

What the Native Pasture Trial Results show

At the start of the trial, baseline phosphorus (P) levels of the soils (Colwell-P) indicated that soil P was very low (between 5 and 10 mg/kg in 0-10 cm soil layer) across all sites indicating that there should be a plant growth response to applying a P fertilizer. The target soil P level (Colwell) based on the soil Phosphorous Buffer Index (PBI) to achieve 95% of maximum plant growth at all three sites is ~25 mg/kg.

Former trial work conducted across the district has highlighted that soil P is usually one of the most limiting nutrients to pasture growth. In this project we assessed a range of 'alternative' P fertilizer products that are currently being promoted to farmers. The quantities of the different forms of P in the products trialled varies.

Differences in pasture production were recorded on the plots at the trial sites and this is likely to be due to the varying forms of P present in each of the fertilizers.

- Products delivering a significant proportion of water soluble P stimulated pasture growth; i.e. single superphosphate, SEP pig manure and Agriash.
- Products containing a significant proportion of unavailable P forms stimulated plant growth to a lesser extent, and took longer to do so; i.e. YLAD Compost Mineral Blend, BioAg Blend and Dical 64.

Note that some products contain a mix of both plant available and unavailable P forms; i.e. Agriash, SIP Pig Manure, Groundswell Compost and Trio-min/Eco-min Balance.

Significantly higher levels of soil P (Colwell) treated with Agriash, single superphosphate and SEP Pig Manure products, compared to the control, were demonstrated statistically (see graph below for data on each trial site). The Colwell method of P extraction is indicative of the amounts of P present in the soil that plants can access.

Among the agricultural research and extension sectors in Australia there is much experience in using the P (Colwell) test for measuring P availability in soil and interpreting the relationship with plant growth, especially for soluble P fertilizers. However, there is less experience with using the (Colwell) P test with fertilizers containing more slow release forms of P. The (Colwell) soil P data collected under the alternative fertilizer products does not always show as strong a relationship between the soil P levels and pasture growth response as might be expected.

This study has highlighted that when using alternative fertilizer products care must be taken when interpreting P (Colwell) levels. Only time and experience will allow us to learn how to interpret the reliability of these soil tests in relation to pasture growth when using alternative fertilizer products with less soluble forms of P. Plant growth response remains the best guide as to which fertilizer to use, along with an analysis of the costs to obtain, transport and apply alternative forms of P fertilizer.

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The Importance of Phosphorus in Pasture Production: Lessons from the Native Pasture & Alternative Fertiliser Trial (Binalong/Bookham)

A replicated field trial managed by Binalong Landcare, subgroup of Harden Murrumburrah Landcare Group, with technical support from NSW Dept of Primary Industries



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Plant Growth in Pastures and the Importance of Phosphorus?

Of the 90 known elements that occur naturally only 14 or 15 are crucial for plant growth. The most important of these are phosphorus (P) and nitrogen (N), the latter being commonly addressed by a legume component in pastures.

P is an essential nutrient to support strong and healthy plant root development. In native pasture stands it stimulates the legume component which in turn elevates the N status in the soil, thus enhancing native perennial grass growth.

Australian native plants have an ability to persist under low phosphorous conditions but will also thrive under higher soil fertility conditions. When P is applied to soils, less than 5% of total P applied as superphosphate or ammonium phosphate fertiliser is absorbed by plants.

This is because the water soluble P that moves from the fertiliser into the wet soil reacts rapidly with other elements, principally calcium, iron and aluminium in the soil solution and on the surfaces of soil constituents (adsorption) to form a range of insoluble compounds (Barrow 1980).

Thus there are different forms of P to be found in soils:

- Water soluble P (plant available now)
- Citrate soluble P (available to plants in weeks or months)
- Citrate insoluble P (available to plants over years – a very slow release form of P)
- Organic P (varying levels of solubility)

If P deficiencies are not addressed plant growth will be limited result in lower animal production (see plant growth in pot trial picture). Appropriate use of fertilisers will improve feed quantity and quality.



The Binalong Native Pasture Trial

The Trial is based at 3 sites: “Glenroy” at Binalong, and “Kia Ora” and “Te Kooti” at Bookham. The Trial commenced with baseline measurements taken in 2008, followed by regular collection and analysis of soil nutrients, pasture production, botanical composition and soil microbiology over 2009-2012.

Each site has 3 replicates of 11 plots (2m x 10m): 10 fertiliser products as well as a control (no treatment). Rates of application are provided by the fertilizer suppliers based on the soil test results for each year. Details of the treatments are available in annual updates. Regular field days are held in autumn or spring and attract landholders and agronomists from all eastern states.

