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Optimization of Dosages of Biocontrol agents for the Management of Root knot nematode, *Meloidogyne incognita* in Ridgegourd and Snakegourd

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Field trials were conducted to optimize the dosage of biocontrol agents for the management of root knot nematode, *Meloidogyne incognita* in ridgegourd and snakegourd. The trials were conducted in a randomized block design during June and July for subsequent years (2013-14) with seven treatments and four replications. The results revealed that among the different dosages of application, seed treatment with *P. fluorescens* @ 50g/kg of seed was found effective, which recorded 15.2 t/ha with 58.3% increase in yield and 52.3% reduction in nematode population followed by seed treatment with *T.viride* @ 50g/kg seed, which showed 14.5 t/ha with 51.0% increase in yield and 50.0% reduction in nematode population.

Key words: Biocontrol agents, *Meloidogyne incognita*, Ridgegourd, Snakegourd

Cucurbits are the popular name for the members of the family Cucurbitaceae, commonly known as the gourd family. This is one of the largest group of summer vegetable crops and are the oldest plants used and cultivated by mankind. Cucurbits are commonly used as vegetables, fruits, salad, pickle and also as culinary vegetable. Cucurbits are valuable sources of vitamins and minerals. These crops are damaged by many plant parasitic nematodes. Root knot nematodes (*Meloidogyne* spp.) are by far the most important plant parasitic nematodes in cucurbits. All cultivated cucurbits are very susceptible to the southern *(M. incognita)* and javanese *(M. javanica)* root knot nematodes, while they are poor hosts to the northern root knot nematode (*M. hapla)*. Above ground symptoms include patches of variable crop growth with stunted, cholotic patches, and /or excessively wilted plants. Nematode infested plants may grow less vigorously, smaller in size, and produce lower yield and diminished fruit quality compared to cucurbits grown in nematode free soil. Young seedlings are particularly sensitive to nematode attack. In the last decade, nematode management through biocontrol agents was in the forefront of research and development. Management of Plant parasitic nematode through ecofriendly means is the need of this era. In view of the increasing awareness about environment and demand of organic farming, the present investigation was undertaken to evaluate the potentiality of biocontrol agents to manage *M. incognita* on ridgegourd and snake gourd at different dosage levels.

Materials and Methods

Field trials were conducted in farmers holdings at Alandurai and Thondamuthur, Coimbatore district, Tamil Nadu in nematode infested fields to optimize the dosage of biocontrol agents as seed treatment against root knot nematode, *Meloidogyne incognita* in ridgegourd and snakegourd. The trials consisted of seven treatments with four replications in Randomized Blocks Design. The treatments were T_1 -Seed treatment with *Pseudomonas fluorescens* @ 10 g/kg seed, T_2 -Seed treatment with *P. fluorescens* @ 25 g/ kg seed, T_3 – Seed treatment with *P. fluorescens* @ 50g / kg seed, T_4 – Seed treatment with *Trichoderma viride* @ 10 g/kg seed, T_5 - Seed treatment with *T. viride* @ 25 g/kg seed, T_6 – Seed treatment with *T. viride* @ 50g / kg seed and T_7 - untreated control. Observations on yield characters and nematode population were made at the time of harvest. The results are presented in Table 1 and 2.

Results and Discussion

The results revealed that, seed treatment with *P. fluorescens* and *T. viride* had enhanced the growth of ridgegourd plants, thereby increasing the yield, with reduced nematode population. Among the different rates of application, seed treatment with *P. fluorescens* @ 50g/kg seed was found effective which recorded 15.2 t/ha with 58.3% increase in yield and 52.3% reduction in nematode population. The effect of this treatment was followed by seed treatment with *T. viride* @ 50g/kg seed, which showed 14.5 t/ha with 51.0% increase in yield and 50.0% reduction in nematode population. Seed treatment with *P. fluorescens* and *T. viride* @ 10g and 25g / kg of seed were found to be on par in respect of yield and nematode population (Table 1).

In snakegourd also, seed treatment with *P. fluorescens* @ 50g / kg seed was found to be effective

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Table 1. Optimization of different dosages of biocontrol agents as seed treatment for the management of *M. incognita* in ridgegourd

Treatments	Yield characters				Nematode population*		
	No. of fruits / plant	Yield / plant (kg)	Yield/ ha (tons)	% increase over control	Root knot index	Soil Population / 200cc	% decrease over control
T_1 – Seed treatment with *Pseudomonas fluorescens* @ 10g/kg seed	18.0	8.5	13.5	41.0	3.5	370.2	43.2
T_2 – Seed treatment with *P.fluorescens* @ 25g/kg seed	19.0	9.2	14.1	45.8	3.5	355.3	45.4
T_3 – Seed treatment with *P.fluorescens* @ 50 g/kg seed	21.0	10.3	15.2	58.3	3.0	310.7	52.3
T_4 – Seed treatment with *T. viride* @ 10g/ kg seed	17.0	8.0	13.4	41.0	3.5	380.5	41.5
T_5– Seed treatment with *T. viride* @ 25g/ kg seed	18.0	8.5	13.5	41.0	3.5	365.3	43.8
T_6 – Seed treatment with *T. viride* @ 50g/ kg Seed	19.0	9.1	14.5	51.0	3.0	325.6	50.0
T_6 - Untreated control	13.0	6.4	9.0	-	5.0	651.0	-
CD (p= 0.05)	1.3	0.6	0.9	-	-	31.1	-

* Pooled data of two season trials

in increasing yield with reduced nematode, population which recorded maximum yield of 13.0 t/ ha with 64.5% increase and 55.0% reduction in nematode population. The next best treatment was seed treatment with *T. viride* @ 50g/kg seed, which recorded 12.4 t/ha with 57.0% increase in yield and 48.7% reduction in nematode population. Whereas *P. fluorescens* @ 25g and 10g / kg of seed recorded 12.0 t/ha and 11.5 t/ha with 52.0% and 45.6% increase over control. The reduction in nematode population was 47.0 and 43.5%, respectively over control. Application of *T. viride* @ 25g and 10 g/kg of seed was on par with each other in respect of yield and nematode population (Table 2).

It is apparent from the present studies that seed treatment with *P. fluorescens* @ 50g / kg of seed is the optimum dose which could significantly reduce the damage caused by *M. incognita* and improve the yield of ridgegourd and snakegourd plants. These findings are in accordance with Krishnaveni (2002) who reported that *P. fluorescens* as seed treatment @ 10g / kg of seed recorded improved cucumber growth and yield and reduced nematode

Table 2. Optimization of different dosages of biocontrol agents as seed treatment for the management of *M. incognita* in snakegourd

Treatments	Yield characters				Nematode population*		
	No. of fruits / plant	Yield / plant (kg)	Yield/ ha (tons)	% increase over control	Root knot index	Soil Population / 200cc	% decrease over control
T_1 – Seed treatment with *Pseudomonas fluorescens* @ 10g/kg seed	18.0	8.5	13.5	41.0	3.5	370.2	43.2
T_1 – Seed treatment with *Pseudomonas fluorescens* @ 10g/kg seed	21.0	8.0	11.5	45.6	3.5	390.2	43.5
T_2 – Seed treatment with *P.fluorescens* @ 25g/kg seed	23.0	9.0	12.0	52.0	3.5	365.3	47.0
T_3 – Seed treatment with *P.fluorescens* @ 50 g/kg seed	25.0	9.5	13.0	64.5	3.0	313.9	55.0
T_4 – Seed treatment with *T. viride* @ 10g/ kg seed	19.0	8.0	11.0	40.0	3.5	410.5	40.5
T_5– Seed treatment with *T. viride* @ 25g/ kg seed	21.0	8.5	11.4	44.3	3.5	390.7	44.4
T_6 – Seed treatment with *T. viride* @ 50g/ kg Seed	23.0	9.0	12.4	57.0	3.0	353.9	48.7
T_6 - Untreated control	16.0	6.0	7.9	-	5.0	690.3	-
CD (p= 0.05)	1.6	0.6	0.8	-	-	31.4	-

* Pooled data of two season trials

population in roots and soil. Rao *et al.*(2004) reported that seed treatment with *P.fluorescens* alone or nursery treatment with *P. chlamydosporia* was also effective. Commercial formulation of *P. chlamydosporia* was significantly more effective at 50 g/ m^2 than at 25 g/m^2 in reducing root gall index and the measure of nematodes in roots and soil of bell pepper in nursery. It is also reported that one time application of *P. chlamydosporia* was able to slow down the buildup of *M . javanica* population on cropping systems having lettuce and tomato crops for atleast 5-7 months (Damme *et al.* 2005). Pathak *et al.* (2005) found that *T. harzianum* 4 g /kg soil significant improvement in plant growth characters and suppression in number of galls and number of *M. graminicola* larvae penetrated per plant as well as final nematode population in soil compared to only nematode control.

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