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Management of Root Knot Nematodes, *Meloidogyne Incognita* Using Bioagents And Compost in Cucumber, Ridge Gourd, Bitter Gourd and Bottle Gourd Cultivars.

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ABSTRACT

A field experiment was conducted to evaluate the efficacy of acacia compostindividually and also tested withbioagents such as *Poconiachlamydostoria*, *Pseudomonas aeruginosa*, acacia fertilizer and carbofuran, root knot nematode. All behaviours were noticeable significantly superior over untreated check. Acacia compost boosted growth with a sharp reduction in the root knot index.However, the combinations of acacia compost treatments with different bioagents performed well with highest shoot growth , root length, root weight and lowest root-knot indices. In integrated treatment, *P.lilacinus* with compost of acacia recorded the most extreme development parameters with least root-knot index. In contrast with other works of combination of two bioagents. *Paeciliomyceslilacinus* + *Pochoniachlamydosporia* with acacia treatments. Further carbofuran with all parameters were studied.

Keywords: Bioagents, compost, acacia, *Meloidogyne incognita*, cucumber, ridge gourds, bitter gourd, bottle gourd, carbofuran.

1. Introduction

Meloidogyne species (root-knot nematodes) species are obligate parasites and exceptionally damaging plant pests restricting agricultural productivity. Most developed plants suffer from root-knot nematode infection (Sasser and Carter, 1985, Amin, 1993 and Amin 1994). It has been assessed that 10% of worldwide vegetable production is lost each year because of the nematode disease and that 50% of these losses are because of the presence of types of *Meloidogyne*, making root-knot nematodes among the most harming agricultural pests around the world (Sikora and Fernandez, 2005; Perry and Moens, 2013)

Control of nematodes has become increasingly difficult because of the removal of numerous nematicides and soil fumigants from the market on account of their poisonousness and unfavourable impacts on the environment, the absence of appropriate nematode resistance in many vegetables, the uneconomical parts of long term rotationsand the restricted availability of commercial biological control agent. Thus, examination to discover new alternative for nematodemanagement hasbecome very important (Sikora and Fernandez, 2005; Davies and Spiegel, 2011). Cucurbits are an important part of a diverse diet and are suffer from more than 200 diseases worldwide (zitter et al., 1996; M. Grath, 2004). Root-knot nematodes (*Meloidogyne sp.*) are perhaps the most economically significant group of plant parasitic nematodes assaulting essentially every harvest developed and have been reported for to cause a yearly deficiency of Rs.547.5 million in cucurbits (Jain et al., 2007). Nematode control is definitely more unpredictable than some other kind of pathogens since nematodes essentially attack underground parts of the plants (Sikora and Fernandez, 2005). The control of plants parasitic nematodes has depended on synthetic nematicides (Akhtar and Malik, 2000).

Root-knot nematodes, *Meloidogyne spp*., are obligate endoparasites and are among the most widely recognized biotic stressors that can cause major issues in soil grown cucurbits (Ploeg, et.al. 2001). Bacteria and fungi are among the most predominant soil-borne groups in natural soil ecosystem and some of them have shown incredible potential as

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biological control agents for root-knot nematodes (Kerry 2000). The rhizospheric microorganism target nematodes fundamentally rely upon parasitizing, for example, *Pasteuriapenetrans*(Chen et. al. 1998). and*Paecilomyceslilacinus*(Kalele et. al., 2010). A large number of the soil amendments utilized as nutrient sources for crop production have been found to control plant parasitic nematodes. Such materials include green manure,, cow dung, poultry dropping, dried harvest deposits, botanicals, and composted agro-industrial wastes (Hassan et. al., 2010).Although, nematicides are productive and effective, they are presently being reappraised with them and moreover they are generally unreasonably expensive to numerous limited scale farmers. One of the elective procedures for the management of plant parasitic nematodes is the use of organic amendments in the soil (Agyarko and Asante, 2005). Organic amendments have reliably been shown useful consequences for soil nutrients, soil physical conditions, soil biological action and in this way improving the health of plants and decreasing population of plant parasitic nematodes (Oka et. al., 2000).

The induction of host plant systematic resistance by microorganisms has been demonstrated to be a novel and promising system that could be used in biological management of nematodes in general and root-knot nematodes specifically (Cooper et. al., 2005; Dababat and Sikora, 2007a.b; Martinuz et. al., 2012,2013). Various practices are utilized in the integrated pest management (IPM) however the biological control would be the most enviable. Different fungi, for example, *Paecilomyces, Verticillium, Fusarium, Aspergillus, Trichoderma, Pochonia*and*Pencicillium* were tested against juvenile mortality and on egg restraint of nematodes. These filtrates end up being poisonous because of the arrival of antibiotics or enzymes (Dorcas et. al., 2010).

The objective of the present study was to assess the effectiveness of *Paeciliomyceslilacinus and Pochoniachlamydospora* alone and in integration with acacia compost for the management of root knot nematode on cucumber, ridge gourd, bitter gourd and bottle gourd cultivars. Acacia was not used extensively for the management of root-knot nematode and extensive literature survey indicates that this kind of experiment is among the preliminary attempts to integrate the bio agents with acacia compost for the management of root-knot nematodes.

Materials and Methods

A field experiment was conducted in root-knot nematode infested plot maintained at Barshi during 2016. The experiment was conducted in randomized block design (RBD) with three replication and eight treatments. Cucurbit cultivars was sown with a spacing of ……. . The soil type was sandy loam. The treatments included bioagents procured from Indian Institute of Horticultural Research (IIHR), Hesarghatta, Bangalore and acacia compost was prepared using leaves and young stems.

The treatments viz., *Paeciliomyceslilacinus* $2X10^6$ cfu (250 g/m^2), *Pochoniachlamydospora* $2X10^6$ cfu (250 g/m^2), acacia compost (1 kg/m2), *P. chlamydospora* $2X10^6$ cfu (250 g/m^2) + acacia compost, *P. lilacinus* + acacia compost (1 kg/m^2), Carbofuran 3G (0.3 a.i) and untreated control (check), *Paeciliomyceslilacinus* $2X10^6$ cfu (250 g/m^2) + acacia compost (1 kg/m^2).

The observations on RKI (0-5 scale) and plant growth parameters like, root length and root weight were recorded. The data obtained were analyzed statistically.

Results and Discussion

All the treatments were high over the untreated check. Organic amendments viz, acacia compost have the lowest root-knot indices in cumber indicating efficacy managing the nematodes. These present results confirm the early findings of organic amendments in control

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of root-knot nematodes (Akhtar and Alam, 1993; Akhtar and Malik, 2000; D. Addabb, 1995; Litterick et. al., 2004; Muller and Gooch, 1982; Oka, 2010; Rodrguez-Kabana, 1986; Stirling, 1991; Trivedi and Barker, 1986).

A number of mechanisms have been proposed to explain observed beneficial effects of organic amendments on plants in the presence of nematodes. Release of nematicidal compounds from decomposing materials, stimulation of natural enemies of nematodes and improved plant growth and tolerance to nematodes was reported by reseachers (Akhater and Malik, 200; Oka, 2010; Stirling, 1991; Thoden et. al., 2011). Multiple mechanisms may operate simultaneously, so it is difficult to distinguish which are most important (Akhtar and Malik, 2000).

Organic amendments were followed by the combination treatment of *Paeciliomyceslilacinus* + *Pochoniachlamydospora* + acacia compost. In whole, bioagents individually performed well than in combination with acacia compost. *P. lilacinus* both individually and in combination performed very close to the recommended check carbofuran 3G while, *P.chlamydospora* both in combination and individually recorded higher root-knot indices than the carbofuran 3G. Nematicidal properties are present in acacia extracts and particularly in funicles of acacia seeds (Sultana et. al., 2011 Datta et. al., 1997, 2000).

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