



Macro Prima™ for In-Furrow Liming on Acid Soils

Acidic soils limit agricultural production: low soil pH reduces nutrient availability, increases aluminium toxicity and lowers yield potential. In the last 20 years, topsoil and subsoil acidity has increased dramatically, and the subsequent loss of production continues to impact growers' bottom-line returns. Existing subsoil acidity is costly and difficult to treat with historical methods. Remediating generated acidity in the furrow improves fertiliser efficiency, early plant vigour and limits the effect of aluminium toxicity.

The Historical Approach for Treating Acidity

Agricultural lime has traditionally been used to remediate soil acidity on a whole-paddock basis, usually spread across the soil surface. Over time, application rates have been cut back due to budget constraints and rising transport costs. With no-till seeding in broadacre cropping areas, surface-applied lime has limited opportunities to be mixed into the soil profile. One-size-fits-all liming management plans are no longer affordable or effective. Farming technology has changed, yet the historical approach to lime evaluation remains, with limited results.

The Modern Approach

Applying Macro Prima™ is a viable alternative to applying excess fertiliser. Macro Prima™ works by remediating the generated acidity from in-furrow ammonium fertilisers through nitrification. Its reactivity provides immediate control of damaging concentrated acid in the germination zone, allowing nutrients to be more available for preferential uptake.

Identify the Cost of Doing Nothing

Wilchem® Macro Prima™ should not be seen as a lime replacement to remediate existing acidity, but as a strategy to prevent further acidification from banded fertiliser going forward. Managing furrow pH leads to better nutrient recovery and improved efficiency from applied fertiliser. An improved pH in the root zone also increases biological activity and root enhancement. Phosphorus availability is particularly affected by pH; recovering some of the past investment in these nutrients can free up capital for a broader soil remediation program.

The Permanent Result of Doing Nothing

The lethal result of generated acidity is leaching of the acid into the subsoil. Most soil testing has identified this subsoil acidity problem. Accompanied by sodium and aluminium, it lowers the plant's resistance to moisture stress and disease, leading to a more permanent and costly problem for farmers to remediate going forward.

If we focus on the generated acidity from nitrogen-based fertilisers and the concentration of acidity in the furrow under no-till and wider tine spacing (compared with spreading the same application across the surface of 1 ha / 10,000 m²), the problem becomes clear:

- 12" spacing with 40 mm furrow width places all fertiliser in 1,332 m² (increased generated acidity of 7.50 times the hectare surface area).



Beverley WA — Soil pH and Yield Response

Soil was an acid red loam in the 10–12 CEC range, growing wheat. Average soil pH was measured 10 cm directly under the base of the plant, with corresponding average yield. Macro Prima™ at 5 L/ha improved root-zone pH and increased yield by a small percentage, while rates of 10 L/ha had a major effect on localised acidity and produced dramatic improvements in yield. All sites received 65 kg of MAP at seeding. (Source: Injekta)

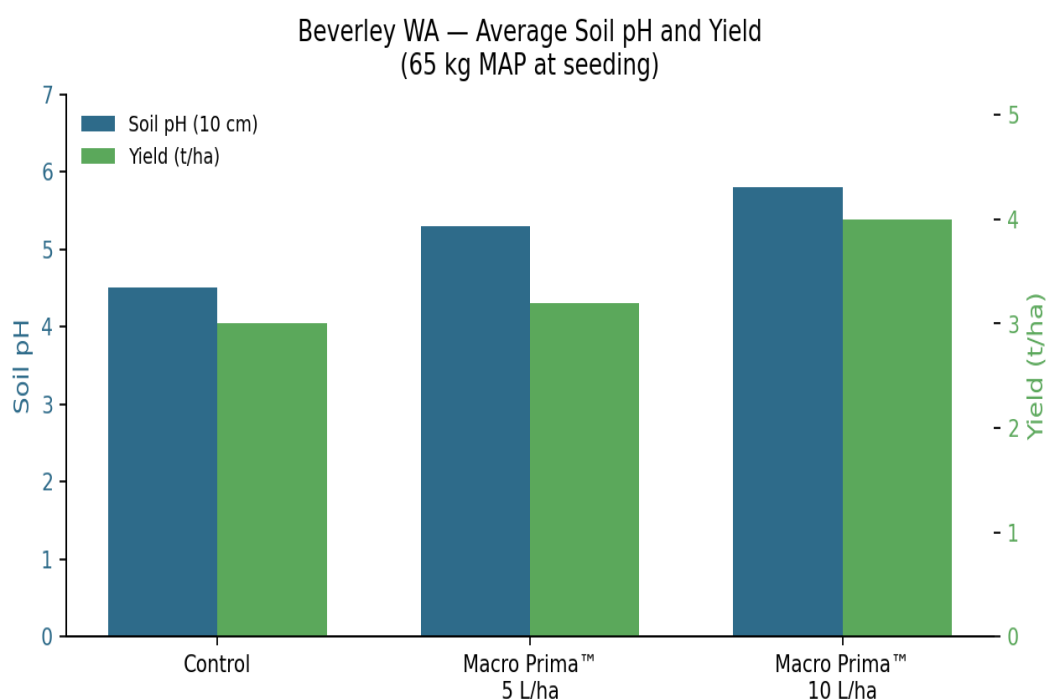


Figure 1. Average soil pH (10 cm under plant base) and corresponding yield response to Macro Prima™ rates.

More Recent Trial Results — Central NSW

Over three seasons a commercial company trialled Macro Prima™'s effect on high-acid and high-aluminium loams in central NSW. Macro Prima™ was applied in-furrow at seeding with standard fertiliser, alongside a control. The trial ran for three years and Macro Prima™ treated plots were rated number one following statistical analysis. A total of 42 replicated trials were conducted on this site by a professional trial company.

These trials support earlier work conducted in various locations in WA. Wilchem Agriculture has benchmarking data quantifying the reactivity of Macro Prima™ on generated acidity compared with traditional calcium carbonate requirements. The ease of injecting Macro Prima™ at low rates in the furrow at seeding makes it a cost-effective product for improving fertiliser efficiency.



Central NSW Yield Results

Wheat — Liquid Injection Trial

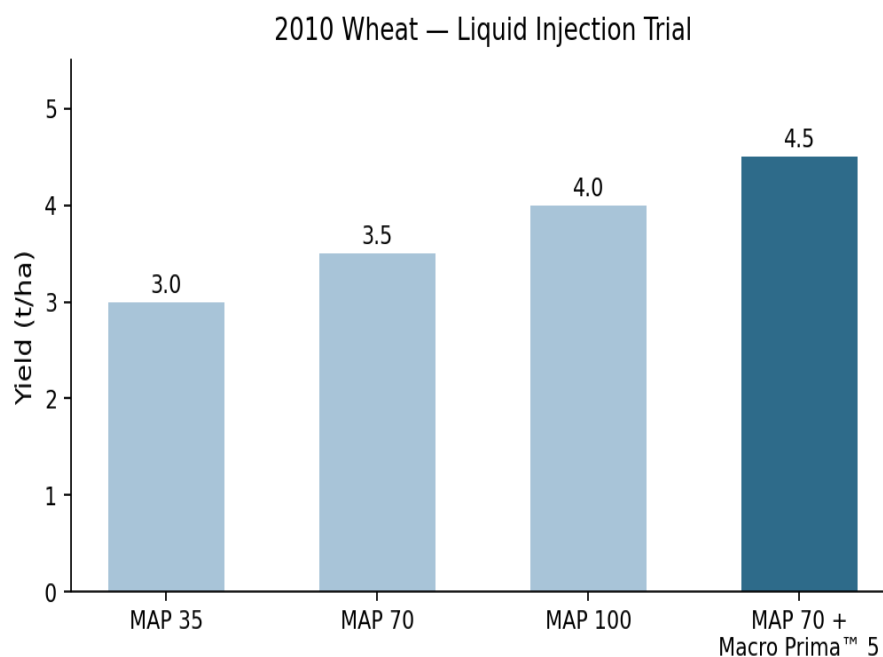


Figure 2. Wheat yield response to MAP rates with and without Macro Prima™ (5 L/ha).

Canola — Liquid Injection Trial

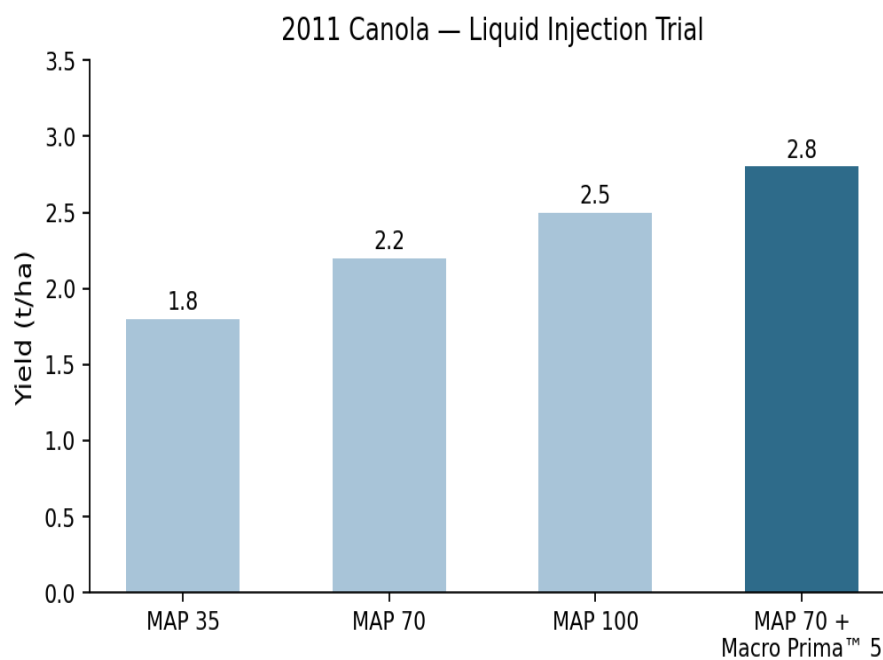


Figure 3. Canola yield response to MAP rates with and without Macro Prima™ (5 L/ha).



Wheat — Liquid Injection Trial (Central NSW)

2012 Wheat — Liquid Injection Trial

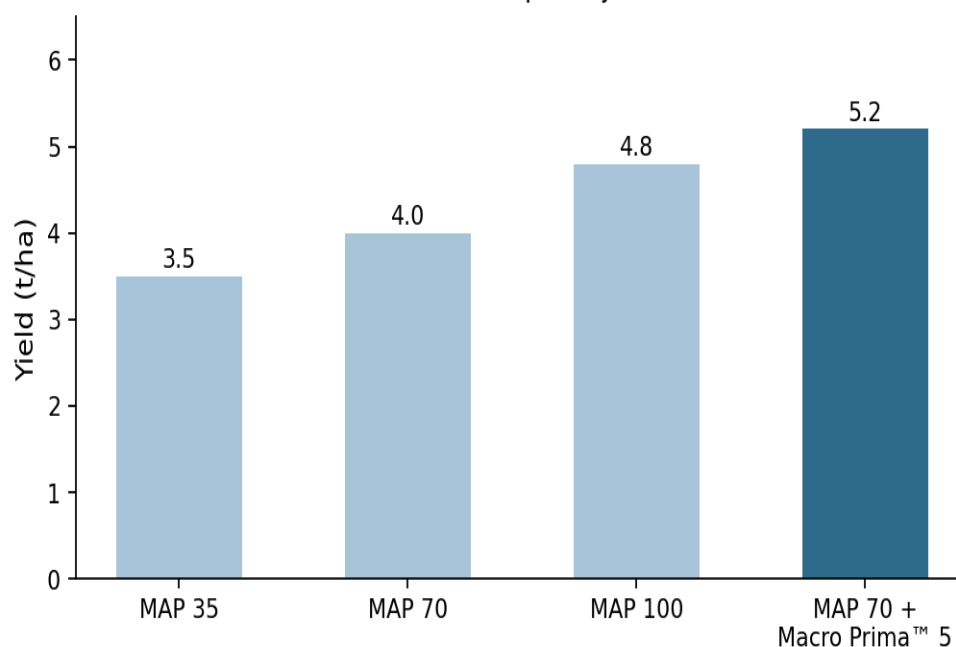


Figure 4. Wheat yield results from liquid injection trials comparing MAP rates with and without Macro Prima™.

Conclusion

Macro Prima™ used in cropping trials has shown the ability to remediate generated acidity and, in most cases, increase yield potential. Improving the preferential uptake of phosphorus into the plant is a likely basis for the net gains observed. Over the three-year trial period the Macro Prima™ plot produced approximately 1.50 t/ha above the control plot of 70 kg/ha MAP. Using average prices of wheat at \$280/tonne and canola at \$600/tonne, the net return is approximately \$456.80/ha.