

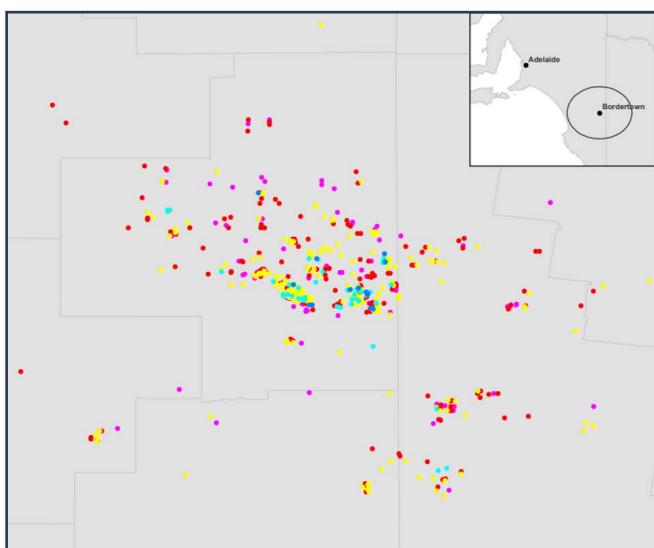
Colwell P Summary

Bordertown Regional Insights



Phosphorus is an essential nutrient for plant growth. It has a key role in building plant structure compounds and as a catalyst in the conversion of numerous key biochemical reactions in plants, such as photosynthesis. Phosphorus is critical for the overall health and vigor of all plants.

Across the breadth of Bordertown region Cowell P data from 619 paddocks can provide valuable insights into soil P levels and the variability seen at the sub-paddock. Across the entire dataset, the average paddock Cowell P was 32 mg/kg, ranging from 5 to 122 mg/kg. Figure 1 shows the spatial distribution of paddock average Colwell P. While the critical Colwell P levels will vary significantly due to the soils Phosphorus Buffering Index and crop type, we can use an indicative critical value of 35 mg/kg to aid in the interpretation of the data. In this region 58% of paddocks had an average Colwell P of less than 35 mg/kg.



pH (CaCl2) 0-10cm

- Below 23.9
- 24.0 - 34.9
- 35.0 - 52.9
- 53.0 - 70.9
- Above 71.0

Figure 1. Average Cowell P data for the Bordertown Region (2018-2022) by individual paddocks.

More importantly, 92.5% of paddocks had a minimum Colwell P of less than 35 mg/kg suggesting that at least some areas of most paddocks are potentially P limited.

Similar to other soil constituents, Colwell P was highly variable within a paddock (Figure 2.), with an average of 44 mg/kg variance within a paddock (ranged from 1-301mg/kg). This variation suggests that there is significant potential for variable rate capital P applications to address soil constraints and optimise fertiliser use.

Soil Colwell P - Bordertown Region

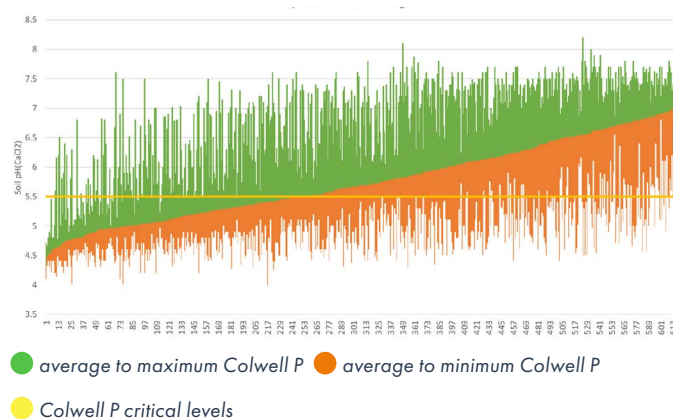
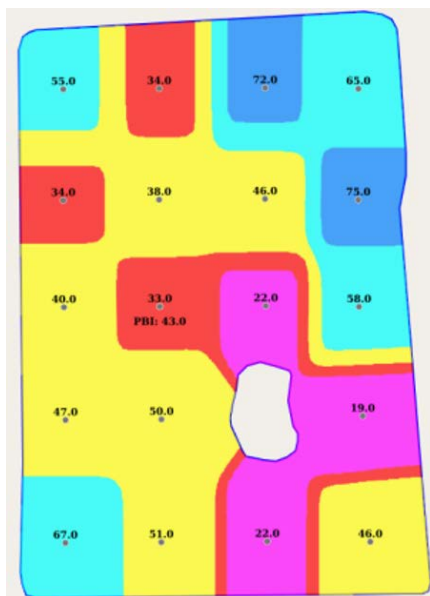


Figure 2. Soil Colwell P data for 319 individual paddocks sorted by average Colwell P. The orange line is the average to minimum P values and the green line is the average to maximum Colwell P in individual paddocks. The yellow line represents a Colwell P critical value of 35 mg/kg.

WHAT DOES AN AVERAGE Paddock LOOK LIKE:

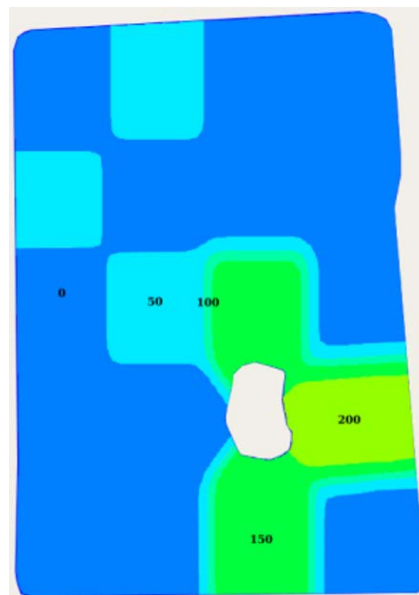
These results may be best understood through a Colwell P map of an individual paddock. This paddock (Figure 3.) was tested in 2021 with an average Colwell P of 46 mg/kg (ranging from 19-75 mg/kg).



■ Below 23.9 mg/kg
 ■ 24-34.9 mg/kg
 ■ 35-52.9 mg/kg
■ 53-70.9 mg/kg
 ■ Above 71 mg/kg

Figure 3. Soil nutrient map showing the Colwell P across a paddock. The average Colwell P was 46 mg/kg (ranging from 19-75 mg/kg) highlighting 28% of that paddock was underperforming, despite a reasonable paddock average.

By utilising the variable rate seeding technology, we are able to readily create a variable rate application (Figure 4.) that will target the low P regions to increase the base level of P up to 35 mg/kg.



■ 200 kg/ha
 ■ 150 kg/ha
 ■ 100 kg/ha
■ 50 kg/ha
 ■ 0 kg/ha

Figure 4. Variable Rate MAP application map to target lifting the minimum Colwell P regions to 35mg/kg.

This application map requires an average of 38kg/ha of MAP applied across the paddock to a total of 1.5 tonnes. By improving the base P levels throughout the paddock, the on-going annual P-replacement strategy can become more sophisticated and targeted.

Regular soil testing is critical for monitoring P levels to maintain critical P levels and to track that sufficient P is used to replenish the soil. This is particularly important when wheat can remove 3kg/t, grass pasture can remove 3kg/t of dry matter and milk production can remove 1kg/t of liquid. Knowing that the P capital is being continually mined, without a strategic P strategy to address constraints and replace the removed P, the soil will continue to degrade and productivity will drop.

