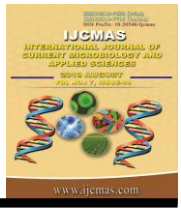
Int.J.Curr.Microbiol.App.Sci (2018) *7*(8): 3038-3040

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 7 Number 08 (2018)**
Journal homepage: http://www.ijcmas.com



Original Research Article https://doi.org/10.20546/ijcmas.2018.708.323

Study on Efficiency of Biocontrol Agents for the Management of Rice Root-Knot Nematode, *Meloidogyne graminicola* in Paddy (*Oryza sativa*)

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Keywords

Meloidogyne graminicola, Paddy (*Oryza sativa*)

Article Info

Accepted:
17 July 2018
Available Online:
10 August 2018

A B S T R A C T

Field experiment on efficacy of biocontrol agents for the management of rice root knot nematode *Meloidogyen graminicola* in paddy nursery and field were conducted during the samba season (2014-15) with rice variety TRY 3. The results revealed that seed treatment (10g/kg of seeds) along with soil application (@2.5kg/ha) of *Pseudomonas fluorescens* were found to inhibit the nematode population and increase the plant biomass followed by individual application compared to untreated control. The biocontrol agent *P. fluorescens* as seed treatment and nursery soil application recorded lowest incidence of rice root knot nematode and in improving the seedling growth.

Introduction

The rice root knot nematode *Meloidogyne graminicola* is an endomic nematode pest of rice, causes serious damage in nurseries and upland rice (Prot *et al.*, 1994). Jonathan and Padmanathan (2001) reported the nematode incidence in rice nurseries of Cauvery delta areas in Tamil Nadu. This root knot nematode has also been subsequently found to occur in main fields of irrigated rice in other parts of Tamil Nadu and cause yield loss 16-80 per cent. Generally various study were conducted to management of the root knot nematode in different crops. So far very limited research work has been made on the biological control of *M. graminicola* on rice. Therefore present experiment was conducted on rice variety TRY 3 for sustainable management of rice root knot nematode *M. graminicola* using biocontrol agents along with organic manures.

Materials and Methods

Nursery experiments were carried out on rice variety TRY3 with a plot (20 cents) nematode infested sick field during samba season (2014-16). Paddy seeds were surface sterilized with mercuric chloride (0.05%) and sown through broadcasting after seed treatment with bioncontrol agents *Pseudomonas fluorescens* @ 10g/kg of seed, soil application of *P. fluorescens* @2.5kg/ha, combined application of *P. fluorescens* (Seed treatment 10g/kg of

seed + soil application 2.5kg/ha), farm yard manure (1 tonne/20 cent), chemical nematicides carbofuran 3G @33kg/ha and untreated control. All the treatments were replicated four times in Randomized Block Design.

The nursery experiments were terminated at 30 days after sowing and observation on plant growth parameters were made. The soil and root samples were collected for estimation of nematode population in soil and root gall index (Taylor and Sasser, 1978) and recorded. The data recorded were pooled and analyzed statistically.

Results and Discussion

Results revealed that all the treatments were significantly increased the plant growth parameters compared to untreated control. Seed treatment with bioncontrol agents *P. fluorescens* (10g/kg of seed), soil application of *P. fluorescens* (2.5kg/ha), combined application of *P. fluorescens* (seed and soil application), farm yard manure (1 tonne/20 cent), chemical nematicides carbofuran 3G (33kg/ha) were found to be effective for the management of rice root knot nematode, *M. graminicola*. Among the treatment the chemical nematicide carbofuran 3G @ 33kg/ha and combined application of *P. fluorescens* (seed and soil application) minimizing the root gall index (3) and enhancing the growth of rice seedlings in terms of shoot weight 1.40 g and 2.60 g and root weight 1.20 g and 2.25 g respectively followed by soil application of *P. fluorescens*, seed treatment with *P. fluorescens*, Farm yard manure recorded reduction in rice root-knot nematode. Earlier research had shown that the chemical nematicides carbofuran 3G was effective in the management of plant parasitic nematodes in different crops, particularly against *M. graminicola* (Krishna Prasad and Rao, 1984). The results of the present study also fall in line with the report of Ramakrishna *et al.*, (1988), where *P. fluorescens* was found to be effective against *Hirchmanniella gracilis* in rice. Further, the use of farmyard manure @ 1 ton/20 cent had also been reported to be effective, but the degree of nematode control was greater than the effect of carbofuran 3G in the management of *M. graminicola* (Table 1).

Table.1 Efficacy of biocontrol agents on rice root knot nematode *Meloidogyne graminicola* management in rice

Treatment	Shoot length (cm)	Shoot weight (g)	Root length (cm)	Root weight (g)	Nematode population (200 cc soil)	Gall index
T1- Seed treatment with *Pseudomonas fluorescens* @ 10g/kg of seed	23.00	1.65	6.25	1.55	89	3
T2 - Soil application of *Pseudomonas fluorescens* @ 2.5kg/ha	22.50	1.90	7.50	1.75	84	4
T3 - Combined Application of *Pseudomonas fluorescens* (10g/kg of seed) + Soil application (@2.5kg/ha)	26.50	2.60	8.50	2.25	73	3
T4 - Farm yard manure (1tonne/20 cent)	21.50	1.45	5.75	1.55	97	4
T5 - Carbofuran 3G @33kg/ha	20.00	1.40	6.00	1.20	113	3
T6 - Untreated control	16.50	1.00	3.50	0.90	142	5
	2.15	0.14	0.15	0.65	14.72	-

∗Pooled analysis of two season data

The present study, concluded that the seed treatment (10g/kg of seed) along with soil application of biocontrol agents *P. fluorescens* (2.5 kg/ha) can be effective for the management of rice root knot nematode *M. graminicola* in nursery.

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How to cite this article:

Senthilkumar, T. 2018. Study on Efficiency of Biocontrol Agents for the Management of Rice Root-Knot Nematode, *Meloidogyne graminicola* in Paddy (*Oryza sativa*). *Int.J.Curr.Microbiol.App.Sci.* 7(08): 3038-3040. doi: https://doi.org/10.20546/ijcmas.2018.708.323