

the deep P application at the highest rate (40 kg P/ha) effectively doubled the yield at the Dysart site (1,408 kg/ha) and quadrupled the yield at the Clermont site (1,298 kg/ha). Further to this, the Dysart chickpea crop was the fourth crop to be grown on the site since the original application of deep P.

Data also suggests that residual benefits from single deep banded P applications are strong, with continued significant grain yield responses to the application of deep P up to five years after the deep banded treatments were applied (Dysart site).

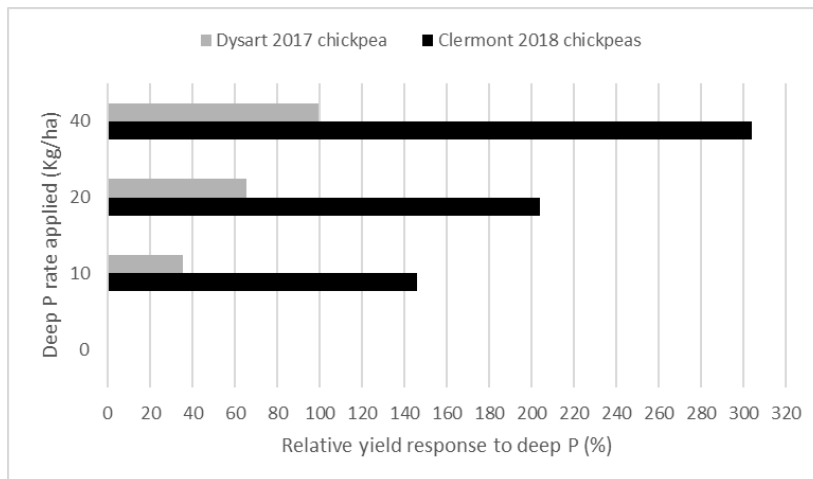


Figure 1. Relative grain yield responses to deep applied P treatments as a % of the zero P treatment for two chickpea crops that were grown with limited in-crop rainfall. Both these crops were also grown on sites that had limited surface (< 8 mg/kg) and sub-surface (< 3 mg/kg) Colwell P concentrations.

The difference in grain yields between 20 kg P/ha and 40 kg P/ha rates was negligible in most situations, although there were indications that in later years the yields were starting to diverge in favour of the higher rate (Dysart site) or in very dry conditions, the higher rate has an advantage (Clermont site).

The variability in the response to deep P requires more detailed analysis of this trial data, including P uptake in plant and grain tissue and an assessment of other potential yield constraints. Early indicators would suggest that there is no single factor that drives most of this variability but more a combination of factors such as P distribution in the surface and sub-surface layers, planting depth, timing and amount of in-crop rainfall and the root distribution of the crop species.

Conclusion

The placement of bands of P fertiliser at 20 cm to 25cm deep in the profile is an effective strategy for increasing grain yields in cracking vertosol soils that have been assessed as having a low P status (< 8 mg/kg Colwell P).

These findings have major implications for zero till farming systems based in the sub-tropics. The erratic in-season rainfall and the reliance on stored soil moisture means that P supply from surface soils is often limited and sub-surface supply of P is being depleted and not replaced.

References

- Bordoli JM and Mallarino AP (1998) Deep and shallow banding of phosphorus and potassium as alternatives to broadcast fertilization for no-till corn. *Agronomy Journal* Vol 90, 27-33.
- Glendinning JS (1990) AFL Fertilizer handbook. Australian Fertilizers Limited, North Sydney NSW.
- Raven PH and Johnson GB (1989) *Biology*. Chapter 36 Nutrition and Transport in Plants, pp 729-732, Times Mirror/Mosby College Publishing, St Louis Missouri.