Effect of supreme 15 CS against *Meloidogyne incognita* on tomato

Tulika Singh · Deepak Ebhad · Ashokbhai D. Patel ·
Bhagabhai A. Patel

Received: 8 January 2013 / Accepted: 18 January 2013 / Published online: 3 February 2013
© Indian Society for Parasitology 2013

Abstract Pot and laboratory experiments were conducted to study the efficacy of supreme 15 CS in varying doses for management of root-knot nematode, *M. incognita* in tomato. The results indicated that supreme 15 CS containing alkali metal *N*-(*n*-propyl) Dithiocarbamate proved to be more effective in improving plant growth characters and reducing root-knot index and final nematode population. Among the doses tested, higher dose of 0.5 % (w/w) was more effective than lower doses.

Keywords Tomato · *Meloidogyne incognita* ·
Supreme 15 CS

Vegetables like tomato, egg plant, okra, and cucumber are greatly affected with root-knot nematodes in all parts of India (Khan et al. 1993; Khan and Khan 1990, 1996). Among the vegetables, Tomato (*Lycopersicum esculentum* L.) is an important commercial and widely grown vegetable crop in most parts of the world including India. It is heavily attacked by root-knot nematodes (*Meloidogyne* spp.) across the country incurring enormous quantitative and qualitative losses. The root-knot nematodes, *M. incognita* is a limiting factor in its commercial production, responsible for 15–60 % yield loss (Krishnappa et al. 1992). If the plants are attacked by nematodes in the early stage, then cent percent losses are incurred. Different researchers have tried several chemicals to combat nematodes but Carbofuran (Furadan 3G) is the only one available to the farmers. That also has not remained much effective now. In view of this, new molecules/chemicals

need to be tested. Supreme 15 CS containing alkali metal *N*-(*n*-propyl) Dithiocarbamate, has substantial nematicidal value but it is non phytotoxic at conventional level. The compound may be used in pure form. It appears that more effective utilization of the active compound is obtained when formulated with the conditioning agents. Some of the compounds, when used within the scope of this invention, have other beneficial effects on soil, viz. insect eggs and larvae may be destroyed or other populations get reduced as reported by Santemyer (1958). In the present investigation, effect of supreme 15 CS on *M. incognita* management in pots and nematode egg hatching in vitro conditions were studied during 2012.

The experiments were conducted to test the effect of supreme 15 CS (a product of Sai Samarath Chemicals, Vadodra, Gujarat, India) under in vitro conditions on tomato. The nematicidal effect of the chemical was examined by 0.1, 0.3 and 0.5 % concentrations by two ways i.e. for growth and development and nematode control on tomato plants in pots and ii. on nematode egg hatching in cavity blocks.

Pot experiments

The earthen pots of 15 cm diameter were washed with water and rinsed with 4 % formaldehyde (Formalin 40 EC) solution, then filled with nematode infested soil (1.0 kg/pot) having initial nematode population of 1,500 J₂/100 g soil. Twenty-one days old seedlings of tomato cv. Anand tomato (AT3) raised in steam sterilized soils were transplanted at one seedling/pot. After thorough establishment of seedlings, suspension of chemical were drenched in the rhizosphere of each plant. The suspension of chemical for 0.1, 0.3, and 0.5 % concentrations were prepared by adding

T. Singh (✉) · D. Ebhad · A. D. Patel · B. A. Patel
Anand Agricultural University, Anand, Gujarat, India
e-mail: tulikasingh006@gmail.com

Plate 1 Effect of supreme 15 CS on plant growth of tomato

Plate 2 Effect of supreme 15 CS on nematode multiplication on tomato

6.5, 19.5, and 32.5 ml/lit. water. Solution of different concentrations were drenched at 200 ml/plant in the rhizosphere of each plant as per the treatments. Normal water was drenched in control plants. Each treatment was repeated five times in completely randomized design. The pots were subjected to net house at $28 \pm 1^\circ\text{C}$ temperature. After 45 days of drenching the chemical, the plants were depoted carefully and washed with water. Observations on

plant growth characters, root-knot index and final soil nematode population were recorded.

Laboratory experiments

Fresh and uniform size egg masses of *M. incognita* were collected from nematode infected tomato plant maintained in micro plot. Two egg masses (420 eggs/eggmass) of approximately same size were placed in each glass cavity block of 8 cm $\times$ 5 cm size. Five millilitre suspension of each of the 0.1, 0.3 and 0.5 % concentrations was poured in cavity block. Normal water was used in control. All treatments were repeated five times including check. Number of larvae hatched out from egg masses was counted at 24, 36 and 48 h exposures. The cavity blocks were kept in the room at $25 \pm 1^\circ\text{C}$ temperature.

In DAS significant differences in plant growth characters (Plates 1, 2) as well as on nematode multiplication were obtained among various concentrations including control. All three concentrations of chemical increased the plant height, fresh shoot and root weights and decreased RKI and soil nematode population over control. Among the different concentrations, 0.5 % concentration recorded significantly more plant height as well as fresh shoot and root weights and there by reduced root- knot index and soil nematode population (Tables 1, 2; Plates 1, 2).

Under laboratory condition, significant reduction was noticed on nematode egg hatching in all the concentrations over control at each exposure time i.e. 24, 36 and 48 h. The comparative reduction in hatching over the control increased with an increase in concentrations and exposure time. At 24 h exposure time, there was increased in hatching in all the concentrations. However, at 36 and 48 h, the total inhibition was almost constant indicating that chemical had immediate effect on nematode egg hatching within 24 h of exposure. However, 0.5 % concentration had most retarding effect on egg hatching.

Table 1 Effect of supreme 15 CS on plant growth characters and nematode multiplication on tomato in pot

Doses (%)	Plant height (cm)	Fresh		Root-knot index (0–5)*	Soil nema. popn./pot. (1 kg soil)
		Shoot (wt)	Root (g)		
0.1	9.4 ^b (+8.0)	4.6 ^{bc} (+76.9)	0.6 ^b (+11.1)	3.2 ^{ab} (–5.8)	21,864 ^a (–4.1)
0.3	10.2 ^a (+17.2)	7.2 ^b (+176.9)	1.0 ^{ab} (+85.2)	2.4 ^{bc} (–36.8)	18,784 ^a (–17.6)
0.5	14.8 ^a (+70.1)	12.1 ^a (+365.4)	1.7 ^a (+214.8)	1.8 ^c (–52.6)	10,050 ^b (–55.9)
Control	8.7 ^b	2.6 ^c	0.54 ^b	3.8 ^a	22,792 ^a
SEM	0.8	0.9	0.2	0.2	500
CV (%)	17.6	34.0	47.4	18.9	6.9

Figures indicating common letters do not differ significantly from each other at 5 % level, figures in parentheses indicate percent increase (+)/decrease (–) over control. INP: 1500 J2/ 100 g soil

* 0: free; 5: maximum root gallings

Table 2 Effect of supreme 15 CS on nematode egg hatching in glass cavity blocks

Doses (%)	Period		
	24 h	36 h	48 h
0.1	23 (43.9)	12 (73.9)	15 (40.0)
0.3	19 (53.7)	7 (84.8)	7 (72.0)
0.5	5 (95.1)	3 (93.5)	3 (88.0)
CON	41	46	25

Figures in parentheses indicate percent decrease (–) over control

It is concluded that supreme 15 CS at 0.3 and 0.5 % concentrations was most effective for maximum suppressing of nematode egg hatching and thereby the control of *M. incognita* on tomato in pots. These results need to be explored under field condition in future.

References

- Khan AA, Khan MW (1990) Infestation, distribution pattern and identity of root- knot nematodes associated with vegetable crops in the districts of Meerut division in Uttar Pradesh. *Indian J Nematol* 20:67–75
- Khan AA, Khan MW (1996) Distribution of root- knot nematode species and races infesting vegetable crops in eastern Uttar Pradesh. *Indian J Nematol* 26:238–244
- Khan MW, Ashraf SS, Ansari NA, Khan AA (1993) Incidence and intensity of root- knot on vegetables and identity of species/race of root- knot nematode in some hilly districts of Uttar Pradesh. *Indian J Nematol* 23:95–100
- Krishnappa K, Ravichandra NG, Reddy BMR (1992) Nematode pests of national importance and their managements pp. 57–66. In: David BV (ed) *Pest management and pesticides Indian scenario*. Namrutha Publ, Madras, p 384
- Santemyer PH (1958) Method of controlling nematodes employing alkali metal salt of N-(n-propyl) dithiocarbamate