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EFFECT OF BARE-ROOT DIP TREATMENT WITH EXTRACTS OF CASTOR ON ROOT-KNOT DEVELOPMENT AND GROWTH OF TOMATO

by
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Summary. Bare-root dip treatment of tomato seedlings with undecomposed and decomposed extracts of castor cake and leaves significantly reduced root-knot development in pre-infected seedlings and in those which were inoculated with 2nd stage juveniles of *Meloidogyne incognita* after dip treatment. Suppression of root-knot development was greater in pre-infected seedlings than in those inoculated after dip treatment. Oilcake extracts were more effective than leaf extracts and decomposed extracts more effective than undecomposed extracts.

Considerable work has been done on the use of organic matter for management of plant-parasitic nematodes (Muller and Gooch, 1982). The nematicidal effects of these amendments have encouraged the development of unconventional management strategies. Some non-edible industrial byproducts like oilseed cake of castor (*Ricinus communis* L.) have been proved beneficial for suppressing plant-parasitic nematodes (Lear, 1959). Alam *et al.* (1977, 1980) and Sitaramaiah and Singh (1978) found that castor cake incorporated into the soil before planting not only reduced the infection of *Tylenchorhynchus brassicae*, *Meloidogyne incognita* and *M. javanica* respectively but also imparted some resistance in the plants to the nematodes which they attributed to an increase in the phenolic content of the roots. The work reported herein was undertaken to investigate whether a bare-root dip in oilcake and leaf extracts of castor is useful in controlling root-knot nematode.

Materials and methods

Water extract of castor cake was prepared by mixing 25 g powdered cake in 100 ml distilled water, allowing decomposition to take place for 15 days at $20 \pm 2^\circ\text{C}$ and then collecting the extract after filtration. An undecomposed extract was prepared by soaking oilcake in water for only one hour. Water extracts of castor leaves were prepared similarly. These extracts were termed as standard 'S', and other dilutions, viz., S/2, S/10 were prepared by adding appropriate quantities of distilled water to 'S'.

Tomato (*Lycopersicon esculentum* Mill. cv. Pusa Ruby) seedlings were grown in 25 cm diameter clay pots containing autoclaved soil-manure mixture. Some seedlings when

2-wk-old were transplanted singly to small clay pots (5 cm diameter) containing autoclaved soil-manure mixture, and each inoculated with 1000 freshly hatched 2-nd stage juveniles (J_2) of the root-knot nematode, *Meloidogyne incognita* (Kofoid *et* White) Chitw., obtained from culture maintained on potted tomatoes in green house. Some plants were left uninoculated. At 3-wk age all the seedlings growing in small pots as well as those originally raised in big pots were given bare-root dip treatments in different concentrations of decomposed and undecomposed extracts of castor cake and leaves for 30 minutes, and then transplanted to 15 cm diameter clay pots containing 1 kg autoclaved soil-manure mixture. The seedlings obtained from big pots were inoculated with 1000 J_2 . In this way seedlings from small pots received nematodes before bare-root dip treatment, while those from big pots after bare-root dip treatment. Uninfected and uninoculated seedlings served as control. There were five replicates for each treatment.

The experiment was terminated three months after inoculation. Plants were uprooted, washed and plant growth (weight of shoot and root) and root-knot index on 0-5 scale of Taylor and Sasser, were determined (Sasser *et al.*, 1984).

Results and discussion

A bare-root dip in water extracts of castor cake and leaf significantly reduced the root-knot development in pre-infected tomato plants as well as in those inoculated at a later stage (Table I). The severity of infection decreased with the increase in concentration of the extracts. Nevertheless, decomposed extracts caused relatively more inhibition in root-knot development than undecomposed ex-

tracts. Cake extract was more effective than leaf extract. The growth of plants improved with increasing concentration of the extracts and it was correlated with the degree of control of the nematodes.

The inhibition of root-knot development was greater in pre-infected and treated plants compared to those inoculated with nematode after root-dip treatment. This indicates that the chemicals absorbed by the roots have instantaneously acted against the nematodes already present in the roots. Whereas when nematodes were inoculated after the root dip treatment, the potentiality of the chemicals might have reduced to some extent by the time the nematodes had established an effective host-parasite relationship.

The present findings indicate that the water extracts

from castor cake and leaves rendered the roots of a susceptible plant highly unfavourable to *M. incognita*. Similar results have also been demonstrated by Siddiqui and Alam (1988) with bare-root dip of tomato in undecomposed extract of neem leaves.

The decomposed extracts were more effective than the undecomposed ones due to the release of more toxic substances during the course of decomposition. Our results with castor cake are generally similar to those of Singh *et al.* (1980) who obtained considerable control of root-knot nematode by seed dressing of tomato in castor cake extracts. Thus our findings would go a long way in reducing the cost of application and its possible utilization in farm practices.

TABLE I - Effect of bare-root dip of seedlings in the extracts of castor cake and leaf on root-knot development caused by *Meloidogyne incognita* and plant growth of tomato cv. 'Pusa Ruby'.

Treatment			Oilcake extract				Leaf extract			
Nematode	Extract	Concentration	Pre-inoculated		Post-inoculated		Pre-inoculated		Post-inoculated	
			Plant weight (g)	Root-knot index	Plant weight (g)	Root-knot index	Plant weight (g)	Root-knot index	Plant weight (g)	Root-knot index
Inoculated	Undecomposed	Standard	34.7	0.50	38.8	0.50	26.6	0.75	32.9	1.25
»	»	S/2	31.9	1.00	36.4	1.25	22.5	1.25	29.6	1.75
»	»	S/10	28.9	1.25	34.2	1.75	21.2	1.50	27.8	2.00
»	Decomposed	Standard	41.6	0.25	43.3	0.25	30.8	0.50	34.4	0.75
»	»	S/2	39.1	0.75	39.7	0.50	27.9	1.00	31.7	1.00
»	»	S/10	34.2	1.00	36.3	1.25	25.5	1.25	28.7	1.75
»	Undipped	—	20.2	4.00	18.1	4.00	20.2	4.00	18.1	4.00
Uninoculated	Undipped	—	46.5	—	46.5	—	46.5	—	46.5	—
		C.D. (P = 0.05)	1.78	0.66	1.33	0.72	2.26	0.92	1.55	0.77
		(P = 0.01)	2.48	0.92	2.26	0.98	3.08	1.24	2.11	1.03

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