

AN EXAMINATION OF THE REASONS FOR VARIATION AMONG CROP SPECIES IN THE UTILITY OF SOIL P TESTS - YIELD RESPONSES ON A FERROSOL

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The strong P fixation reactions resulting from high contents of Fe and Al oxy-hydroxides in Ferrosol soils have resulted in considerable attention being paid to P fertiliser rate responses of crops grown on them. Field experiments carried out with maize (Moody, unpubl. data) and soybean (1) have shown soybean yield to be highly correlated with 0.01 M CaCl₂ - extractable P (an estimate of intensity *viz.* concentration of P in the soil solution) while maize yield was most highly correlated with Colwell-extractable P (an estimate of quantity *viz.* adsorbed P plus solution P). The objective of this study was therefore to examine the reasons for this differing response to P supply factors between two crops in the same soil type.

MATERIALS AND METHODS

Crops of soybean (cv Manark) and maize (cv Pioneer 3270) were sown at a site where a known history of P fertilization studies had produced plots with a wide range of soil P levels (*viz.* 6 - 55 mg/kg Colwell-extractable P). In addition, some plots with low soil P levels (9-14 mg/kg) received P applications of 30 kg P/ha as single superphosphate banded alongside the row at planting, to both check for maximum yield response and to compare the response to banded versus well-distributed P supply. Crop phenological development, accumulation of dry matter and P, root development and VAM colonisation were followed in selected treatments.

RESULTS AND DISCUSSION

Grain yield variation in response to soil P ranged from 600-3200 kg/ha in soybean and from 100-7500 kg/ha in maize. At any calendar date, maize and soybean had similar relative DM responses to soil P, but the maize response was less when plots were compared at similar phenological stages (e.g. flowering). This was due to the ability of maize, but not soybean, to delay phenological development in response to P deficiency (Fig. 1). Similar final leaf numbers (19 leaves/plant) were recorded in all plots, with a 22 d delay between the lowest and highest P treatments. This ability of maize to delay phenology in response to P deficiency, is consistent with its response to soil P quantity, rather than intensity.

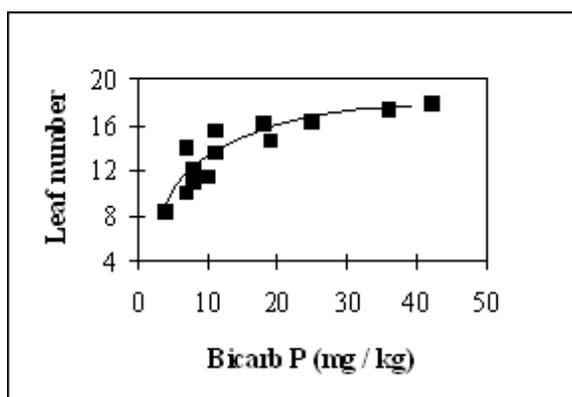


Figure 1. Effects of P supply on maize leaf number (22/3/95).

REFERENCES

1. Moody, P., Dickson, T., Dwyer, J. and Compton, B. 1990. Aust. J. Soil Res. 28, 399-406.