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EFFECTS OF NITROGEN SOURCE AND RATE ON THE GROWTH OF LIME SEEDLINGS AND THE CONTROL OF *TYLENCHULUS SEMIPENETRANS*

by

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The effect of nitrogen on plant growth is well recognized but nitrogenous fertilizers have also been used as means of nematode control (Clayton, 1950; Walker and Anneliese, 1969; Walker, 1971; Mankau and Mankau, 1975). La Massese *et al.* (1973) showed that the citrus nematode, *Tylenchulus semipenetrans* Cobb, was virtually eliminated from 10-year old clementines by an application of 300g/N/tree. Similar investigations have not been made in nurseries and therefore, the work reported here was aimed at the determination of the effect of nitrogen source and rate on the growth of citrus seedlings and the control of parasitizing *T. semipenetrans.*

MATERIALS AND METHODS

One-year old lime seedlings, *Citrus aurantifolia* Swingle, were potted singly in 25 cm clay pots filled with autoclaved clay loam. Each pot was inoculated with 5,000 *T. semipenetrans.* Two sources of nitrogen (N) were used - ammonium nitrate (NH_4NO_3) and ammonium sulphate [$(NH_4)_2\ SO_4$]. These were applied at the rates of 25, 50, 100, 200, 300, 400 and 500 ppm N, each dose being split with the first half applied one month after the nematode inoculation and the second one month later. Each treatment, including a control without nitrogen was replicated four times. The experiment was

undertaken in a green house at 30 ± 5°C and terminated 45 days after the second N application. Shoot and root weights were recorded and nematodes extracted from soil samples by Oostenbrink's technique (1960) and from roots by the Waring-blendor technique of Fallis (1943) as modified by Taylor and Loegering (1953).

RESULTS

Both sources of N at all concentrations increased the growth of the lime seedlings compared with untreated controls (Table I). However, at the highest concentrations of N there was some evidence of phytotoxicity with typical yellowing of the leaves. Generally, ammonium sulphate treatments gave greater growth responses for roots and shoots than for comparable N levels with ammonium nitrate.

Table I - *Lime growth response to extra N-fertilizing and its influence on* Tylenchulus semipenetrans.

Treatment (ppm)	Shoot wt. (g)	Root wt. (g)	N. of *T. semipenetrans*	
			per 250 g soil	per 5 g tissues
Ammonium nitrate:				
25	11.12	8.24	423	186
50	15.27	8.50	348	175
100	17.69	9.88	277	140
200	20.38	10.25	250	106
300	24.82	17.00	200	87
400	18.61	10.14	108	64
500	15.70	6.50	79	71
Ammonium sulphate:				
25	12.60	9.75	368	152
50	15.00	9.87	318	133
100	17.00	11.00	299	107
200	17.70	11.76	188	83
300	18.83	14.65	162	74
400	21.00	16.38	104	53
500	20.11	10.73	52	36
Untreated	9.25	6.63	1920	384
LSD 0.05	7.33	5.08	723	38
LSD 0.01	9.75	6.75	967	51

Both N sources suppressed *T. semipenetrans* in the roots (Table I). Soil populations of nematodes were decreased by 78-96% with ammonium nitrate and 81-97% with ammonium sulphate, compared with N-untreated soils.

DISCUSSION

The results indicate that ammoniacal nitrogen in ammonium sulphate is more effective in suppressing nematode populations than nitrate nitrogen in ammonium nitrate. Oteifa (1955) found that the numbers of *Meloidogyne incognita* females and egg masses on infected lima bean roots were significantly fewer on plants treated with ammonia N (NH_4Cl) than on those treated with nitrate N and attributed this to the inhibitory effect of ammonia ions on the nematode larvae in the soil. Barker *et al.* (1971) concluded from a similar study that $NaNO_3$ or NH_4NO_3 at 56-896 ppm N decreased the hatch, penetration and cyst development of *Heterodera glycines*.

Our results suggest that applications of N fertilizers at a level of 100-300 ppm per lime seedling at intervals of 6 months during the first five years of growth will virtually eliminate *T. semipenetrans* infection and lead to appreciable growth response.

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