

Trial 7

The Phosphorus Nutrition of Winter Crops in Relation to Soil P Tests and Vesicular-Arbuscular Mycorrhizae (VAM)

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AIM:-

This project, which is funded by the Grains Research and Development Corporation, commenced in 1993 to examine the scope for using soil tests to more effectively allocate phosphorus fertiliser expenditures between paddocks and through time (eg. after good and bad seasons). It is also sought to examine the role of vesicular-arbuscular mycorrhizae (VAM), often referred to as the “friendly fungi” in the phosphorus nutrition of winter crops in Victoria.

Table 1 Nutrient levels in Barley At Early Tillering And Final Grain Yield For Different Rates of Applied Phosphorus

Phosphorus (kg/ha)	Nitrogen (%)	Phosphorus (%)	Zinc (mg/kg)	Boron (mg/kg)	Sulphur (%)	Grain Yield (t/ha)
0	4.50	0.45	17.0	11.0	0.34	2.68
7.5	3.91	0.39	13.8	9.7	0.28	2.90
15	4.15	0.52	14.6	11.7	0.36	3.49
30	4.31	0.61	19.0	11.6	0.37	3.17

Table 2 Nutrient levels in Canola At 4 to 5 Leaf Stage And Final Grain Yield For Different Rates of Applied Phosphorus

Phosphorus (kg/ha)	Nitrogen (%)	Phosphorus (%)	Zinc (mg/kg)	Boron (mg/kg)	Sulphur (%)	Grain Yield (t/ha)
0	4.25	0.47	24.7	25.4	0.31	0.12
7.5	4.16	0.51	30.8	26.3	0.31	0.21
15	3.94	0.51	28.4	25.5	0.31	0.15
30	3.75	0.51	28.8	26.1	0.33	0.2

Table 3 Nutrient levels in Chickpeas At 4 to 5 Node Stage And Final Grain Yield For Different Rates of Applied Phosphorus

Phosphorus (kg/ha)	Nitrogen (%)	Phosphorus (%)	Zinc (mg/kg)	Boron (mg/kg)	Sulphur (%)	Grain Yield (t/ha)
0	3.59	0.31	21.6	29.6	0.20	2.76
7.5	3.56	0.39	20.9	27.9	0.21	2.68
15	3.65	0.44	18.3	28.5	0.22	2.54
30	3.46	0.44	17.6	27.1	0.21	2.74

Interpretation

Barley - Tissue levels of Zinc were less than adequate and levels of nitrogen were marginal. Tissue levels of other nutrients were adequate. Tissue levels of phosphorus tended to increase with increasing rates of applied phosphorus. Yields also increased with increasing rates of applied phosphorus up until the 15kg/ha phosphorus rate. Increasingly the phosphorus rate from 7.5kg/ha to 15kg/ha returned an extra \$140 per hectare for an outlay of around \$14 per hectare.

Canola - This site was deficient in zinc and sulphur which resulted in very low yields. There was little yield response or change in phosphorus tissue levels with increasing phosphorus rates. Increasing the rates of phosphorus did not compensate for the deficiency in sulphur and zinc.

Chickpeas - All nutrient levels were adequate. Applying more phosphorus did increase the tissue levels of phosphorus, although levels were adequate where no phosphorus was applied. This would explain why applying or increasing the rates of phosphorus did not increase yields.