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Short Communication

Bacterial Feeding Nematodes Use as a Suppressing Agent of Plant Parasitic Nematodes

Tabassum Ara Khanum*, Nasir Mahmood and Shahina Fayyaz

National Nematological Research Centre, University of Karachi, Karachi, Pakistan

***Corresponding Author:** Tabassum Ara Khanum, National Nematological Research Centre, University of Karachi, Karachi, Pakistan.

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Abstract

Efficacy of *Oscheius niazii* for controlling plant parasitic nematode through application of an effective amount of new entomopathogenic nematode. The process comprising steps dissolving at the rate of 5 x 10^6 and 5 x 10^8 Infective stage juveniles/ml with five replicates for each treatment (A_1- A_4; C_1- C_4) on population of plant parasitic nematodes of Bermuda grass (*Cynodon dactylon*) was evaluated in microplot. Equally toxic to plant parasitic nematodes causing more than 60 % suppression in total population of PPN within 15 - 30 days of inoculation. The populations of plant parasitic nematode genera viz., *Tylenchorhynchus* and *Pratylenchus* were significantly reduced 30 days after treatment. Free-living soil nematodes were not affected by this treatment. This is the first report of managing the population of plant parasitic nematode by live and dead entomopathogenic nematodes in Pakistan.

Keywords: *Nematodes; Cynodon dactylon; Tylenchorhynchus; Pratylenchus*

EPNs are used worldwide for the control of insect pests [1]. Review of literature shows that EPN can also suppress species of plant parasitic nematodes. Suppression of plant parasitic nematode by entomopathogenic nematode was first reported by Bird and Bird [2], who found that *S. glasseri* suppressed *M. javanica* on tomato seedlings in agar. *H. bacteriophora* reduced populations of *Tylenchorhynchus* spp. and *Pratylenchus pratensis* on turf grasses under irrigated conditions in the field [3]. *S. riobrave* reduced population of *Meloidogyne* sp., *Belonolaimus longicaudatus* and *Criconemoides* sp., on turf grasses in coastal South Carolina and Georgia [4]. Somasekhar., *et al*. [5] reported that *Heterorhabditis* spp., reduced total number of PPN in turf grass system in Ohio. Insect killed by EPN, filled with both symbiotic bacteria and various life stages of nematodes can release high concentration of ammonia which can be toxic to many organisms including plant parasitic nematodes [6-8].

In soil analysis of grass before treatment, the most commonly encountered plant parasitic nematode genera were *Tylenchorhynchus* spp., *Helicotylenchus* spp., *Pratylenchus* spp., *Hemicriconemoides* spp., *Rotylenchulus* spp., *Aphelenchoides* spp., and free-living soil nematodes. Total number of plant parasitic nematodes in each sample were counted and identified up to the species level. The population of plant parasitic nematodes significantly decreased in both treatments relative to the control. No differences ($P < 0.05$) in the populations of plant parasitic nematodes were observed in both treatments after 30 days in two applications. Also no detectable increase in the population of plant parasitic nematodes was observed between 15 to 30 days after application in both treatments in March-April, 2009 and Oct-Nov, 2009. 55 % decreased in the population levels of *Helicotylenchus* spp., in both treatments was observed. The population levels of *Rotylenchulus* spp., *Tylenchorhynchus* spp., *Pratylenchus* spp., *Hemicriconemoides* spp., and *Aphelenchoides* spp., were also considerably decreased ($P < 0.05$) in both these treatments.

These results demonstrate that the use of entomopathogenic nematodes can be highly effective in managing plant parasitic nematodes. This study has revealed that plant parasitic nematode population significantly decreases by the application of *O. niazii* on Bermuda grass

(*Cynodon dactylon*) in both trials. Further suppression of individual plant parasitic nematodes genera viz., *Tylenchorhynchus* spp., *Helicotylenchus* spp., *Pratylenchus* spp., *Rotylenchulus* spp., *Hemicriconemoides* spp., *Aphelenchoides* spp., by *O. niazii* indicates that its use may be expanded to other economically important crops that are affected by these nematodes. The results clearly showed that EPNs could be efficient control agents of plant parasitic nematodes of Bermuda grass confirming reports of several previous studies: by using live entomopathogenic nematodes [2,8-10], field studies [3-5]. This is the first report from Pakistan on suppressive effects of *O. niazii* on plant parasitic nematodes under field conditions.

Application of 5 x 10^6 IJs of *O. niazii* suppresses the population of plant parasitic nematodes of Bermuda within 15 - 30 days after both treatments. The duration of suppression using *O. niazii* on other plant parasitic genera varied between treatments. For example in trial one (March - April, 2009), *O. niazii* suppressed the population of *Rotylenchulus* spp., and *Aphelenchoides* spp., at 15 days after treatment, whereas they were suppressed only at 30 days after treatment in trial second (October - November 2009).

The population growth of *Tylenchorhynchus* spp., *Helicotylenchus* spp., *Pratylenchus* spp., was less than that in the control plot. The suppression effect of *O. niazii* on plant parasitic nematodes in this study agrees with previous studies showing the reduction of plant parasitic nematodes by entomopathogenic nematodes [2,11,12]. Our findings using *Oscheius* spp., to suppress plant parasitic nematodes on *Cynodon dactylon* grass suggest that *O. niazii* has the potential for nematode control on Bermuda grass and may be for other grasses. Most plant parasitic nematode genera were suppressed within 30 days after treatment. Further application may be required to achieve suppression for periods longer than 30 days and can evaluate the economic aspects of using entomopathogenic nematodes for nematode control on *Cynodon dactylon* grass.

There is need to use the bacterial feeding nematodes as suppressing agent of plant parasitic nematodes for production of healthy plants or crops. Nematodes as a suppressing agent give benefits in agriculture to raise productivity.

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