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ECT OF SOME TREE-BARKS AGAINST ROOT-KNOT ATODE, *MELOIDOGYNE INCOGNITA* INFECTING *ZINGIBER CINALE* ROSC.)

SAMPAT NEHRA, SONALI PANDEY and P. C. TRIVEDI
Department of Botany, University of Rajasthan, Jaipur-302004, India.

Experiment was conducted to determine the efficacy of barks of local trees on the pathogenic potentiality of root-knot nematode, *Meloidogyne incognita* infesting ginger under natural environmental conditions. Maximum enhancement in various growth parameters such as fresh and dry root/shoot weight and total rhizome yield were obtained in plants treated with *Azadirachta* and *Acacia nilotica* barks. Reduction in population of nematode as well as root-knot indices followed a similar trend.

Keywords : *Acacia nilotica; Azadirachta; Meloidogyne incognita,.*

uction

(*Zingiber officinale* Rosc.) is an ant spice crop grown in India. It is vulnerable to many plant parasitic des viz. *Meloidogyne incognita*[1-4], *olus similis*[5-7] and *Pratylenchus* . Inspite of various methods adopted mise nematode problems in spice uccess in ginger crop is still lacking. s and decomposition products of t parts of many plants have been o be toxic to several plant parasitic des[9-10]. Present study was conducted out the nematicidal properties of local trees growing in the area of

als and Methods

barks of different locally available z. *Azadirachta indica, Holoptelia folia. Delonix regia, Albizzia lebbeck, gia sissoo, Acacia nilotica* and *indica* were taken and dried under conditions. These dried barks were ed and mixed in autoclaved soil that ed in earthen pots @ 2.5 and 5 gm t separately. Each treatment was ed four times. This treatment of bark rs was mixed in soil 15 days prior to g of ginger rhizomes to facilitate r decomposition. After 15 days, was done. At three leaf stage, 1000 of *M. incognita* which was multiplied aintain on tomato root were inoculated plants. One set of untreated but lated control was taken for rison.

After 150 DAI (Days after inoculation), the plants and roots were observed for different plant growth parameters. Root-knot index, number of galls/gm root, number of eggmasses/gm root, and number of eggs/eggmass were also recorded.

Results and Discussion

The nematode infected plants dried faster than the healthy plants. Stunting, chlorosis, poor tillering and necrotic leaves were the common symptoms of nematode infestation resulting in poor rhizome production. Root-knot nematode, *M. incognita* caused galling and rotting of roots and underground rhizomes. Highly reduced fibrous roots highly reduced and brown, water soaked areas were observed in the outer tissues of infected rhizomes. Application of tree barks as soil amendment against root-knot infection gave encouraging results. A significant improvement in plant growth and rhizome yield of ginger was observed due to the application of different tree barks. Among the barks *Azadirachta* and *Acacia nilotica* gave the highest biomass production followed by *Saraca indica, Albizzia lebbeck, Dalbergia sissoo, Delonix regia* and *Holoptelia integrifolia*. Highest rhizome was produced at higher dose of *Azadirachta* (5.0 gm) on 22.7 gm and lowest rhizome was recorded in *Holoptelia* (2.5 gm) as 7.07g among the various bark treatments. The higher dose of bark powders applied played a prominent role in increasing rhizome yield. The bark powders proved effective in enhancing the growth characters as shoot-root growth (length and weight) parameters.

Table 1. Efficacy of different barks on the yield and control of *M. incognita* infesting ginger (*Zingiber officinale* Rosc.).

S. No.	Treatment	Length (cm)		Fresh wt. (g)		Dry wt. (g)		Ginger Yield (g)		No. of galls/gm root	No. of eggmass/ gm root	No. of eggs/eggmass	% decrease in eggmasses
		Shoot	Root	Shoot	Root	Shoot	Root	Fresh	Dry				
1.	*Saraca* (2.5 g)	51.03	21.3	25.7	08.75	2.57	0.81	16.14	3.15	6.57	07.16	197.66	40.22
2.	*Sarac* (5g)	54.72	21.4	27.8	08.31	2.76	0.88	17.70	3.48	05.05	06.19	200.33	54.05
3.	*Albizzia* (2.5g)	49.2	18.9	20.6	08.00	2.00	0.79	13.07	2.54	04.62	05.91	190.66	57.97
4.	*Albizzia* (5g)	51.1	19.5	23.3	08.34	2.30	0.84	14.30	2.67	03.65	05.00	182.00	66.79
5.	*Dalbergia* (2.5g)	45.3	17.4	16.9	06.80	1.72	0.68	12.07	1.96	07.65	09.02	215.33	30.40
6.	*Dalbergia* (5g)	46.5	18.0	18.6	07.17	1.84	0.71	12.82	2.25	05.93	06.82	211.00	46.05
7.	*Delonix* (2.5g)	39.6	15.1	15.1	0.500	1.51	0.50	08.88	1.62	09.27	12.13	210.66	15.66
8.	*Delonix* (5g)	40.9	16.0	16.7	06.03	1.69	0.60	10.38	1.85	06.54	12.04	209.00	40.50
9.	*Holoptelia* (2.5g)	34.7	13.5	10.3	02.53	1.04	0.25	07.07	1.22	09.04	11.26	228.00	17.75
10.	*Holoptelia* (5g)	36.2	15.7	11.7	03.94	1.18	0.39	08.47	1.37	07.84	09.88	222.33	28.58
11.	*Acacia* (2.5g)	53.9	21.2	29.5	09.57	2.98	0.96	18.39	3.26	03.41	04.67	162.66	68.98
12.	*Acacia* (5g)	59.7	24.0	30.4	10.50	3.16	1.07	18.90	3.42	02.75	02.99	157.66	74.98
13.	*Azadirachta* (2.5g)	64.1	25.9	35.8	09.06	3.58	3.61	21.05	3.94	0.76	01.29	142.00	93.09
14.	*Azadirachta* (5g)	68.7	29.1	36.7	10.76	3.68	1.15	22.70	4.20	0.50	00.81	134.33	95.50
15.	*Nematode*	28.4	12.3	04.9	01.60	0.52	0.16	5.30	0.89	10.99	17.96	249.00	-
	CD at 5%	1.5650	1.3082	1.2700	3.8790	0.2834	0.7266	0.5261	0.5261	3.3232	2.0817	6.9922	-

Mean of five replicates

Maximum shoot length was observed in plants treated with 5.0 and 2.5 gm of *Azadirachta* as 68.7 and 64.1 cm followed by 5.0 gm of *Acacia* (59.7 cm). However the shoot length slightly increased than control in plants having both doses of *Holoptelia.* Root length also followed similar trend when compared with control (Table 1).

The fresh and dry weight of shoot and root increased significantly in all the treatments when compared with control. Addition of bark powder proved effective in controlling the nematode. (*M. incognita)* population. Very significant reductions in the number of galls and eggmasses/gm root were reduced to 0.50 and 0.81 at 5 gm dosage which was considerably very less than in non amended soil where the average number of galls and eggmasses/gm root were recorded to be as high as 10.99 and 17.96 per gm root respectively. *Acacia, Albizzia, Saraca* and *Dalbergia* were effective to control *M. incognita* reproduction in their decreasing chronological order at their both dosages.

The mortality of the nematode population was higher (90.50%) when *Azadirachta* was used as an amendment followed by *Acacia nilotica* (74.98%) lowest mortality (15.66%) was observed in *Delonix regia* and *Holoptelia* (17.75%) treated barks (Table 1).

Irrespective of the amending material the higher dose of bark application (5gm/pot) resulted in maximum decrease of nematode multiplication or disease incidence. All the datas were found statistically significant.

Plants are the richest source of organic chemicals. Most of the biochemicals act against pests, pathogens, parasites and weed competitors. They have both inhibitory or stimulatory influence on egg hatchability of many plant parasitic nematodes.

Application of dry bark to soil is not a conventional practice except that a good amount of barks is annually left in the field. Use of these waste materials in a profitable manner such as control of pathogens and improvement of soil conditions for better plant growth provides a good alternative economic method. Decomposition products like organic acids and phenol develop unfavourable phytochemical changes in the environment hence penetrated J_2 of *M. incognita* fail to establish and further development ceased in ginger. Secondly decomposition of barks in soil is extremely slow for a long time. In absence of rapid decomposition the microbial activity probably leads to nutrient deficiency for the plants affecting yield. The results are in accordance with the findings of several earlier workers. Jain and Hasan[11] reported toxicity of Soo-babool (*Leucaena leucocephala)* extract against *M. incognita.* Miller *et al.*[12] reported toxicity of leaf and stem extracts of various plants to *Tylenchorhynchus dubious in vitro* test. However tree barks can be used as manure and nematotoxic substance to minimise nematode incidence.

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References

1. Charles JS 1978, *Studies on nematode diseases of ginger,* M.Sc. Thesis, Kerala Agric., Univ. of Vellanikara, Kerala, India.
2. Parihar A 1985, *Indian J. Mycology and Plant Pathol.* **16** 84 (Abstr.)
3. Sudha S and Sundararaju P 1986, *Indian J. Nematol.* **16** 258
4. Nehra S 2001, *Integrated management of root-knot nematode, Meloidogyne incognita associated with ginger.* Ph. D. Thesis, Univ. of Raj. Jaipur.
5. Hart WH 1956, *Spreading decline of citrus caused by the burrowing nematode.* Bull. California. Deptt. Agric. **45** 263
6. Vilsoni F, Mc Clure MA and Butler LD 1976, *Plant Dis. Reptr.* **60** 417
7. Sundararaju P, Koshy PK and Sossamma VK 1979, *J. Plant Crops* **7** 15
8. Kaur DJ and Sharma NK 1990, *A new report on Pratylenchus coffeae- a cause of ginger yellows.*

Int. Nematol. Network Newsl. 7 15
9. Taylor CE and Murant AF 1967, *Nematologica* 12 488
10. Nehra S and Trivedi PC 2000, *Screening of bionematicidal properties of different plant parts against Meloidogyne incognita infecting ginger.* Proc. 87th Indian Sci. Cong. Pune, Bombay (Abstr.) pp. 19
11. Jain R K and Hasan M 1984, *Indian J. Nematol.* 14(2) 179
12. Miller PM, Turner MC and Temlison H 1973, *J. Nematol.* 5 173