

**THE EFFECT OF NEMATODES ON THE GROWTH  
AND UTILISATION OF PHOSPHORUS BY WHITE  
CLOVER ON A YELLOW-BROWN LOAM**

J.P. Widdowson, W.B. Healy and G.W. Yeates  
Soil Bureau, D.S.I.R.  
Private Bag, Lower Hutt

SUMMARY

Relationships between root nematodes and pasture legumes were studied under greenhouse conditions after it has been established that poor seedling growth of 'Huia' white clover on Egmont brown loam was caused by a mixed infestation of root-knot nematode (Meloidogyne hapla) and clover cyst nematode (Heterodera trifolii).

All experiments were carried out on Egmont brown loam and methyl bromide was used to sterilise soil in order to eliminate nematodes and other organisms. Examination of clover plants infested with M. hapla and H. trifolii indicated that these nematodes were the only significant primary pathogens.

'Huia' white clover, both at the seedling stage and in established plants was highly susceptible to attack by a mixed infestation of root-knot and clover cyst nematode. Infestation of white clover occurs immediately after germination and root-knots are apparent 3-4 days after emergence. In unsterilised soil nematodes depressed clover growth and sterilisation resulted in a five-fold increase in dry weight over a 36 day growth period. The depression in clover growth by nematodes was greater in the 0-10 cm depth than in 10-20 cm depth of Egmont brown loam and reflects the change in nematode population with depth.

In a factorial experiment with four levels of phosphate (25-200 kg P/ha), established white clover on unsterilised soil gave dry matter yields about 50% of those grown in nematode-free soil over an 80 day period. The efficiency of P utilisation by clover was markedly reduced in nematode-infested plants. Where nematodes were present more than five times the quantity of phosphorus was required to give yields of clover similar to those obtained where nematodes had been eliminated with methyl bromide.

The better utilisation of phosphorus under nematode free conditions suggests that under field conditions the high rates of superphosphate associated with yellow-brown loams and usually attributed to the P-fixing capacity of these soils, may in part, be a consequence of nematode activity.

Screening studies under greenhouse conditions have shown that all lines of white clover, representing four varieties, and two varieties of Lotus pedunculatas were highly susceptible to root-knot and clover cyst nematodes. Red clover, and "Wairau" lucerne were less susceptible to nematode attack, whereas College glutinosa lucerne and subterranean clover were tolerant.

#### REFERENCES

Healy, W.B., Winnowson, J.P., Yeates, G.W., 1973:

The effect of root nematodes on the growth of seedling and established white clover on a yellow-brown loam. New Zealand Journal of Agricultural Research 16: 70-76.

Winnowson, J.P., Yeates, G.W., Healy, W.B., 1973:

The effect of root nematodes on the utilisation of phosphorus by white clover on a yellow-brown loam. New Zealand Journal of Agricultural Research 16: 77-80.

Yeates, G.W., Healy, W.B., Winnowson, J.P., 1973:

Screening of legume varieties for resistance to the root nematodes Heteradara trifolii and Meloidogyne hapla. New Zealand Journal of Agricultural Research 16: 81-86.