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Research Article

Eco-Friendly Management of Root-knot nematode *Meloidogyne incognita* using Organic amendments on Tomato

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ABSTRACT

Chemical control of plant-parasitic nematodes, essentially, involves the use of synthetic nematicides. However, apart from its very high cost, increased concern for the environment has necessitated a reduction in the amount of nematicides used for nematode control. Additionally, there has been an increase in the intensity of search for other efficient, ecologically sound and safe control methods. The screen house experiments were conducted to test the efficacy of five organic wastes rice husk, saw dust, cow urine, cow dung and neem cake to control the root knot nematode of tomato. Equal quantities of rice husk, saw dust, cow urine, cow dung and neem cake were separately made up to one liter with autoclaved soil. Two weeks old seedlings of tomato raised in autoclaved soil were transplanted into soil manure mixture and inoculated with one thousand second stage larvae of *Meloidogyne incognita* race I. Treatments were completely randomized and effects assessed based on plant height, dry weight, extent of galling and the nematode multiplication factor. Results obtained showed that rice husk, saw dust, cow urine, cow dung and neem cake produced significantly higher result than the untreated control.

Keywords: Root knot nematodes; *Meloidogyne incognita;* organic materials; tomato; root-knot index.

INTRODUCTION

Tomato (*Lycopersicum esculentum mill*) is one of the most widely grown vegetables in the world ranking second in importance to potato in many countries. It belongs to family Solanaceae. In India tomato, cultivated in about 80,000 hectares of land. It is essential for balanced diet & maintenance of good health (Mastol et al., 2006). Tomato is source of carbohydrates, fats, proteins, vitamins and minerals with neutralizing property. Their seeds contain 24% oils and more medicinal value, promotes gastric secretion, acts as blood purifier which keeps intestine in good condition. In view of its importance, efforts are underway to improve the yield and the quality of tomato. Root-Knot nematodes are serious and economically most important pest of many cultivated crops specially tomato around the world. It is ranked among the most damaging plant pathogen (Sasser JN et. al., 1984). Root-Knot Nematodes of genus Meloidogyne are among the main pathogens of tomato plants all over the world (Jacquet et al., 2005). Infested plants shows the symptoms of stunting, yellowing, aberrant development of root system characterized by the formation of typical galls, a general unthrifty appearance and limited fruit production, estimated yield loses ranging from 28% to 68 % (Adesiyan et al., 1990; Williamson et al., 1996). In recent years many effective and relatively inexpensive nematicides have been withdrawn from the market because of health hazards to production worker or because of their detection at unacceptable levels in ground water. In addition they are relatively unaffordable to many small-scale farmers (Johnson AW et al., 1987). Organic amendments of different kinds used as nutrient sources for crop production have been found more effective in control of root diseases of plants. The aim of work is to study the effectiveness of the various organic amendments in the control of root knot nematodes of tomato.

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MATERIALS AND METHODS

A screen house experiment is carried out on tomato crop in Sullurpet, Nellore district heavily infested with *Meloidogyne incognita.* A total of 36 (15cm mouth wide) plastic pots were divided into seven groups containing six in each. The pots in group I was filled with one liter of autoclaved soil serves as untreated and uninucleated control. The Group II was filled one liter of autoclaved soil serves as inoculated untreated control. The groups III and IV were filled with equal quantities of one liter of autoclaved soil with rice husk and saw dust used as bedding agent in Poultry farms respectively. The groups V, VI and VII were filled with equal quantities of one liter of autoclaved soil with cow

Table 1: Effect of organic amendments on Tomato

Groups	Treatment	Plant height (cm)	Plant dry weight (kg)	Root knot index	RF
I	Uninoculated , untreated	15.02a	3.7a	0.0 e	0 e
II	Inoculated untreated	5.21d	1.2d	0.7a	1.1a
III	Inoculated treated with Poultry waste + rice husk	10.11a	2.1c	1.4a	1.9b
IV	Inoculated treated with Poultry waste + saw dust	9.67d	1.2b	1.1a	1.6c
V	Inoculated treated with cow urine	11.21c	2.8c	1.7b	2.1b
VI	Inoculated treated with cow dung	14.01b	3.61b	1.3c	1.5c
VII	Inoculated treated with neem cake	17.89b	2.96b	0.4c	0.5a

RF- Reproductive factor

urine, cow dung and neem cake respectively. Susceptibility of tomato seeds to *Meloidogyne incognita* have been established were raised in autoclaved soil. Two weeks after sowing, two seedlings were transplanted into each pot. Thereafter, one thousand second stage juveniles of *Meloidogyne incognita* race I were inoculated into each pot except group I which serves as control. The experiments were conducted in a screen house with the pot arranged in randomized block design. The plants were watered regularly.

Four weeks after transplant, the seeding were uprooted and growth was observed in terms of (i) plant height (ii) dry weight of plant and (iii) extent of galling. The nematode multiplication factor was also accessed.

The nematode for this work were obtained from an infected tomato farm, previously inoculated with the egg mass of the nematode, using Cobb's decantation and sieving techniques followed by modified Baermann's funnel method (Robinson et al., 1989). At the end of the experiment the soil nematode population were extracted by the same methods and counted. The roots of the tomato were cut into smaller pieces and mixed homogenously in a blender for 45 seconds. One gram (1g) of the root was taken and examined under a dissecting microscope. The number of juveniles, eggs, and females were counted.

Root-knot index was determined using Sasser et al, (1984) scale of 0 = No galling; 1 = 1-10 galls; 2 = 11 – 20 galls; 3 = 21 – 30 galls; 4 = 31-100 galls and 5 = more than 100 galls. Data obtained were analyzed using the new Duncan Multiple Range Test.

RESULTS AND DISCUSSION

The result obtained (Table 1) showed that seedlings treated with all kinds of treatment produced significantly (p=0.05) higher results than those of the inoculated, untreated control with higher plant height, dry weight, lesser root-knot indices and smaller reproductive factor (RF). All the treated groups shown significant results which were comparable to those obtained with the uninucleated control. Seedlings treated with neem cake shown better nematocidal activity compared to other organic amendments. The observed in number of nematodes may be responsible for the increase in growth of seedlings. Such decrease means fewer disturbances to the seedlings resulting in a unhindered growth. The reduction in the reproduction factor of the nematode may be responsible for the observed decrease in root knot nematode indices. The decrease in number of nematode accompanied by increase in growth of tomato suggest nematocidal potential of the rice husk, saw dust, cow urine, cow dung (Babatoloa, 1990; Akhtar and Alam, 1990, 1992; Alam et al., 1994) and neem cake.

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