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Effect of applied phosphorus on yield in chickpea

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Introduction

The availability of adequate phosphorus (P) is essential if chickpeas are to reach their full yield potential. Being a tap rooted plant chickpeas are not as good at thoroughly exploring the soil as cereals which have fibrous root systems. However, they are able to capitalise on a P source, like a fertiliser band very efficiently, by concentrating root activity in the fertiliser band.

If the area sown to chickpeas is to expand they will need to be grown on the areas of red soils of central NSW as well as the uniform clays in north western NSW. The red soils tend to have lower inherent P due to soil type and length of cropping.

Treatments

A trial was established at Tamworth Agricltural Institute (TAI) in 2012. In 2012, P was applied at sowing to cultivar PBA HatTrick$^{\Phi}$ at rates of 0, 5, 10 and 20 kg P/ha as Triple superphosphate. Additional treatments applied were Granulock SuPreme Z (20 kg P/ha, 10 kg N/ha and 1 kg Zn/ha) and Urea + Triple Superphosphate (20 kg P/ha, 10 kg N/ha).
This trial was sown on a low P (Colwell 16 mg P/kg) red duplex soil.

Results

- Chickpeas responded to applied P at 10 and 20 kg P/ha resulting in increased grain yield (Figure 1).
- There was a tendency for grain yield to be suppressed at 20 kg P/ha compared to when 10 kg P/ha was applied.
- Suppression of yield in PBA HatTrick$^{\Phi}$ at high rates of applied P has been seen in previous years.
- The Granulock SuPreme Z treatment had a similar grain yield to the 20 kg P/ha treatment (Figure 2).
- The Urea + triple superphosphate treatment had significantly lower grain yield than the 10 and 20 kgP/ha treatment (Figure 2).

Key findings

Under low soil P (Colwell < 20 mg P/kg) applying 10 kg P/ha at sowing gave a yield advantage of 13% over not applying P.

High rates of straight P (20 kg P/ha) tended to lead to yield suppression compared to 10 kg P/ha.

High rates of starter fertiliser (20 kg P/ha) also led to lower yields compared to when 10 kg P/ha was applied.

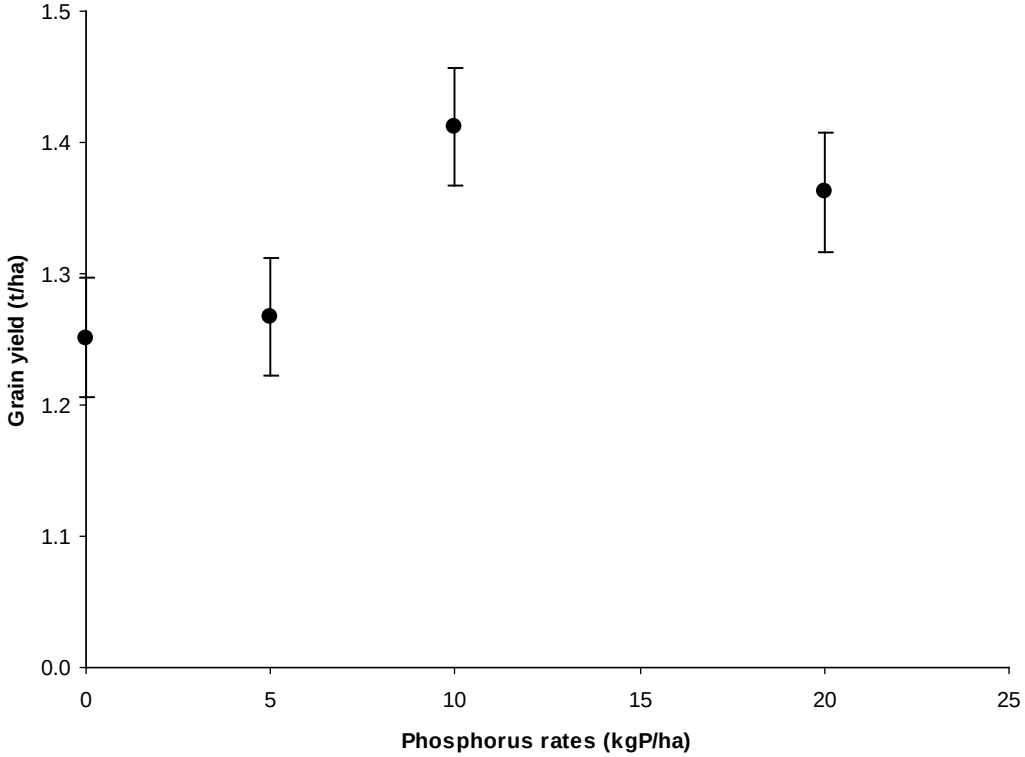

Figure 1: *Chickpea grain yield (t/ha) in response to applied P at sowing (Error bars indicate se ± 0.045 t/ha)*

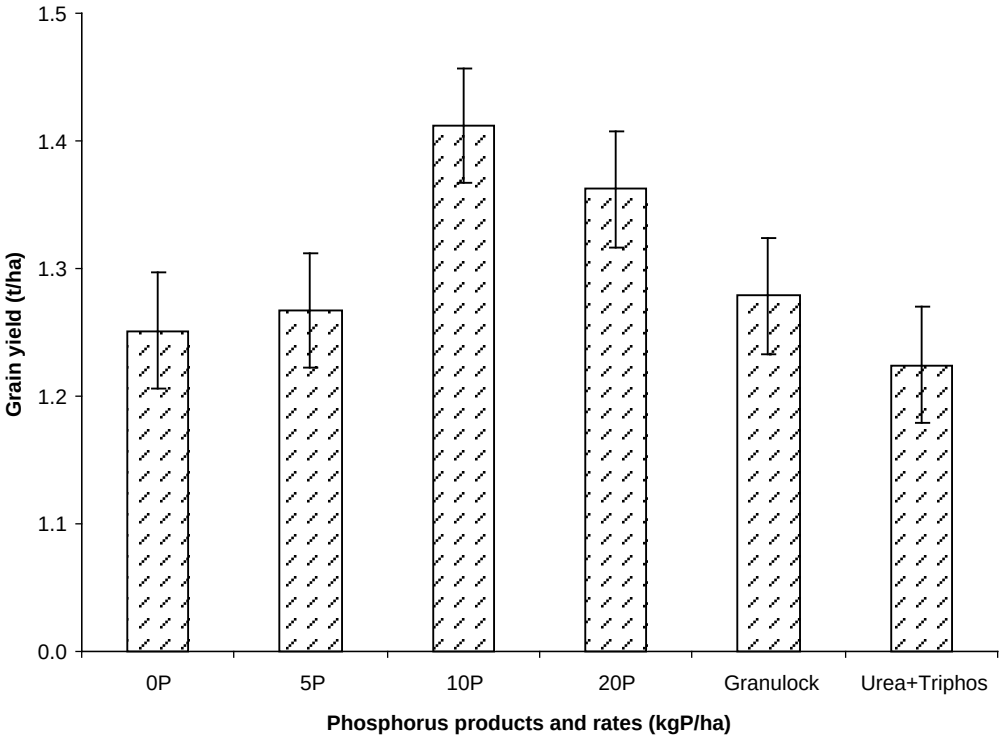

Figure 2: *Comparison of chickpea grain yield (t/ha) for rates of applied P plus Granulock Zn and Urea + Triple Superphospate (Error bars indicate se ± 0.045 t/ha)*

Summary

Chickpeas certainly respond to applied P, especially where available P is low. A rate of 10 kg P/ha gave a 13% yield advantage over not applying P.

Using a starter fertiliser such as Granulock SuPreme Z or a composite of Urea + Triple Superphosphate (TSP) gave no advantage over the straight Triple Superphosphate application. In fact, the composite of Urea and TSP had a significantly lower yield then these treatments, There was a tendency for yield to be suppressed at this higher rate (20 kg P/ha) which may suggest antagonism in the seeding furrow from high salt content due to these higher rates. At these high rates and at 40 cm row spacing approximately 4g of fertiliser is being applied per metre of row with the seed. This issue needs to be explored further.

Acknowledgements

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