



## Management of root knot nematodes in tomato, chilli and brinjal by neem oil formulations

M. Sivakumar<sup>1</sup> and K. Gunasekaran<sup>2</sup>

### ABSTRACT

Three botanical formulations based on neem oil and Pongamia oil viz., No 60 EC(C) No 60 EC (A) and NOPO 60EC (C) were tried against root knot nematode *Meloidogyne incognita* on tomato, chilli and brinjal. The formulations were tried as seed treatment and seedling root dip @ 2ml / lit. All the three formulations were found superior to control. Among the formulations No 60 EC (C) was significantly superior to the other two formulations in the reduction of nematode population 48.6, 51.7 and 39.6 per cent over control on tomato, chilli and brinjal respectively. The yield increase over control in the crops were 52.6, 47.3 and 41.7 per cent respectively. The treatment has recorded the least root knot indices of 2.0 in the three crops tested as against 5.0 in the untreated control. Use of botanical formulation is easy to apply is of low cost and it is an environmentally safer method of nematode management.

**Key words :** *Meloidogyne incognita*, NO 60 EC (C), NO 60 EC (A) NOPO 60 EC (C)

### INTRODUCTION

In recent years, management of plant parasitic nematodes using plant products and their derivatives is gaining importance in the light of increased awareness of environmental and human health hazards associated with nematicidal chemicals. Several indigenous plants have been identified for their nematicidal action on root knot nematodes and promising source of biopesticides of plant origin. Different parts of neem are known to contain over 40 bitter principles belonging to the terpenoid, triterpenoid, limonoid and flavanoid group of natural products (Thakur *et al.*, 1981) the most well known are the azadirachtins. The other limonoids which have been found in traces are meliantriol, salannin, nimbin and nimbidin. The Central Insecticides Board of India has approved the registration of 300 ppm oil based and 1500 ppm kernel based neem formulations (Akhtar, 2000). Neem oil based formulations have been tried against *M. incognita* as seed treatment and bare root dip with varying degrees of success. (Das and Padhi., 1988; Akhtar and Mahmood, 1997; Vijayalakshmi and Reshmi Basu, 1999; Javed *et al.*, 2008).

### MATERIALS AND METHODS

Three macro emulsion formulations were developed using neem oil and pongamia oil with surfactants and naturally occurring anti oxidants. They are NO 60EC(C), NO60 EC(A) and NOPO 60 EC (C). The three formulations were tried against root knot nematode *Meloidogyne incognita* on tomato, chilli

and brinjal as seed treatment and seedling bare root dip under field conditions.

#### Seed Treatment

The seeds of tomato (c.v PKM-1) chilli (c.v.Co.1) and brinjal (cv.co.3) were treated with the formulations @ 0.2 per cent concentrations with polymer coating and shade dried for 48 hours before sowing.

#### Seedling bare root dip

The root portions of 25-day old seedling of tomato, chilli and brinjal were immersed in the neem and pongamia oil formulations @ 0.2 per cent concentrations for half an hour and they were transplanted in the field.

#### Observations

The observations on the root gall index as 1-5 scale (Heald *et al.*, 1989) nematode population in soil at harvest and fruit yield were recorded. The neem oil formulations were tried as seed dressing with polycoat and seedling bare root dip. Carbofuran 3G @ 1.0kg a.i. / ha as soil application as recommended practice was also tried as standard check for comparison.

## RESULTS AND DISCUSSIONS

The results of the tomato experiments revealed that all the three neem oil formulations tested were found effective against *M. incognita*. Among the treatments the neem oil formulation NO 60 EC (C) applied as seed dressing and seedling bare root dip was found superior to the other formulations by recording lowest root knot index of 2.0 when compared to 5.0 in control. The same treatment has recorded the lowest nematode population in soil at harvest and highest fruit yield over control. In chilli the neem oil formulation NO 60EC (C) as seed dressing and seedling bare root dip has recorded the lowest root knot index against the untreated control. The treatment has significantly lowered the soil population of *M. incognita* and increased the green chilli over control (Table 1).

The results clearly indicated that the neem oil formulation NO 60EC (C) as seed dressing and seedling bare root dip had significantly reduced the root galling by *M. incognita* by recording the lowest root knot index of 2.0, lowest soil population of nematodes and highest brinjal fruit yield. The formulation NO 60EC (C) was found best against *M. incognita* in all the three crops tested under field condition, followed by neem oil and Pongamia oil formulations. However, the treatments were on par with Carbofuran 3G at 1.0 kg a.i. / ha as

soil application. Comparing the cost factor and environmental hazards the neem oil formulation is the most suitable and ideal method of nematode management.

The current results confirm the earlier findings by various workers. Neem oil formulations have been tried as seed dressing, seed coating, seedling bare root dip treatment and soil drenching (Das and Padhi, 1998; Jawant Singh *et al.*, 2000; Javed *et al.*, 2007). Indian farmers without the knowledge of the chemical constituents have been using neem products as a traditional method of pest control for centuries. The increasing interests in neem in recent years has resulted in the development of cheap, safer and ecofriendly nematicides and pesticides. Neem seed constitutes the basic raw materials for neem products. Currently a number of azadirachtin based insecticides are available in India *viz.*, Achook, Nemin, Jawan, Repelin, Sunneem etc., Considering safety to the environment, human health hazards and cost of nematode management, the non chemical means especially botanical nematicides will be much safer and highly practicable. It can easily fit into the integrated nematode management programmes.

**Table.** Management of *Meloidogyne incognita* with neem oil formulations

Treatment	Tomato			Chilli			Brinjal		
	RKI	Nematode populations	Yield t/ha	RKI	Nematode populations	Yield t/ha	RKI	Nematode populations.	Yield t/ha
NO 60 EC (c) – Seed Treatment	3.0	409.3	19.80 (18.4)	3.0	445.6	16.32 (27.50)	3.0	286.0	26.3 (21.8)
NO 60 EC (A) - Seed Treatment	3.0	337.7	19.50 (16.55)	3.0	402.7	15.70 (22.65)	3.3	226.5	25.9 (19.9)
NO PO 60 EC (c) - Seed Treatment	3.0	452.6	19.65 (17.45)	2.7	352.3	16.50 (28.90)	3.0	303.7	25.4 (17.6)
NO 60 EC (c) - Seed Treatment & Seedling Root Dip	2.0	185.0	24.86 (48.60)	2.0	236.6	19.42 (51.70)	2.0	146.8	30.2 (39.6)
NO 60 EC (A.0) - Seed Treatment & Seedling Root Dip	2.7	408.1	22.46 (34.24)	2.7	357.5	17.33 (35.39)	3.0	246.8	28.6 (32.4)
NO PO 60 EC (c) - Seed Treatment & Seedling Root Dip	2.3	422.5	22.63 (35.26)	2.7	408.7	17.48 (36.56)	3.6	336.7	29.8 (37.8)
Carbofuran 3G @ 1.0kg a.i./ha	2.3	306.7	22.52 (34.60)	2.7	446.0	18.50 (44.0)	3.3	322.0	27.6 (37.7)
Control	5.0	572.6	16.73	5.0	678.6	12.8	5.0	486.7	21.6
CD p=0.05	0.237	137.67	1.89	0.731	112.3	1.67	0.631	154.6	1.76

Figures in the parentheses is the per cent increased yield over control

**REFERENCES**

- Akhtar, M. and Mahmood. I.1997. Control of root knot nematode, *Meloidogyne incognita* in tomato plants by seed coating with Suneem and Neem oil. *Journal of Pesticide Science*, **22** : 37-38.
- Akhtar, M. 2000. Nematicidal potential of the neem tree *Azadirachta indica* (A. Juss). *Integrated Pest Management Reviews*, **5** : 57-66.
- Das, B. and Padhi. N. N. 1998. Relative efficacy of neem products against root knot nematode on tomato. *Indian Journal of Nematology*, **28** : 163-167.
- Heald, C.M. Briton, B.D. and Davis R.M.1989. Influence of *Glomus intraradices* and soil phosphorus on *Meloidogyne incognita* infecting *Cucumis melo* *Journal of Nematology*, **21**: 69-73.
- Jagwant Singh, Mojumder, Pankaj V. and Singh. R. 2000. Effect of Nimbin, U coat (R) and modified neem oil (R) as urea coating on phytonematodes associated with carrot. In. *Proceedings of National Congress on Centenary of Nematology in India. I.A.R.I. New Delhi. 5-7 Dec. 2001.*(abs).
- Javed, N., Gowen, S. R., Inam-ul-Haq, M., Shainab, F. and Pembroke, B. 2008. Efficacy of neem (*Azadirachta indica*) formulations on biology of root – knot nematodes (*Meloidogyne javanica*) on tomato. *Crop Protection*, **27**: 36-43.
- Tahkur, R. S., Singh, S. B. and Goswami, B. K. 1981. Article, E. I. *Azadirachta indica* A. Juss – A review *CROMAP*, **3**: 135 - 140.
- Vijayalakshmi, K. and Reshmi Basu, 1999. Seed coating of chickpea with neem based pesticidal formulations for the management of *Meloidogyne incognita*. *Indian Journal of Nematology*, **29** (1) : 28-32.

---

**M. Sivakumar<sup>1</sup> and K. Gunasekaran<sup>2</sup>**<sup>1</sup>Department of Nematology,<sup>2</sup>Department of Nano Science and Technology,  
Tamil Nadu Agriculture University, Coimbatore – 641  
003. Tamil Nadu, India. Phone : 0422-6611264.  
Fax : 0422-6611. Email : siva\_nem@yahoo.co.uk.

Received: October 15, 2011

Revised: November 10, 2011

Accepted: November 16, 2011