HortFlora Research Spectrum, 2(1): 35-39 (Jan.-March 2013) ISSN : 2250-2823

EFFECT OF SOME INDIGENOUS PLANT EXTRACTS ON THE INHIBITION OF EGG HATCHING OF NEMATODE *Meloidogyne Incognita* Chitwood INFESTING MULBERRY

N. Vijaya Kumari* and M. Lakshmi Devi

Department of Sericulture,

Sri Padmavati Mahila Visvavidyalayam, Tirupati-517 502, Andhra Pradesh

**E-mail: vijji nelaballe@yahoo.co.in*

ABSTRACT: Root knot disease caused by the nematode *Meloidogyne incognita* is one of the major diseases of Mulberry, *Morus* spp. which causes major reduction in yield affecting both quality as well as quantity of leaves and fruits. Plants produce a high diversity of secondary metabolites for self defense and survival in their habitat. Some of the plants are known to be inhibiting the development of the nematodes. The present study was carried out to screen the locally available plants for their nematicidal activity. Twelve plants species were selected and methanol extracts with different concentrations (25, 50, 75 and 100%) of different plants were tested for inhibition of hatching of *M. incognita* egg and juvenile mortality in different durations. The plant extracts of *Neem*, *Clitoria ternatea* and *Passiflora foetida* were recorded to be highly effective for inhibition of hatching of egg and increasing juvenile mortality of *M. incognita*. Which will be immense helpful to reduce the qualitative and quantitative loss of mulberry leaf and fruit with eco-friendly plant extract.

Keywords: *Meloidogyne incognita, juvenile mortality, egg hatching, nematicidal activity.*

Mulberry, *Morus species* is commercially important plant and its leaves are used for rearing of silkworm, *Bombyx mori* and horticultural value as fruits. Among the diseases of mulberry, root knot disease caused by the nematode *Meloidogyne incognita* Chitwood is the major one which causes 10-12% leaf yield loss besides causing depletion in nutritive value (Govindaiah *et al.,* 4). Nematode infested plants show typical symptoms like root galling, stunted growth, nutrient deficiency particularly nitrogen deficiency (Siddiqui *et al.*, 9). Chemical control is expensive and is economically viable only for high value crops and creates a potential hazard to the environment and human health (Tsay *et al.,* 12). Plant products a high diversity of secondary metabolites for self defense and survival in their habitat. A wide variety of plant species, representing 57 families have been shown to nematicidal compounds (Sukul, 10), which includes isothiocynates, thiophenics glycosides, alkaloids, phenolics and fatty acids (Gommers, 3). Plant extracts showed nematicidal activity i.e. inhibition egg hatchting and juvenile mortality of *Meloidogyne incognita* by Neem leaf extract in tomato (Mukhtar *et al.,* 6, and Dash and Pradhi, 2), by shoot and root extracts of *Ocimum sanctum* (Akhtar and Farzana, 1), *Pongamia* leaf extracts (Sharma *et al.,* 8) and *Annona* leaf extracts (Poornima *et al.,* 7). The leaf extracts of *Prosopios juliflora, Abutilon indicum, Datura, Tridax procumbens, Xanthium indicum* on the inhibition of nematode *Pratilenchus coffeae* in banana (Sundararaju and Cannayane, 11) had also shiwed in hibitary effects. The effect of leaf extracts of *Glyricidia maculata, Ricinus communis* and *Cratolaria juncea* were lethal to *Radopholus similis* at dilutions of 1:5 within 24 hr and nematode mortality decreased with increase in dilutions of the extract (Jasy and Koshy, 5). Hence, the present study was conducted to screen some locally available plant species for their nematicidal properties against root-knot nematode, *Meloidogyne incognita,* infesting mulbery.

MATERIALS AND METHODS

Twelve plants namely *Abutilon indicum* Linn. (T_1), *Azadirachta indica* Linn (T_2), *Datura stramonium* Linn. (T_3), *Prosopis juliflora* Sw. (T_4), *Tridax procumbens* Linn. (T_5), *Xanthium indicum* Linn. (T_6), *Annona squamosa* Linn. (T_7), *Ricinus*

Received : 30.1.2013 Revised : 20.2.2013 Accepted : 25.2.2013

cummunis Linn. (T_8), *Ocimum sanctum* Linn. (T_9), *Pongamia pinnata* Linn. (T_{10}), *Clitoria ternatea* Linn. (T_{11}) and *Passiflora foetida* Linn. (T_{12}) were selected for the present study. Thsese plants were selected mainly from the university campus. Leaves were collected from the selected plants and were shade dried. Leaf powder was prepared for each selected plant with the help of grinder. Methanol extracts of leaves were prepared using Soxhlet apparatus. The extract was dissolved in Methanol (1:10) w/v and stock solution was prepared. Different concentrations (25, 50, 75 and 100 %.) of plant extracts were prepared using distilled water.

Nematode culture maintenance: Three months before the study, *Meloidogyne incognita* culture was maintained by raising tomato seedlings in earthen pots filled with sterilized soil and farm yard manure. When tomato seedlings were well established (one month of seed sowing) juvenile nematodes were collected from nematode infested mulberry garden by bayermann's funnel technique and tomato seedlings were inoculated with 500 juveniles /seedling. Pure nematode culture was obtained after 3 months maintenance and utilized for present study.

Studies on nematode egg hatching and juvenile mortality: Mature nematode egg masses (containing 100 to 105 eggs) were taken in petri plates @ 5 egg masses/plate of containing 5ml/plate different concentrations of plant extracts. The same procedure was follwed for all the ten plants and control (Distilled water). The egg masses were kept for hatching and hatching percentage was calculated after 24, 48 and 72 hrs for each lot. The treatments were replicated thrice and nematode egg inhibition percentage was calculated taking the average of five egg masses.

RESULTS AND DISCUSSION

Data (Table 1) revealed that all plant extracts showed nematicidal activity by affecting the hatching of eggs of root knot nematode, *Meloidogyne incognita* Chitwood (Fig. 1). The hatching of nematode eggs was observed to be varying after 24, 48 and 72 hrs in different concentrations in different plant extracts. The highest percentage of egg hatching inhibition was recorded in *Azadirachta indica* leaf extract treated lots (99.00%) at 100 per cent concentration of extract followed by *Clitoria ternatea* (93.3%), *Passiflora foetida* (92.4%), *Prosopis juliflora* ((87.7%), *Abutilon indicum* (82.0%), *Datura stramonium* (75.9%), *Ricinus communis* (73.8%), *Xanthium indicum* (70.8%), *Ocimum sanctum* (70.5%), *Tridax procumbens* (68.5), *Annona squamosa* (66.6%) and *Pongamia pinnata* (59.17%), after 72 hr of application. The impact of plant extracts is dose (concentration) and time dependent. In this study it was observed that *Passiflora foetida* and *Clitoria ternatea* were at par with *Azadirachta indica* in is inhibiting nematode egg hatching.

In present findings all plant extracts showed nematicidal activity by inhibiting of eggs hatching and juvenile mortality of nematode *Meloidogyne incognita* causing root knot disease of mulberry and are inconformity with the reports of Mukhtar *et al.* (6), and Dash and Pradhi (2) who observed the effect of Neem leaf extracts on nematode *Meloidogyne incognita* incidence in tomato. The incidence of *M. incognita* was also reduced by shoot and root extracts of *Ocimum sanctum* (Akhtar and Farzana, 1), *Pongamia* leaf extracts (Sharma *et al.,* 8) and *Annona* leaf extracts (Poornima and Vadivelu, 7) which supported present findings. The leaf extracts of *Prosopios juliflora, Abutilon indicum, Datura, Tridax procumbens, Xanthium indicum* showed the inhibition of nematode *Pratilenchus coffeae* in banana (Sundararaju and Cannayane, 11). In the present study it was recorded that effect plant extracts on inhibition of hatching of eggs of *M. incognita* was dose and time dependent and results are in conformity with the report of Jasy and Koshy (5) that the effect of leaf extracts of *Glyricidia maculata, Ricinus communis* and *Crotolaria juncea* were lethal to *Radopholus similis* at dilutions of 1:5 within 24 hr

Table 1. Effect of different plant extracts with different concentrations at different duration on hatching of eggs of *Meloidogyne incognita* Chitwood.

Name of the plants	Duration (hours)	Inhibition of Egg hatching (%)			
		Concentration of plant extract (%)			
		100%	75%	50%	25%
Abutilon indicum Linn. (T_1)	24	11.00	16.30	20.10	25.10
	48	15.40	19.20	24.30	28.90
	72	18.40	20.20	26.80	30.10
Azadirachta indica Linn. (T_2)	24	0.00	1.20	2.30	5.00
	48	0.00	3.50	5.40	8.10
	72	1.00	6.50	8.40	10.50
Datura stramonium Linn. (T_3)	24	13.30	19.30	25.60	29.90
	48	19.80	23.90	29.70	31.00
	72	24.60	27.70	31.00	35.60
Prosopis juliflora Sw. (T_4)	24	6.50	9.40	14.80	18.40
	48	8.30	12.40	16.90	24.80
	72	12.50	16.80	19.00	28.50
Tridax procumbens Linn. (T_5)	24	21.80	27.40	30.00	34.70
	48	30.50	31.90	39.60	41.50
	72	32.20	33.40	42.10	46.60
Xanthium indicum Linn. (T_6)	24	17.60	21.00	28.90	35.40
	48	26.50	28.90	34.00	36.80
	72	29.80	33.50	38.70	39.60
Annona squamosa Linn. (T_7)	24	23.90	29.40	31.10	35.60
	48	31.60	32.90	40.60	41.60
	72	34.20	33.40	42.10	46.60
Ricinus cummunis Linn. (T_8)	24	14.10	20.30	27.60	31.90
	48	22.00	24.70	30.70	33.20
	72	26.80	29.70	33.00	37.60
Ocimum sanctum Linn. (T_9)	24	19.80	24.60	29.50	33.70
	48	28.10	30.90	38.60	40.40
	72	30.20	36.50	41.10	45.60
Pongamia pinnata Linn. (T_{10})	24	25.50	3.40	7.80	10.80
	48	36.20	6.10	10.00	15.40
	72	41.92	7.20	12.50	18.30
Clitoria ternatea Linn. (T_{11})	24	2.90	3.60	8.80	10.80
	48	4.70	6.10	11.00	16.40
	72	6.80	7.90	14.50	19.30
Passiflora foetida Linn. (T_{12})	24	4.90	5.60	9.00	11.50
	48	6.70	6.90	13.00	16.90
	72	7.70	9.00	14.50	20.30
Control	24	75.80			
	48	81.50			
	72	98.40			

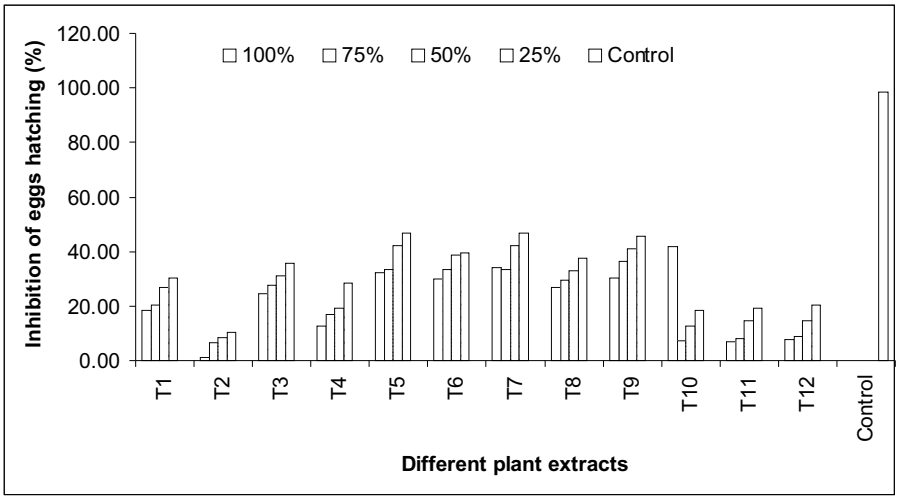

Fig.1. Impact of different plant extracts on inhibition of eggs hatching of *Meloidogyne incognita* Chitwood after 72 hours. T_1 : *Abutilon indicum* Linn., T_2 : *Azadirachta indica* Linn, T_3 :*Datura stramonium* Linn.,T_4 : *Prosopis juliflora* Sw., T_5 : *Tridax procumbens* Linn.,T_6 : *Xanthium indicum* Linn., T_7 : *Annona squamosa* Linn., T_8 : *Ricinus cummunis* Linn., T_9 : *Ocimum sanctum* Linn., T_{10} : *Pongamia pinnata* Linn, T_{11} : *Clitoria ternatea* Linn., T_{12} : *Passiflora foetida* Linn and control.

Plate 1 : Photographs of root knot nematode, *Meloidogyne incognita* infesting mulberry roots.

and nematode mortality decreased with increase in dilutions of the extract.

REFERENCES

1. Akhtar Haseeb and Farzana Butool (1990). Evaluation of nematicidal properties in some members of the family *Lamiaceae. Intl. Nematol. Network Newsl.,* **7**(2): 24-26.
2. Dash, B. and Pradhi, N.N. (1998). Relative effects of neem products against root knot nematode on tomato. *Indian. J. Nematol.*, **28**(2):163-167
3. Gommers, F.G. (1973). Nematicidal principles in Compositae. Mededelingen Landbouwhoges school, Wageningen. *The Nethherlands*, **17:**71-33
4. Govindaiah, Dandin, S.B. and Sharama, D.D. (1991). Pathogenicity and avoidable leaf yield loss due to *Meloidogyne incognita* in mulberry (*Morus alba.* L). *Indian J. Nematol.*, **21:**52-57

5. Jasy, R. and Koshy, P.K. (1992). Effect of certain leaf extracts and leaves of *Glyricidia maculate* (HB&K) Steud as green manure on *Rodophylus similis. Indian. J. Nematol.,* **22**: 117-121.
6. Mukhtar, T., Ahmad, R.R, M.Inam-ul-Haqand and Javed, N. (1994). Effect of leaf extracts of some plants on *Meloidogyne incognita. Pakistan J. Phytopathol.,* **6:** 35-37.
7. Poornima, K. and Vadivelu, S. (1990). Comparative efficacy of nematicides, oil cakes and plant extracts in the management of *Meloidogyne incognita, Pratylenchus delattrei* and *Rotyenchulus reniformis on brinjal. Indian. J. Nematol.,* **20:** 170-173.
8. Sharma, R., Sharma, K. and Patel, Y.M. (2012). Nematicidal and preventive effect of *Pongamia pinnata* and *Thevetia peruviana* leaf extracts and powder against *Meloidogyne incognita. J. Adv. Developmental Res.,* **3** (1) 2012: 52-55
9. Siddiqui, Z.A., Iqbal, A. and Mahmood, I. (2001). Effect of Pseudomonas fluorescens and fertilizers on the reproduction of *Meloidogyne incognita* and growth of tomato. *Applied Soil Ecol.,* **16**(2): 179-185.
10. Sukul, N. C. (1992). Plant antagonistic to plant parasitic nematodes. *Indian Rev. Life Sci.,* **12:** 23-52.
11. Sundararaju, P. and Cannayane, I. (2002). Antinemic activity of plant extracts against *Pratylenchus coffeae* infecting Banana. *Indian J. Nematol.,* **32**(2) : 121-124.
12. Tsay, T.T., Wu, T.S. and Lin, Y.Y. (2004). Evaluation of *Asteraceae* plant for control of *Meloidogyne incognita. J. Nematol.,* **36:** 36-41.