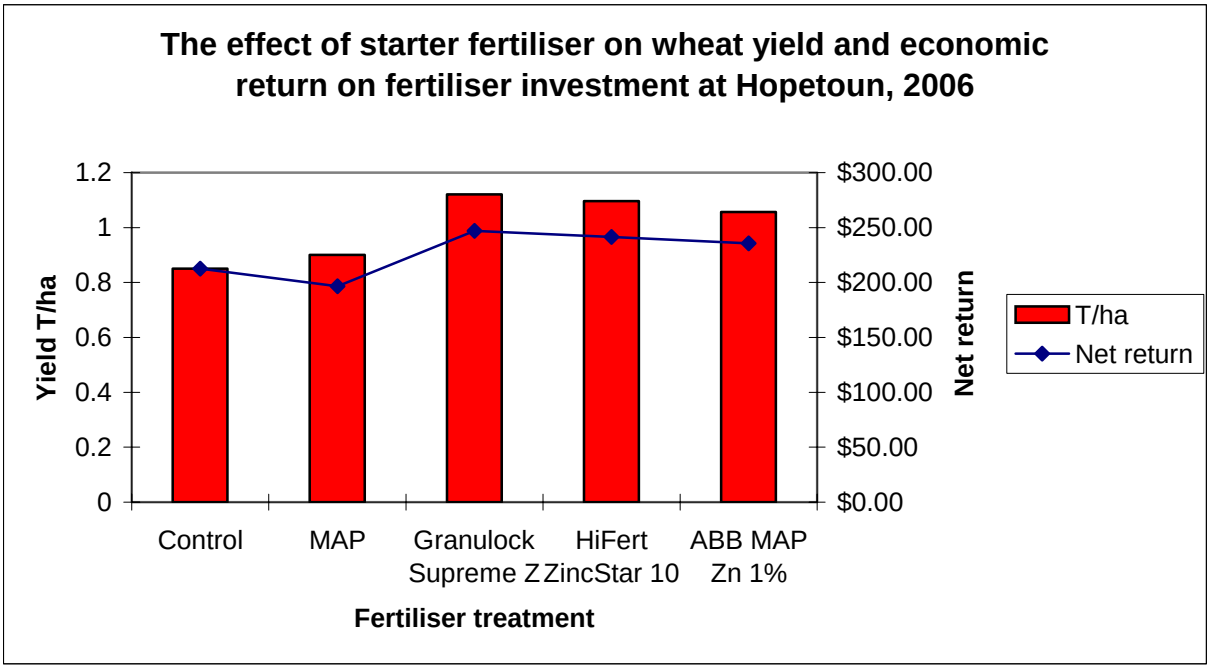

Figure 1: Grain Yield and Profit

Interpretation

This trial site was responsive to the application of Granulock Supreme Z. Possible reasons for this response could be:

- Granulock Supreme Z provides the highest water soluble, plant available Zn (approx. 30%) of all the treatments.
- The zinc paddock history may not be as positive as the history suggests. The total zinc applied in the previous 3 years was only 2.23 kg/ha and possibly in a plant unavailable form as compared to Granulock Supreme.

Commercial Practice

- Grain growers should have an understanding of each paddocks fertility, fertiliser history, soil pH and free limestone level and how these factors influence the availability of zinc.
- Records should be maintained for zinc application and nutrient audits completed. The old recommended levels of 2-3 kg/ha of zinc every 3-4 years can now be revised. Mallee grain growers could now be targeting an average application rate of 0.5kg of zinc per annum.
- If any paddocks do not meet these levels, then the application of Granulock Supreme Z should be considered first, followed up with foliar tissue tests during the growing season. A foliar tissue test is an accurate and timely method of determining if a foliar application of zinc is needed.
- If zinc has never been applied and zinc deficient crops have resulted, then a combination of applications may be necessary.
- The cost of applying zinc with the fertiliser is an extra $2-3/ha. If problems with zinc have been previously experienced, applications as a granular fertiliser, for example, as Granulock Supreme Z in the cropping rotation would be a safer option.