

Crystal green: a potential phosphorus replacement

Sarah Noack and Peter Hooper, Hart Field-Site Group

This trial has been coordinated and conducted in collaboration with Greg Butler, SANTFA.

Key Findings

- In the first year of trials (2012) a 75 kg/ha rate of Crystal Green significantly increased lentil yield by 18% compared to the nil (100%) and DAP treatments.
- In the second year of trials no carry-over effect of Crystal Green or DAP was observed on wheat grain yield.

Why do the trial?

Crystal Green (also known as struvite) is a product produced from urban waste water. Phosphorus (P), magnesium (Mg) and a low amount of nitrogen (N) are the main nutrients in Crystal Green. With increasing interest in removing phosphorus (P) from waste water, recovery of P in Crystal Green and using it as a P fertiliser has gained interest. Crystal Green has a low solubility in water and therefore is often suggested to be a slow-release supply of P.

This experiment was designed to compare Crystal Green with traditional DAP and urea applications alone and in combination. In the second year of trials the carry-over or slow-release properties of Crystal Green were evaluated on grain yield and quality.

How was it done?

Plot size	1.4 m x 10 m	Fertiliser	None residual effects of 2012 treatments
Seeding date	12 th June 2013	Variety	Scout wheat @ 70 kg/ha

Method

This trial was established in 2012 at Hart, where the Crystal Green was compared to MAP at two rates, 25 kg/ha and 75 kg/ha in a lentil production trial (Graph 1). The trial was designed using three randomised replicates.

In 2013 the same plots were over sown with Scout wheat to look at the residual effects of the fertiliser treatments. All plots in 2013 were assessed for grain yield, test weight, protein and screenings.

Results

In 2013 the trial aimed to assess the P nutritional carry-over of the fertiliser treatments applied in 2012. Grain yield ranged from 4.1 - 4.4 t/ha, averaging 4.2 t/ha across the whole trial. There was no significant effect of any fertiliser treatments on grain yield, test weight or screenings (Table 1). The only grain quality parameter to display any difference was grain protein. Crystal Green alone or applied with urea produced the highest protein levels 12.4 - 12.9%.

Based on these results Crystal Green applied alone or with urea or DAP in 2012 did not carry-over a significant amount of nutrients in 2013 to improve grain yield, when compared to the nil treatment. None of the fertiliser treatments increased grain yield compared to the nil treatment.

Table 1. Effect of fertiliser treatments applied in 2012 on grain yield (t/ha), protein (%), test weight (kg/hL) and screenings (%) in Scout wheat at Hart in 2013.

2012 Treatments	Nitrogen kg/ha	Phosphours kg/ha	Grain yield (t/ha)	Protein (%)	Screenings (%)
1. Nil (seed only)			4.1	11.9	2.2
2. DAP + TSP equiv CG 35 kg/ha	2	11	4.1	11.8	2.1
3. DAP + TSP equiv CG 100 kg/ha	5	32	4.3	11.5	2.1
4. DAP 35 kg/ha	6	13	4.2	11.7	2.1
5. DAP 100 kg/ha	18	36	4.2	11.7	2.1
6. CG 35 kg/ha	2	10	4.3	11.4	1.8
7. CG 100 kg/ha	5	28	4.3	12.4	2.9
8. CG + Urea equiv DAP 35 kg/ha	6	7	4.4	12.5	2.0
9. CG + Urea equiv DAP 100 kg/ha	18	20	4.4	12.9	2.5
LSD (P≤0.05)			ns	0.91	ns

CG = Crystal Green

TSP = triple super phosphate