EFFECT OF SOME PLANT EXTRACTS ON NEMATODE POPULATION AND ON THE GROWTH AND YIELD OF MAIZE *(ZEA MAYS* L.)

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Leaf extracts from *Azadirachta indica* (A. Juss), *Withania somnifera* (L.) and *Eucalyptus citriodora* (Hook) were tested for their nematicidal effect on the growth and yield of maize *(Zea mays)* in microplots at CDRI, PARC, Karachi. Preplantation soil samples were collected and nematodes were identified. Initial mean population 100 ml^{-1} of soil extract was calculated. After 12 weeks, nematode population was suppressed i.e. 41.00% in the plants treated with *Azadirachta indica,* 28.28% in *Withania somnifera* and 42.10% in *Eucalyptus citriodora.* Weight of roots and shoots was maximum (47 and 187 g) in the plants treated with neem extract compared with control (37 and 127 g).

INTRODUCTION

The grain and fodder yield is reduced by a number of diseases including plant parasitic nematodes. The pathogenicity of *Quinisulcius curvus* to maize is reported by Khan *et al.* (1988) from Pakistan. Khan *et al.* (1989) observed the reaction of two cultivars of maize to stunt nematode *Quinisulcius curvus.* Khan *et al.* (1989 b) also noted the reaction of two maize cultivars 'Kashmir Gold' and 'Babar' to lance nematode *Basirolaimus indicus* but no attempt has been made to control these nematodes infesting maize.

Egunjobi and Larind (1975) suggested successful control of *Pratylenchus brachyurus* through soil amendment. Egunjobi and Afolami (1976) from his preliminary experiments has shown promise of neem *Azadirachta indica* (A. Juss) leaf extract for controlling *Pratylenchus brachyurus.* Keeping these facts in view, the present work was initiated with three plant extracts to determine nematicidal effect of *Helicotylenchus indicus, Aphelenchus avenae* and *Basiria graminophila* on fodder and yield of maize.

MATERIALS AND METHODS

Neem, Eucalyptus and Withania leaves were air dried, ground to a coarse powder and 300 g l^{-1} of the powder was extracted three times with ethanol at 28 ± 2°C. The filtrate was dried under vacuum at 40°C and redissolved in water for field application. A field at CDRI was divided into 16 microplots, each measuring 1 m^2. Preplantation soil samples were taken from each microplot for determination of initial nematode population 100 ml^{-1} of soil. Nematodes isolated by Improved Bearmann's funnel technique after 48 hours were relaxed at 60°C and fixed in 4% formalin. Slides were prepared from freshly relaxed specimen, nematodes were counted and identified under a stereoscope binocular microscope at 10 x 8 x. Permanent slides were prepared and sent to USDA Beilsvilla, USA for confirmation.

The experiment was done in Randomised Complete Block Design. Each treatment consisted of four replicates. The aqueous solution of extract was poured in

each row (100 ml row^{-1}) @ 10 ml plant^{-1}. Ten healthy maize seeds (Pirsabak variety) were sown in each microplot in a single row. Soil samples were taken after 12 weeks and final nematode population was determined. Four plants of equal size from each row were uprooted after 12 weeks when the experiment was terminated. Fresh weight of shoot, root, fruit and height of plants was recorded. Data were analysed statistically by t-test.

Table 1. Effect of plant leaf extracts on nematodes population and fodder yield of maize (Zea mays L.)

Nematode species	Average number of nematodes (4 replicates) 100 ml^{-1} of soil			
	Azadirachta indica	*Withania somnifera*	*Eucalyptus citriodora*	Control
Helicotylenchus indicus	87 (51.47)	80 (47.33)	25 (14.79)	169
Aphelenchus avenae	66 (54.54)	35 (28.92)	60 (55.37)	121
Basiria graminophila	34 (20.48)	14 (8.43)	10 (60.24)	166
Total	187 (41.00)	120 (78.28)	95 (42.10)	456
t value	9.2	8.57	5.18	
Average height of plants (ft)	4.0	3.5	3.0	3.0
Average weight of fruits plant^{-1} (g)	430	335	620	92
Average weight of shoot plant^{-1} (g)	187	140	150	127
Average weight of root plant^{-1} (g)	47	37	30	37

Figures in parentheses represent per cent reduction over the control.

RESULTS AND DISCUSSION

Leaf extracts of *Azadirachta indica* (A. Juss), *Withania somnifera* (L.) and *Eucalyptus citriodora* (Hook) significantly suppressed the population of plant-parasitic nematode species *Helicotylenchus indicus, Aphelenchus avenae* and *Basiria graminophila*. After 12 weeks, most significant results were obtained with *Azadirachta indica*. The height of plants ($P<0.05$) was 4, 3.5 and 3.0 feet with *Azadirachta indica, Withania somnifera* and *Eucalyptus citriodora,* respectively. The yield ($P<0.05$) plant^{-1} was 620, 40 and 35 g with *Eucalyptus citriodora, Azadirachta indica* and *Withania somnifera.* respectively. The weight of shoot plant^{-1} was 187 g with *Azadirachta indica,* 150 g with *Eucalyptus citriodora* and 140 g with *Withania somnifera.* The weight of root plant^{-1} was 47 g with *Azadirachta indica,* 37 g with *Withania somnifera* and 30 g with *Eucalyptus citriodora* (Table 1). The results indicate that leaf extracts of *Azadirachta indica* and *Eucalyptus citriodora* were highly active followed by *Withania somnifera.*

Kaempterol, Quercetin and Myricetin in *Azadirachta indica,* vegetable rennet 4 enolides and glycoproteins in *Withania som-*

nifera might have been responsible for causing mortality in *Helicotylenchus indicus, Aphelenchus avenae* and *Basiria graminophila.* Nanje and Sethy (1978) used neem cake to control *Meliodogyne incognita* on tomato seedlings and was concluded that neem cake was less effective than methomyle nematicide but the growth of tomato plant was better when neem cake was applied suggesting methomyl nematicide to have phytotoxic effects.

The results of the experiment document that ethanolic leaf extracts of *Azadirachta indica, Withania somnifera* and *Eucalyptus citriodora* contain nematicidal compounds.

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