EFFECT OF LONG-TERM APPLICATION OF PHOSPHORUS FERTILIZER ON BICARBONATE-EXTRACTABLE SOIL PHOSPHORUS IN A MYWYBILLA SOIL

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This poster reports on changes in soil bicarbonate-extractable phosphorus (P_B) following nine additions of four rates of fertilizer phosphorus (P) to a Mywybilla clay in a dryland sorghum/barley rotation on the central Darling Downs, Queensland.

MATERIALS AND METHODS

Soil samples (0-10 cm depth) for P_B analysis (2) were taken from each P rate that received 0 or 120 kg/ha N presowing in each crop. Sample collection was carried out in August 1993 after nine cropping cycles spanning a ten year period.

RESULTS AND DISCUSSION

After nine crops, P_B in the soil increased significantly ($P<0.05$) with P application rate (Table 1), the increases being greater for those treatments receiving no fertiliser N.

Table 2. Effect of four rates of P on the P_B (mg/kg) of the soil after nine separate fertiliser applications.

Annual fertiliser P (kg/ha)	Annual fertiliser N (kg/ha)		
	0	120	Predicted
0	14.1	12.4	10[1]
10	31.6	24.1	25
15	35.8	33.4	33
20	56.9	40.6	41

[1] Mean soil P_B value found prior to the first crop (range 7-13 mg/kg).

The rate of increase in P_B was found to closely fit the soil P prediction equation described by Best *et al.* (1), $P_B = P_B^0 + 0.3\ [\sum 4/(4+(n-1))]R$ where P_B^0 is the initial soil P_B concentration, n is the number of years of application and R is P fertiliser application rate. Where no nitrogen was applied, the prediction of residual P was inferior ($R^2=0.86$) to that when N was applied ($R^2=0.99$). Given the close correlation of the actual and predicted results from this experiment, with nitrogen adequate conditions, the equation may be applicable to cereal crop rotations on a range of clay soils.

REFERENCES

1. Best, E.K., Strong, W.M., Cooper, J.E., Glasby, J.M. and Pumfrey, A. 1991. Queensland Wheat Research Institute Biennial Report 1986-1988. pp. 91-93.

2. Standley, J. 1993. Analytical Note No. 4, QWRI, Toowoomba, Qld. 15 pp.