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Investigation on potential of organic oil cakes as soil application against root knot nematode (*Meloidogyne incognita*) infecting chilli (*Capsicum frutescens* L.)

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Abstract

Experiment was conducted for the management of Root Knot nematode through effect of Oil cakes as soil application infecting Chilli. The effect of different oilcakes namely castor, mahua and Karanj are determined at time of harvest. For this purpose, oilcakes were applied on the experimental site before 15 days for decomposition and crop was sown. The observations were taken at time of harvest. The results showed that the castor cake at 2 different doses (60 g and 30 g/m²) considerably reduced the females number per 5 gm root, number of masses of egg per 5 gm root, egg number and larval egg mass of final nematode population per 200 cc soil and also increased the yield of crop. However all the treatments were significant over control but among the treatments the results were non-significant.

Keywords: Organic oil cakes, *Meloidogyne incognita*, chilli, root-knot nematode

Introduction

Chilli is as one of the important commercial spice in all crops. India is the world leading in chilli production. Chilli grows well in warm and humid climate. Ideal temperature range for good plant growth and fruit development is 15-30 °C. Indian chilli is world famous for two important commercial qualities colour and pungency. Some varieties of chilli are famous for the red colour because of the pigment being length width and skin thickness. Root-knot nematodes in all crops are prevalent in 90% of damage. In world a frequency estimate from 75 countries result showed that *M. incognita* is the most wide spread with 53% occurrence. In India over 350 plant species are known as the host of *Meloidogyne* spp (Sen and Das Gupta, 1982) [11] *Meloidogyne incognita* alone infecting about 250 and *M. javanica* about 150 genera of plants (Krishnappa, 1985) [7] Therefore *M. incognita* has been recognized economically more important nematode as compared to other nematode nematodes. In India Root-knot nematode was first reported by Barber (1901) [3] on tea roots. In Rajasthan Arya (1957) [2] reported that nematode on tomato in Jodhpur. However in those plants that do survive flowering and fruit production is strongly reduced. Annually in India loss due to this root nematode pest was worked out 12.85%. (Jain *et al.*, 2007) [6].

Materials and Methods

The oil cakes castor, Mahua cake and Karanj cake were used at 30 and 60 gm/m² were grind with pestle and mortar and passed through 60 mesh of sieve to get fine powdered forum. One standard check of Neem cake at 5 q/ha and untreated control were also maintained for the comparison of experimental results in field. The experiment was conducted out in RBD and all the treatments replicated 3 times. Oilcakes were left to decompose for 15 days in the soil and thereafter transplanting was done. The utmost care was taken by right from transplanting harvest of experiments for proper development and growth of plants and observations were recorded viz., number of females 5 gm of roots, egg masses number 5 gm of roots, egg number and larvae egg mass, and Final nematode population is 200 cc soil and yield.

Results

I. Number of females 5 gm of root

The presence of female 5 gm of root was determined by using standard methodology at time of crop harvest to determine the effect of different oilcakes. Results showed that castor oilcake at 60 g/m² with 16.00 mean female number per 5 gm of root was the better treatment followed by

castor cake at 30 g/m² (17.33), mahua cake at 60 gm/m² (19.00), karanj cake at 60 g/m² (19.00), mahua cake at 30 g/m² (19.33) and karanj cake at 30 g/m² (19.33). However highest reduction observed in number of females by the standard check neem cake at 5 q/ha (14.33) and lowest reduction observed in untreated control (26.67). The highest percentage reduction over control was observed by the application of castor cake at 60 g/m² (40.00%) followed by castor cake at 30 g/m² (35.02%)

II. Egg masses number per 5 gm of root

The presence of egg masses 5 gm of root was determined by using standard methodology at time of crop harvest to determine the effect of different oil oilcakes. Results showed that castor oilcake at 60 g/m² with 13.67 mean number egg masses per 5 g root was the better treatment followed by castor cake at 30 g/m² (15.33), mahua cake at 60 g/m² (15.67), mahua cake at 30 g/m² (16.67) karanj cake at 60 g/m² (17.00) karanj at 30 g/m² (18.00) However the highest reduction in number of egg mass was observed by the soil application of neem cake at 5 q/ha (12.33) and lowest reduction was observed in untreated check (20.33). The highest percentage reduction over control was observed by the soil application of castor at 60 g/m² (32.75%) followed by castor at 30 g/m² (24.59%).

III. Number of Eggs and larvae per egg mass

The presence of Eggs and Larvae egg mass was determined by using standard methodology at time of crop harvest to determine the effect of different oilcakes. Results observed that castor oilcake at 60 gm/m² with 54.33 mean egg number masses and larvae per egg mass was the better treatment followed by castor cake at 30 gm/m² (56.00), mahua cake at 60 gm/m² (60.67), mahua cake at 30 gm/m² (62.00), karanj cake at 60 gm/m² (64.67), karanj cake at 30 gm/m² (66.00). However highest reduction was observed in neem cake at 5

q/ha (46.33) and lowest reduction was observed in untreated control (80.67). The highest percentage reduction over control was observed by the soil application of castor cake at 60 gm/m² (32.65%) followed by castor cake at 30 gm/m² (30.58%).

IV. The Final population of Nematode/200 cc soil

The final population per 200 cc soil was determined by using standard methodology at time of crop harvest to determine the effect of different oilcakes. Results showed that castor oilcake at 60 gm/m² with 796.67 final mean nematode population per 200 cc soil was the better treatment followed by castor cake at 30 gm/m² (800.00) mahua cake at 60 gm/m² (810.00), mahua cake at 30 gm/m² (813.33), karanj cake at 60 gm/m² (813.33) karanj cake at 30 gm/m² (820.00), However highest reduction observed in final nematode population in neem cake at 5 q/ha (733.33) and lowest reduction was observed in untreated control (1026.67). The highest reduction percentage over control was observed by the soil application of castor cake at 60 gm/m² (22.40%) followed by castor cake at 30 gm/m² (22.07%).

V. Yield (kg/plot)

The yield of chilli was observed by three pickings in the crop period till harvest to determined the effect of oilcakes. The mean yield was observed between 0.92 kg/plot to 1.60 kg/plot. Results showed that castor oilcake at 60 gm/m² mean yield 1.55 kg/plot was the better treatment followed by castor cake at 30 g/m² (1.50 kg/plot), mahua cake at 60 gm/m² (1.50 kg/plot), mahua cake at 30 gm/m² (1.47 kg/plot), Karanj cake at 60 gm/m² (1.45 kg/plot), karanj cake at 30 gm/m² (1.25 kg/plot). The highest yield was observed in neem cake at 5 q/ha (1.60 kg/plot) and lowest yield was recorded in untreated control (0.92 kg/plot). The highest percentage increase in control was observed by castor cake at 8 gm/m² (68.47%) followed by castor cake at 30 gm/m² (63.04%).

Table 1: Efficacy of Oil cakes against Root Rnot Nematode as soil application on Chilli

Sr. No.	Details of treatment	Number of females/5 gm of root	Egg number masses per 5 gm of root	Number of eggs and larvae/egg mass	Final population of nematode 200 cc soil	Yield (kg/plot)
1	Castor cake at 30 gm/m ²	17.33 (35.02)	15.33 (24.59)	56.00 (30.58)	800.00 (22.07)	1.50 (63.04)
2	Castor cake at 60 g/m ²	16.00 (40.00)	13.67 (32.75)	54.33 (32.65)	796.67 (22.40)	1.55 (68.47)
3	Mahua cake at 30 g/m ²	19.33 (27.52)	16.67 (18.00)	62.00 (23.14)	813.33 (20.77)	1.47 (59.78)
4	Mahua cake at 60 g/m ²	19.00 (28.75)	15.67 (22.92)	60.67 (24.79)	810.00 (21.10)	1.50 (63.04)
5	Karanj cake at 30 g/m ²	19.33 (27.52)	18.00 (16.37)	66.00 (18.18)	820.00 (20.13)	1.25 (35.86)
6	Karanj cake at 60 g/m ²	19.00 (28.75)	17.00 (21.29)	64.67 (19.83)	813.33 (20.77)	1.45 (57.60)
7	Neem cake at 5 q/ha	14.33 (46.26)	12.33 (39.35)	46.33 (42.56)	733.33 (28.57)	1.60 (73.91)
8	Untreated	26.67	20.33	80.67	1026.67	0.92
	SEm±	0.92	0.91	2.83	33.50	0.14
	CD at 5%	2.69	2.66	8.27	98.00	0.40

Discussion

Grinded oil cakes Castor cake, mahua cake and Karanj cake were applied before 15 days before transplanting for decomposition. Castor oilcake at different doses (60 gm/m² and 30 gm/m²) were proved best treatment effective control of nematode population with respect to reduction of number of

females/5 gm of root, egg masses number per 5 gm of root, egg number and larval masses/egg mass and considerably increased the yield of Chilli.

The results obtained after the analysis of data showed most similarity with Parihar *et al.*, (2015) ^[9] who used oil cakes neem, castor and mahua at 10, 15 and 20 q/ha for the

management of RKN on gram as soil application. Among these treatments, castor and neem cakes were found most effective in plant growth characters and suppress the nematode population. It also observed similarity with Singh *et al.*, (2011) [12] described that the best protection of RKN of chili was achieved through integrated use of neem cake and *Trichoderma viride* biomass and fruit yield 69, 61 and 80% respectively compared to control. A significant reduction in *M. Incognita* population and development in terms of root galling, egg masses and soil population (58, 46 and 85% respectively) was also achieved in the treatment where all the three components were applied and compared to untreated control. Our results showed similarity with abd-el-khair *et al.*,

(2018) [1] used *Trichoderma harzianum* and *Trichoderma virens* as well as the Oil cakes of olive and castor bean alone or in integration were applied for controlling *Fusarium solani* and RKN on brinjal in pots experiment. They also reduced were nematode parameters (*viz.* J2 of *M. incognita* in soil & roots and the numbers of galls & egg-masses) as well as increased the growth parameters of eggplants (*viz.* shoot length, dry shoot weight, leaves number, root weight and dry root weight), compared with control. The soil amendments *viz.* OC and CC alone or in combination reduced the above RKN parameters in eggplants in the ranges of 74-84; 88-93; 79-81 and 72-76%, respectively.

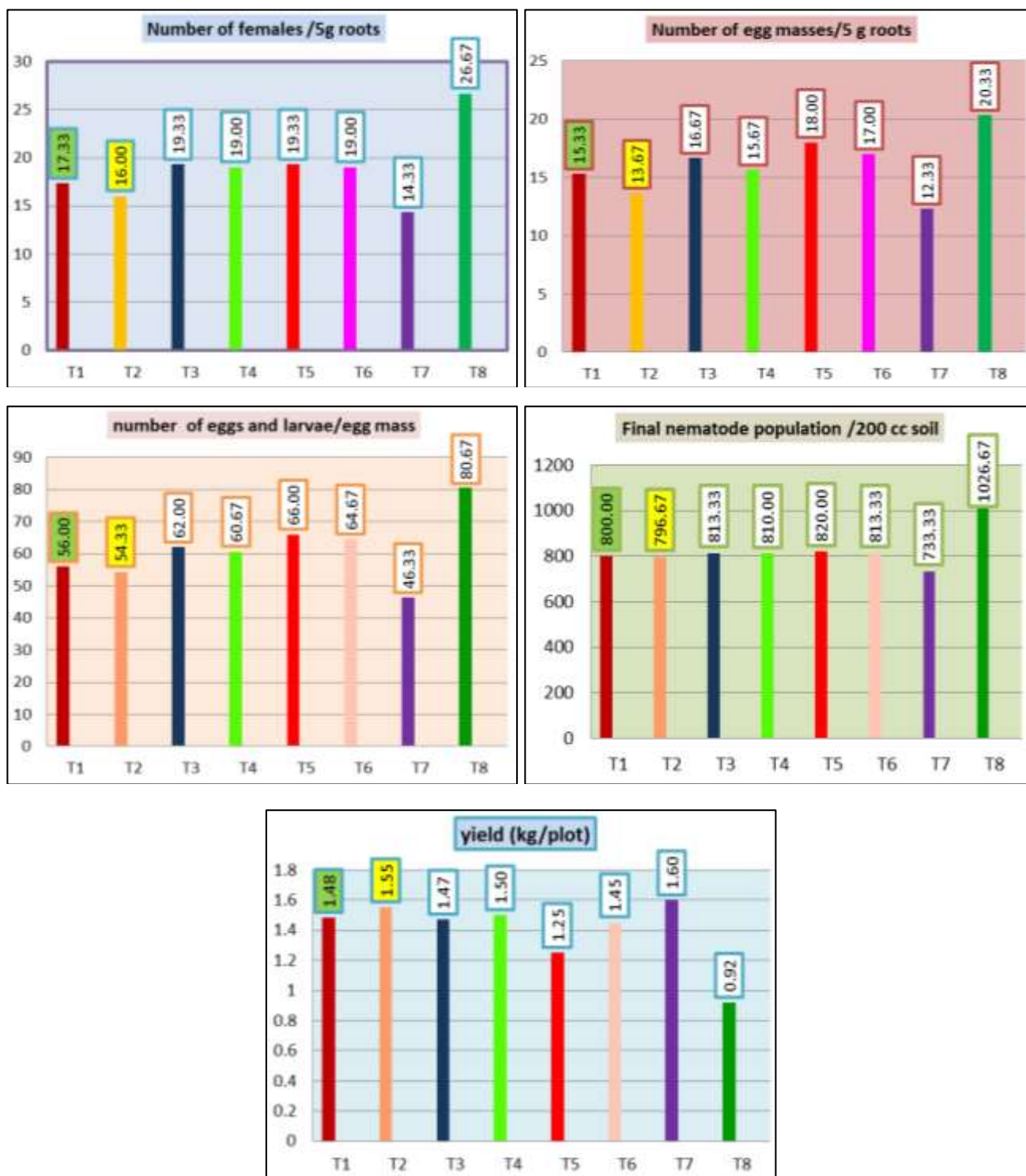


Fig 1: Efficacy of oilcakes against Root Knot Nematode on Chilli

Conclusion

The result showed that the castor cake found most suitable against Root-knot disease of chilli and reduced the females number per 5 gm root, number of masses of egg per 5 gm root, egg number and larval egg mass of final nematode population per 200 cc soil and also increased the yield of crop.

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