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Agriculture Centre, Department of Botany, Aligarh Muslim University, Aligarh - 20200, India

EFFECT OF *MONONCHUS AQUATICUS* AND ORGANIC AMENDMENTS ON *MELOIDOGYNE INCOGNITA* DEVELOPMENT ON CHILLI.

by
M. Akhtar and I. Mahmood

Summary. Root-knot development caused by *Meloidogyne incognita* (Kofoid *et* White) Chitw. on chilli (*Capsicum annuum* L.) cv. Jawala significantly declined in the presence of the predatory nematode *Mononchus aquaticus* Coetzee. The severity of root-knot infection was greatly reduced when chopped leaves of neem (*Azadirachta indica* A. Juss.) and castor (*Ricinus communis* L.) were incorporated into the soil. Improvement in plant growth was positively correlated with the level of nematode control.

Plant-parasitic nematodes generally occur in polyspecific communities, including predacious nematodes. Interest in using predators, e.g. mononchs, as possible agents for nematode control was initiated by Cobb (1917) but little work was done on this aspect until the 1970's, when several workers recorded observations on the predatory ability of mononchs, although this was confined to laboratory conditions. This paper presents a more comprehensive study of the interrelationship among the root-knot nematode *Meloidogyne incognita* (Kofoid *et* white) Chitw., the predatory nematode *Mononchus aquaticus* Coetzee and organic soil amendments in the form of chopped leaves of neem (*Azadirachta indica* A. Juss) and castor (*Ricinus communis* L.) on chilli (*Capsicum annuum* L.) as possible use in nematode control.

Materials and methods

Mononchus aquaticus was collected from soil with a high organic content. The nematodes were extracted by Cobb's sieving and decanting method and Baermann's funnel technique, and maintained in 1% water agar *in vitro*, using free-living nematodes, *Rhabditis* spp. as prey, supplemented with lactogen milk powder. The addition of milk powder helped to maintain the populations of free-living nematodes for longer durations.

Soil for the experiments was collected from a vegetable growing field infested with *M. incognita*. The soil was a sandy loam, and with an organic matter content of less than 1% (w/w). The soil was screened (2 mm mesh) and incorporated with fresh chopped leaves of castor and/or neem at dosage rates of 1% or 5% (w/w). An appropriate amount of material was mixed with 4 l soil and then put into 15 cm clay pots. Pots with or without amendments were autoclaved and placed in a green-house (27±3 °C) where they were kept moist to allow decomposition of the additives.

After 3 weeks, 3-week-old seedlings of chilli cv. Jawala were transplanted into each pot. Pots were inoculated with 200 *M. aquaticus* and/or 2000 freshly-hatched second stage juveniles of *M. incognita*. There were five replications of each treatment included the untreated (without *M. aquaticus*) control. The pots were arranged in a randomized complete block design and maintained for 8 weeks. At the termination of the experiment, the plants were carefully removed and pot soil as well as root-adhering soil were collected separately in order to obtaining final populations of *M. aquaticus*. Root-knot indices were determined on a 0-5 scale (Sasser *et al.*, 1984). Fresh weight and length of root and shoot were recorded.

Results and discussion

There was a significant interaction between the effects of *M. incognita* and organic amendments. Reduction in the development of root-galls were found in all of the treatments, but proportionately the greatest reduction responses with respect to nematode control were obtained from organic amendments in the presence of *M. aquaticus* (Table I).

The highest rate of organic amendments resulted in maximum reduction of root-galls; particularly the incorporation of neem leaves at 5% (w/w). In unamended soil the population of *M. aquaticus* decreased markedly between the time of inoculation to harvest. Thus mononchs require prey nematodes exclusively for survival. The availability of

TABLE I - *Effect of predatory nematode* Mononchus aquaticus *individually and in combination with chopped leaves of neem and castor on the development of root-knot,* Meloidogyne incognita *in chilli.*

Amendment combination	Organic matter level (w/w)	Root-knot index (0-5 scale)	Final *M. aquaticus* population	Plant weight (g)			Plant length (cm)		
				Shoot	Root	Total	Shoot	Root	Total
Untreated (control)		4.0	–	6.6	3.7	10.3	9.5	3.8	13.3
M. aquaticus alone		–	*	40.5	10.2	50.7	48.4	10.2	58.6
M. aquaticus + *M. incognita*		2.5	35	18.4	4.9	23.3	22.4	5.9	28.3
M. aquaticus + *M. incognita* + Neem	1%	1.3	360	20.4	5.7	26.1	26.3	6.7	33.0
M. aquaticus + *M. incognita* + Neem	5%	0.7	500	26.3	8.3	34.6	32.8	8.2	41.0
M. aquaticus + *M. incognita* + Castor	1%	1.7	290	19.4	5.2	24.6	24.4	6.2	30.6
M. aquaticus + *M. incognita* + Castor	5%	1.0	410	24.4	6.1	30.5	28.4	7.9	36.3
L.S.D. (P = 0.05)		0.4				3.75			4.09
L.S.D. (P = 0.01)		0.5				5.08			5.54

* = *M. aquaticus* died soon after inoculation.

increased levels of organic matter to the soil help in promoting the populations build-up of predatory nematode, because their populations are relatively lower in unamended soil. The present findings indicate that the decrease in the development of root-galls occurred because of increased population levels of predators.

As a consequence of reduction in root-knot development plant growth of chilli was improved and it was correlated to degree of nematode control. This was partly due to the fact that organic amendments also served as fertilizers. The present study has shown that predatory nematodes can be used in biological control and it can also be highly beneficial, if organic matter is used as in integrated nematode management options.

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