

Original Research Article

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Study the Efficacy of Fungal Bioagents on Root Knot Nematode, *Meloidogyne incognita* in Black Pepper (*Piper nigrum*) Nursery

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ABSTRACT

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A nursery experiment was conducted to evaluate the efficacy of different biological agents such as *Paecilomyces lilacinus*, *Pochonia chlamydosporia* and AM fungi on root knot nematode management in black pepper. The study revealed that all the biological agents were found to have potential to increase significant plant growth in terms of number of leaves and plant biomass. The maximum number of leaves per plant was recorded in *P. chlamydosporia* treated plants which was significantly different from untreated control followed by AM fungi and *P. lilacinus*. The maximum plant biomass (46%) was recorded in *P. chlamydosporia* and it was on par with AM fungi. The root knot nematode *M. incognita* alone recorded least bio mass of 21 g. The population of root knot nematode *M. incognita* in soil and roots were significantly lower in all biological agents treated cuttings than untreated control. Nematode population in soil, egg mass/g and adult female nematode/g was significantly reduced in *P. chlamydosporia* treated plants when compared to untreated control.

Introduction

Black pepper *Piper nigrum* known as ‘King of Spices’ is the most important and most widely used spice in the world. The production share of Tamil Nadu is 851 MT from 3,745 ha (NMCE, 2006). In India, generally yield varies widely in different areas and depends on several factors such as pest & diseases, soil fertility, climate, age of vine, etc. The low productivity and crop loss due to pests and diseases has been identified as a major constraint in the production of black pepper. The major disease identified in black pepper are ‘slow wilt’ caused by root

knot nematode *Meloidogyne incognita* prevailing pepper growing areas of Tamil Nadu. Slow wilt is the most harmful disease, which spreads rapidly destroying a large number of vines, estimated at about 20 per cent of the total crop almost every year. Several factors were responsible to spread of plant parasitic nematodes from one place to another place. Among this infestation and spread of nematodes through rooted cutting is foremost important one. Hence, an attempt was made to select efficient biological agent for the management of root knot nematode in nursery was conducted in popular black pepper variety ‘Panniyur 1’.

Materials and Methods

A nursery experiment in completely randomized block design was conducted at Horticultural Research Station, Pechiparaito evaluate efficacy of biological agents such as *Pochonia chlamydosporia*, *Paecilomyces lilacinus* and AM Fungi on root knot nematode management in black pepper. The nursery mixture was prepared and filled with polythene bags. Good and disease-free black pepper cuttings was selected and planted in the polybags containing nursery mixture. Before planting the poly bags containing nursery mixture were incorporated with *P. chlamydosporia* (5g/cutting), *P. lilacinus* (5g/cutting), AM Fungi (5g/cutting), carbofuran 3 G (10g/cuttings) along with untreated control for check. Biological agents treated poly bags were inoculated second stage juveniles of root knot nematode *M. incognita* @ one juvenile/g of soil. The trial was concluded 180 days after nematode inoculation. At the time of termination of the experiment observation such as soil nematode population (250g), number of females in root

(1g), number of egg mass in 1g of root and gall index of root knot nematode *M. incognita* were recorded. The plant growth characters of number of leaf per plant and plant biomass also recorded. The data were analyzed statistically and tabulated.

Results and Discussion

The results of the study indicated that all the biological agents such as *P. chlamydosporia*, *P. lilacinus* and AM Fungi were found to have potential to increase the plant growth in terms of number of leaves and plant biomass, but varied significantly in improving the biomass between the treatments. The maximum number of leaf per plant was recorded in *P. chlamydosporia* treated plants (5) significantly different from untreated control (3) followed *P. lilacinus* and AM Fungi. The maximum plant biomass of 46.15 per cent was recorded in *P. chlamydosporia* and it was on par with *P. lilacinus* and AM fungi. The *M. incognita* alone recorded least bio mass of 21 g (Table 1).

Table.1 Management of root knot nematode *Meloidogyne incognita* in black pepper through biological agents

Treatments	Nematode population (250g soil)	No. of female /g of root	No. of egg mass/g of root	Gall Index	Number of leaves /Plant	Biomass (g)
T1 – <i>Pochonia chlamydosporia</i> (5 g per cutting)	135 (43.28)	6 (64.71)	5 (66.67)	1	5	39 (46.15)
T2 – <i>Paecilomyces lilacinus</i> (5 g per cutting)	143 (39.92)	9 (47.06)	7 (53.33)	2	4	35 (40.00)
T3 – AM Fungi (5 g per cutting)	140 (41.18)	8 (52.94)	6 (60.00)	2	4	38 (44.74)
T4 – Carbofuran 3G (10g/cutting)	105 (55.88)	5 (70.59)	9 (40.00)	1	3	24 (12.50)
T5 – Untreated control	238	17	15	4	3	21
CD (0.05)	12.2061	1.7514	1.4802		1.7514	5.7328

* Gall index is on a scale of 0 to 5, it was based on the percentage of the root system with galls (Hussey and Janssen, 2002).

* Figures in parenthesis are per cent decrease/increase over control

The population of root knot nematode *M. incognita* in soil and roots were significantly lower in all biological agents treated cuttings than untreated control. The final soil nematode population, number of egg mass/g of root and number of adult female/g of root was also reduced by the application of all the biological agents. The percent reduction in nematode population in soil, egg mass/g and adult female nematode/g was maximum in *P. chlamydosporia* with 43.28, 66.67 and 64.71 percent respectively over untreated control. Suppression of *M. incognita* nematode population in rhizosphere observed besides it also enhanced the growth parameters as measured by plant height and weight, root length and weight and fruit yield (Cannayane and Rajendran (2001). Senthilkumar and Rajendran (2003) recorded increase of yield by soil application of bioagents in grapevine. Application of VAM as bio-fertilizer were able to grow well with ill effect caused by the nematode and gave higher yield (Rajeswari *et al.*, 1996). Among the biological agents tested, *P. chlamydosporia* treated plants showed greater nematode reduction and maximum increase in growth. Hence, *P. chlamydosporia* application may be a promising practice in the management of root knot nematode in black pepper.

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