

Bio-Management of root-knot nematode (*Meloidogyne incognita*) in tomato (*Lycopersicon esculentum* L.)



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ABSTRACT

Tomato (*Lycopersicon esculentum* L.) is one of the most important vegetables grown in India. It is grown for the domestic market under both rains fed and irrigated conditions. Due to the high demand for tomato in the domestic market and for processing, farmers have extensively adopted high yielding varieties and modern technologies like greenhouse production to ensure year round production and increase production. Intensive tomato cultivation in India has resulted in build-up of soil borne diseases, especially root - knot nematodes. Various bio-control agents' viz. *Trichoderma viride*, *Paecilomyces lilacinus* and *Beauveria bassiana* were used for experimental purpose. The result showed that *Trichoderma viride* was very effective for the management of root-knot nematode followed by *Paecilomyces lilacinus* and *Beauveria bassiana* respectively. Maximum growth parameters {shoot length (58.25cm), root-length (19.75cm), fresh shoot weight (15.37g), fresh root weight (2.37g) and number of fruits (2.25)} were observed in *Trichoderma viride* followed by *P.lilacinus* {shoot length (53.00cm), root-length (13.00cm), fresh shoot weight (11.75g), fresh root weight (2.12g) and number of fruits (1.7)} and *Beauveria bassiana* {shoot length (49.75cm), root length (8.75cm), fresh shoot weight (9.25g), fresh root weight (1.25g) and number of root-knot was noted in *T. viride* (17.25), *P. lilacinus* (18.50) and *B. bassiana* (24.50) respectively).

KEY WORDS

Bio-control | Management Root-Knot Nematode | Tomato.

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Introduction

Plant parasitic nematodes are small microscopic roundworms which live in the soil and attack the roots of plants. Crop production problems induced by nematodes therefore generally occur as a result of root dysfunction, reducing rooting volume and foraging and utilization efficiency of water and nutrients. Many different genera and species of nematodes can be important to crop production. Tomato (*Solanum lycopersicon*) is an important vegetable crop is seriously affected by root-knot nematode (Sasser and Carter, 1985). Bio-control agent's particularly nematode destroying fungi are common and abundant in both natural and agricultural soil (Jatala, 1986 and Pandey *et al.*, 2003).

Bio-control agents have got some inherent advantages of being safe, host specific efficiencies, environmental friendly and long lasting. Despite the significant advantages of bio pesticide there are some other factors which have reduced their practical effectiveness and commercial exploitation (Ganguli *et al.*, 1994). A number of bio-control agents have been found effective against nematodes. Mankau (1990), Alam (1990). Keeping this view in mind the present investigation was carried out. The agriculturist are taking interest in developing bio-pesticides that are pest specific, nontoxic to

human, less expensive and safe for the environment (Suman and Dikshit, 2010).

Materials and Methods

Experiment was conducted in C.M.P. P.G. College, Allahabad (U.P.) during 2018-19. Sixteen pots were taken for experimental purpose. The six inch earthen pots were sterilized with formalin & filled with sterilized soil. Seven days old seedlings of tomato variety 'Kanchan' were planted and after seven days 1000 newly hatched larva from egg masse of *Meloidogy incognita* (extracted from tomato plants) were pipette and inoculated into three inch deep hole near the base of the plant in each pot and 5000 spores of *T. viride*, *P. lilacinus* and *B. bassiana* were also inoculated with the help of pipet in plant zone. Plants were irrigated normally. At senescence stage of the crop observation was taken viz. shoot length, root-length, fresh shoot weight, fresh root weight, number of fruits and root-knot. *T. viride*, *P. lilacinus* and *B. bassiana* were multiplied in nutrient broth at 25°C for 15 days under stationary condition. Fungal met along with culture filtrate was sterilized and 500ml. sterile distilled water was used inoculation in tomato plant. Data of observation was computed as per the analysis of variance test of completely randomized block design.

Treatment	Shoot (cm) length	Root length (cm)	Fresh shoot weight (g)	Fresh root weight (g)	Number of root-knot	Number of fruits
<i>T. virids</i>	58.25	19.75	15.37	2.37	17.25	2.25
<i>B. bassiana</i>	49.75	8.75	9.25	1.25	18.50	1.50
<i>P. lilacinus</i>	63.00	13.00	11.75	2.12	24.50	1.75
Control	38.50	11.00	11.12	0.87	55.00	1.00
CD(P=0.05)	7.78	7.27	-	1.072	16.64	-
F%(P=0.05)	S	S	NS	S	S	NS

Table: 1. Influence of *T. viride*, *P. lilacinus* and *B. bassiana* on the growth parameters, number of fruits and number of root-knot.

Result and Discussion

Observation showed that all the treatments viz. *T. viride*, *P. lilacinus* and *B. bassiana* increase plant growth parameters, number of fruits and reduced number of root knot over control. *T. viride* also found to be the most effective among all the treatments. Maximum plant growth parameters were found in application of *T. viride*, *P. lilacinus* and *B. bassiana* respectively. Minimum number of knots was also found in case of *T. viride*, *P. lilacinus* and *B. bassiana* respectively.

Maximum reduction of root-knot and higher plant growth parameters were observed in *T. viride* may be due to the presence of higher concentration of toxic chemical such as 'viridin, production of volatile and nonvolatile antibiotics and release enzyme during decomposition. *T. viride* is also acts as biofertilizer. Similar observation made by Dennis and Webster 1971; Das and Padhi, 1998; Singh *et al.*, 2000; Javed *et al.*, 2008. *P. lilacinus* also decrease root-knot and increase plant growth parameters due to the production of 'paccilotoxin' and 'lilacin' antibiotic and egg parasitic nature of *M. incognita*. Reduction of root-knot and increase plant growth parameters was also observed in *B. bassiana* due to secretion of toxic chemical such as 'beauverin' and may be also its egg parastic nature. This is supported by the findings of (Barberchek *et al.*, 1991).

The study is in line with the findings of various authors on the effect of *Trichoderma* on *F. oxysporum*. Ramezani, (2010) found that soil treated with *T. harzianum* reduced the disease by 92% while. Mwangi *et al.*, (2011) documented that *T. harzianum* when applied to tomatoes increased the height and dry root weight.

Tomato (*Lycopersicon esculentum* L.) is one of the most important vegetables grown in India. It is grown for the domestic market under both rainfed and irrigated conditions. Due to the high demand for tomato in the domestic market and for processing, farmers have extensively adopted high yielding varieties and modern technologies like greenhouse production to ensure year round

production and increase production. Intensive tomato cultivation in India has resulted in build-up of soil borne diseases, especially root - knot nematodes in greenhouses where monoculture and limited crop rotation are practiced

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