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AN ECO FRIENDLY APPROACH TO CONTROL *Meloidogyne incognita* AFFECTING TUBEROSE

Swapnanjali Mishra[1] and Sunita Behera[2]

ABSTRACT

A pot study was conducted in net house condition during 2010-11 to evaluate the efficacy of oil cakes and bio-control agents for management of root knot nematode (*Meloidogyne incognita*) in tuberose (*Polianthes tuberosa*).

Oilcakes-neem cake (*Azadirachta indica*) and mustard cake (*Brassica rapa*) each at two doses 1 and 1.5 t ha^{-1}, bio control agents *Trichoderma viride* and *Pseudomonas fluorescens* each @ 2 and 2.5 kg ha^{-1} were used. Among different treatments *T.viride* @ 2.5 kg ha^{-1} enriched with FYM was found to be the most effective treatment for reduction of number of nematode galls (76.2%) over check. Whereas neem oil cake @ 1.5 t ha^{-1} has shown its efficacy in controlling the nematode population both in 5 g root 73.2% and in 200 cc soil 83.3% over check.

(Key words : Oil cakes, bio agents, *Meloidogyne incognita*, Tuberose)

INTRODUCTION

Tuberose, *Polianthes tuberosa* (L.) is commercially cultivated for its fragnant flowers, which are used in garlands, floral decorations and natural oil is extracted from the flowers for the use in the perfume industry. It is a half-hardy bulbous perennial plant that perpetuates itself through bulblets. Root knot nematode, *Meloidogyne incognita* was reported as one of the important factors reducing the yield of the crop by 13.78% (Khan and Pravatha Reddy, 1994)

Though there is a very good export potentiality of the tuberose in the world market, still its production system poses potential threat to the growers due to the higher density of soil nematode population. Keeping all these importance of *Meloidogyne incognita* in Tuberose, present study was carried out to know the effect of oil cakes and bio-control agents against *Meloidogyne incognita*.

MATERIALS AND METHODS

The pot study was carried out in the net house, Department of Nematology, OUAT, Bhubaneswar during 2010-11. The experiment was conducted in Completely Randomized Design, with three replications and nine treatments including control. The tested oil cakes were Neem oil cake @ 1t ha^{-1}, Neem oil cake @ 1.5 t ha^{-1}, Mustrad Oil Cake @ 1 t ha^{-1} and Mustard oil cake @ 1.5 t ha^{-1}. Biocontrol agents are *T.viride* @ 2 kg ha^{-1}, *T.viride* @ 2.5 kg ha^{-1}, *Pseudomonas fluorescens* @ 2 kg ha^{-1} and *P. fluorescens* @ 2.5 kg ha^{-1}.

Pots each of 20 cm diameter were surface sterilized in 1.5% formalin solution, dried under sun and filled with 2 kg autoclaved sterilized soil + sand + FYM mixture in 2:1:1 ratio. Then, the pot soil was treated with oil cakes and bio agents in appropriate dosage as per the treatments. The bio-agents *T.viride* and *P.fluorescens* in talc formulations with the spore concentratioin of 2 x 10^6 cfu^{-1}g, were pre-incubated with FYM in appropriate dosage. The uniformly sized bulbs of commercially grown susceptible tuberose cv Vaibhav was selected for planting. Twenty days old tuberose plants in each replicated pots were inoculated with 2000 J2 of *Meloidogyne incognita*. The experiment was terminated 100 days after planting. Final observation on population growth of root knot nematodes in soil and 5 g root along with its infection parameters in respect of number of galls plant^{-1} were recorded. The number of nematodes in the roots plant^{-1} was estimated by staining 5g of root samples in acid fuchsin, homogenizing them and counting of nematodes was done using a microscope.

RESULTS AND DISCUSSION

All the treatments, significantly reduced the nematode multiplication over check as seen from number of galls plant^{-1}, nematode population in 5 g root and 200 cc soil (Table 1). The lowest number of galls (26.67) with highest reduction (76.2%) was recorded in application of *T.viride* @ 2.5 kg ha^{-1} followed by Neem oil cake @ 1.5 t ha^{-1} (75.6%), Mustard oil cake @ 1.5 t ha^{-1} (74.7%), *T.viride* @ 2 kg ha^{-1} (73.2%) and Neem oil cake @ 1 t ha^{-1} (70%) over check (112.3) in descending order which were statistically at par. Maximum per cent of decrease in nematode population^{-1} 5g root over

1. Res. Assistant, Deptt. of Plant Pathology, Inst. of Agrl. Sci., SOAU, BBSR
2. Jr. Scientist, Plant Pathology, High Altitude Research Station, OUAT, Pottangi

Table1. Efficacy of oil cakes and bio agents

Treatment details	Number of galls	% Decrease over check	Nematode 5g root	% Decrease over checck	Nematode Population in 200 cc soil	% decrease over check
T1 Neem Oil cake @ 1t ha $^{-1}$	33.67	70.0	45.66	53.5	1058.33	66.8
T2 Neem Oil cake @ 1.5t ha^{-1}	27.33	75.6	26.33	73.2	532.66	83.3
T3 Mustard oil cake @ 1t ha^{-1}	36.00	67.9	62.00	36.90	1557.00	51.20
T4 Mustard Oil cake @1.5t ha^{-1}	28.33	74.7	38.33	61.0	928.33	70.9
T5 *T.Viride* @ 2 kg ha^{-1}	30.00	73.2	54.00	45.00	1257.66	60.00
T6 *T.viride* @ 2.5 kg ha $^{-1}$	26.67	76.2	32.33	67.1	751.66	76.4
T7 *P.fluorescens* @ 2 kg ha^{-1}	45.33	59.6	57.33	417	1385.33	56.6
T8 *P.fluorescens* @ 2.5kg ha^{-1}	41.00	63.5	50.0	49.1	990.00	69.00
T9 Untreated check	112.33	-	98.33	-	3195.66	-
SE(m) ±	0.12	-	0.33	-	0.03	
CD at (5%)	0.36	-	0.102	-	0.083	-
CV	0.498	-	0.115	-	0.004	-

(Each data mean of three replications)

check was recorded in Neem oil cake @ 1.5 t ha^{-1} (73.2%) followed by *T.viride* @2.5 kg ha^{-1} (67.1%). From the data on mean nematode population in soil it has been found that Neem oil cake 1.5 t ha^{-1} exhibited the lowest root knot nematode population (532.66) with highest reduction (83.3%) in nematode population over check (3195.66) followed by *T.viride* @ 2.5kg ha^{-1} (76.4%).

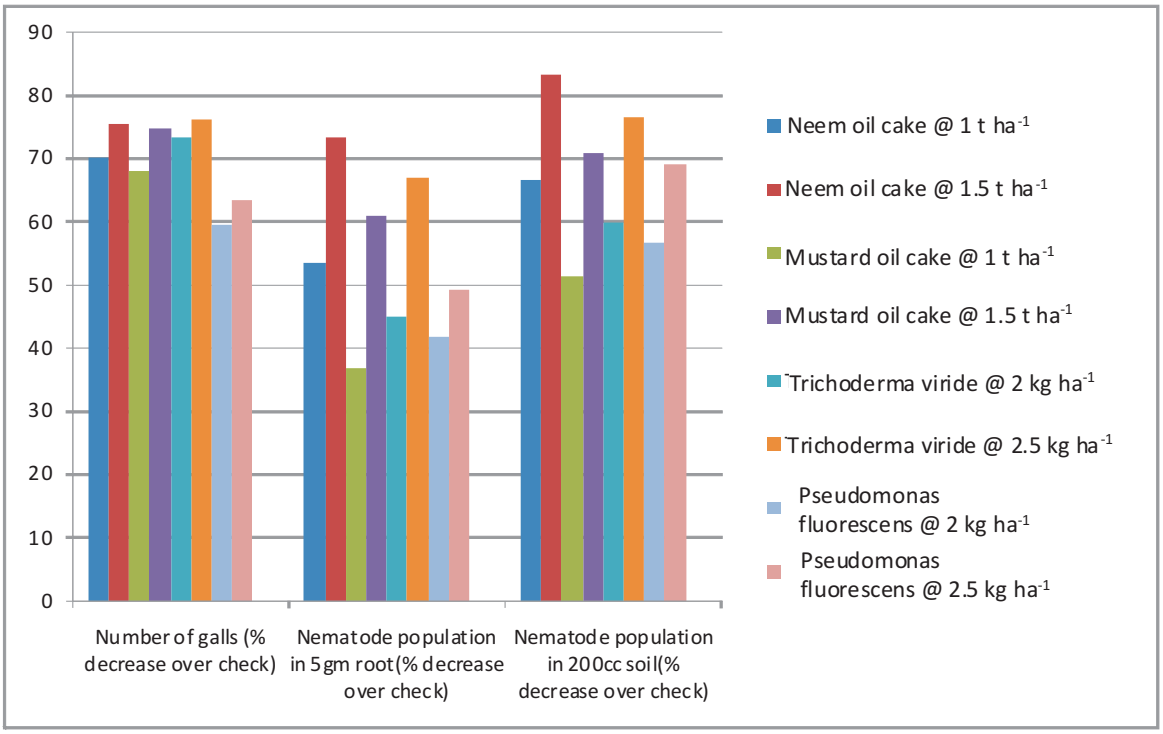
The neem oil cake, *T.viride* and *P.fluorescens* proved the efficacy in reducing *M.incognita* population in tuberose and improved the plant growth which are in conformity with the findings of Saha and Khan (2016), who found the efficacy of *T.harzianum*, neem cake and *P.fluorescens* for economic managing *M.incognita* in tuberose. Water soluble fractions of oil cakes extracted from neem were toxic to nematodes and inhibited the larval hatching of *M.incognita* (Khan *et al.*,1974).Phenols, aminoacides, aldehydes and fatty acids are release from neem which is antagonistic to root knot nematodes. (Satyandra *et al.*,2007).*Trichoderma* sp. acted as a good mycoparasite along with nematicidal activity. Direct parasitism of eggs and larvae through increase in chitinase and protease activities and inducing plant defense response are the two mechanisms of action which are thought to be responsible for controlling nematode (Elad *et al.*,1982).

So, from the above discussion it is inferred that to meet the demand of sustainable management practices of *Meloidogyne incognita*, use of organic amendment and biological control agent is mandatory,which is helpful to overcome the uneconomical and hazardous effects of chemical nematicides on human health, ground water and environment.

Similar results were reported by various researchers such as Tiyagi *et al.* (2001), who found that the decomposition of oil cakes, produce certain products like ammonia, fatty acids, formaldehyde and phenols, the combined effect of which reduce nematode development. Khan and Rathi (2001) found neem cake as the best non-chemical alternative for the management of root-knot nematode in tomato. Bokhasi (2009) reported that all culture filtrate of the *Trichoderma* spp. significantly controlled root knot nematode on egg plant. Singh and Mathur (2010) reported that *T.viride* produces toxin which is fatal to *M.incognita* juveniles and also parasitized eggs.

During their studies Sharma *et al.* (2007); Kumar and Khanna (2006) found that combined use of neem cake

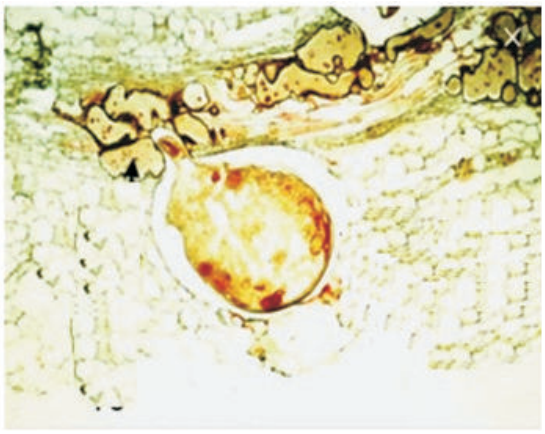
EFFICACY OF OIL CAKES AND BIO AGENTS



C-Control, $\mathbf{T_1}$ Neem Oil cake @ 1t ha^{-1}, $\mathbf{T_2}$ Neem Oil cake @ 1.5t ha^{-1}, $\mathbf{T_3}$ Mustard oil cake @ 1t ha^{-1}, $\mathbf{T_4}$ Mustard oil cake @ 1.5t ha^{-1}

$\mathbf{T_5}$ *T.Viride* @ 2Kg ha^{-1}, $\mathbf{T_6}$ *T.viride* @ 2.5 kg ha^{-1}, $\mathbf{T_7}$ *P.fluorescens* @ 2.5 Kg ha^{-1}, $\mathbf{T_8}$ *P.fluorescens* @ 2 Kg ha^{-1}

2nd stage juvenile of female *Meloidogyne incognita*



Meloidogyne incognita Female infecting root

and bioagents caused greater plant growth with a significant reduction in nematode multiplication in terms of number of galls, egg masses and soil population.

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