

Trial 26

Long Term Phosphorus/Nitrogen Interaction Trial

Site sown to field peas in 1995. Phosphorus only applied, nitrogen to be re-applied in 1996 to wheat. The phosphorus rates used have now been applied for 2 consecutive years.

Phosphorus Rate kg/ha	Plants /m ²	Dry Matter kg/ha	Yield t/ha	WUE kg/mm	Profit \$/ha
0	46	1625	1.31	5.6	
5	56	2486	2.09	8.9	\$162
10	56	3842	2.60	11.2	\$266
20	51	3934	2.84	12.2	\$299
40	50	4110	3.03	13.0	\$303
60	53	4575	3.15	13.2	\$292

Note: 1. Profit is the value of the extra grain produce less the cost of the fertiliser applied.
2. Peas valued at \$220 tonne farm gate, phosphorus costed at \$1.88/kg on farm.

Discussion:

In this field pea trial, significant yield responses were achieved up to 20kg phosphorus/ha. Although grain yields continued to increase above this rate, the returns were maximised at this point. Water use efficiency calculations for this pea crop also show that at the higher rates of phosphorus, the crop reached its potential.

One important point to note is that these results were achieved in the second year of the trial, the first year (wheat '94) being a failure and thus little nutrient was removed from the soil bank.

Applying phosphorus significantly increased dry matter production in the peas. Retaining heavy legume stubbles results in the return of large amounts of organic carbon to the soil. This benefits the soil in the longer term by way of improved fertility and soil structure. With high yields, however, large amounts of nitrogen are exported out the farm gate (around 40 kgN/tonne of peas) so big legume stubbles do not necessarily mean large increases in soil nitrogen but can lead to a slowing of soil nitrogen depletion under intensive cropping rotations.

There was a noticeable reduction in crop emergence and seedling vigour where no phosphorus was applied. Although plant establishment appeared to be reduce at higher rates of phosphorus, yields were still increased through better crop nutrition. Under some conditions, (sandy soils, marginal soil moisture) phosphorus rates greater than 30 - 35kg/ha may start to impact on legume crop emergence to the detriment of grain yield.

Take Home Message:

Field peas are responsive to the application of phosphorus. In the Mallee, peas sown on low phosphorus soils (below 15ppm Colwell) should be sown with 13 - 15 kgP/ha. In higher P soils, rates should be 10 - 13 kgP/ha. The benefits from using phosphorus fertilisers on field peas include increased dry matter production, higher nitrogen fixation, and improved crop emergence and seedling vigour.