NURSERY APPLICATION OF *PSEUDOMONAS FLUORESCENS* FOR THE CONTROL OF *MELOIDOGYNE INCOGNITA* ON TOMATO AND BRINJAL

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Summary. Experiments were conducted in nursery plots to assess the efficacy of *Pseudomonas fluorescens* for the management of *Meloidogyne incognita* infesting tomato and brinjal. Soil application of *P. fluorescens* at the rate of 10 or 20 g/m^2 per plot at planting significantly increased seedling growth and reduced *M. incognita* infestation on both crop plants.

Tomato and brinjal are important vegetable crops grown in India. The root-knot nematode *Meloidogyne incognita* commonly infests these crops and causes yield reduction (Bhatti and Jain 1977). *Pseudomonas fluorescens* is reported to control *M. incognita* in tomato (Shanthi and Sivakumar 1995, Jonathan et al., 2000).

In the present study the efficacy of the plant growth promoting rhizobacterium *P. fluorescens* was evaluated in nursery plots of tomato and brinjal under field conditions.

MATERIALS AND METHODS

The talc based formulation of *P. fluorescens* Migula (Strain PF1) prepared for commercial use was obtained from the Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore, India. The population of *P. fluorescens* in this formulation was estimated as 7 x 10^8 cfu/g at the time of use.

A plot severely (324-375 J_2/250 ml soil) infested with *M. incognita* (Kofoid and White) Chitw. was selected for the experiment. Raised nursery beds were prepared. A randomised block design consisting of six treatments was replicated four times. The plot size was 1 m^2. Pre-treatment soil samples were collected and nematode populations assessed. *P. fluorescens* was added to the soil prior to sowing tomato (*Lycopersicon esculentum* Mill.) cv. PKM-1 and brinjal (*Solanum melongena* L.) cv. Co2 as shown in Table I and II.

The seedlings were carefully uprooted 30 days after sowing and measurements were made on plant height and weight and root length and weight. The root gall index was estimated on a 1-5 scale basis. Egg masses and number of females/g root and soil population were assessed. Nematodes were extracted from soil samples using Cobb's sieving gravity method and Baermann funnel technique. The experiment was conducted in two subsequent years and the results are pooled.

Table I. Effect of *Pseudomonas fluorescens* on plant growth and *Meloidogyne incognita* infestation of tomato seedlings after 30 days.

Treatments/m^2 of nursery plot	Initial population (J_2/100 ml soil)	Plant height (cm)	Plant weight (g)	Root length (cm)	Root weight (g)	Females/g root	Egg masses/g root	Final population (J_2/100 ml soil)	Gall index* (1-5 scale)
P. fluorescens 10 g	351	25.3	73.6	15.9	23.5	60	17.3	372	2.6
P. fluorescens 20 g	361	21.9	77.3	16.3	24.9	72	18.0	349	2.5
Carbofuran 3G 1.5 g a.i.	374	22.6	63.5	15.5	22.5	73	16.5	838	2.5
P. fluorescens 10 g + Carbofuran 3G 1.5 g a.i.	350	21.5	58.6	14.3	20.3	117	36.5	381	5.0
P. fluorescens 20 g + Carbofuran 3G 1.5 g a.i	375	21.3	53.3	13.9	19.6	113	34.6	445	5.0
Untreated control	346	18.1	48.3	9.5	14.9	139	51.4	515	5.0
SE	–	2.2	3.1	1.3	1.4	6.7	2.5	25.4	0.2
CD at 5%	–	6.5	9.2	3.2	3.6	22.2	6.9	78.3	0.6

* 1 = 0 galls, 2 = 1-9 galls, 3 = 10-30 galls, 4 = 31-100 galls and 5 = more than 100 galls per root system

Table II. Effect of *P. fluorescens* on plant growth and *M. incognita* infestation of brinjal seedlings after 30 days.

Treatments/m² of nursery plot	Initial population (J_2/100 ml soil)	Plant height (cm)	Plant weight (g)	Root length (cm)	Root weight (g)	Females/g root	Egg masses/g root	Final population (J_2/100 ml soil)	Gall index* (1-5 scale)
P. fluorescens 10 g	337	15.3	249.4	12.3	28.9	77	13.7	120	2.5
P. fluorescens 20 g	325	11.9	209.7	13.6	29.3	92	22.8	161	2.4
Carbofuran 3G 1.5 g a.i.	357	12.6	232.2	12.9	27.5	123	33.0	101	2.5
P. fluorescens 10 g + Carbofuran 3G 1.5 g a.i.	344	11.5	185.3	11.3	25.3	205	58.3	166	4.5
P. fluorescens 20 g + Carbofuran 3G 1.5 g a.i	339	11.3	173.5	11.9	23.9	241	52.3	241	4.5
Untreated control	329	8.1	135.9	7.5	17.5	326	87.5	291	5.0
SE	-	1.6	16.2	1.1	1.9	17.6	3.4	17.3	0.1
CD at 5%	-	4.2	48.9	2.9	5.6	51.9	10.1	50.5	0.3

* 1 = 0 galls, 2 = 1-9 galls, 3 = 10-30 galls, 4 = 31-100 galls and 5 = more than 100 galls per root system

RESULTS AND DISCUSSION

There were significant increases in seedling growth as measured by plant height and weight and root length and weight in plants treated with *P. fluorescens* either at the rate of 10 g or 20 g/m² of nursery plot. These treatments were equally as effective as carbofuran treatment at the rate of 1.5 g a.i./m² (Table I and II).

The treatments caused significant reductions in nematode infestation. The untreated control plots had the largest soil population, gall index and egg masses/g respectively in tomato and brinjal roots (Table I and II). Significant reduction in nematode population, number of egg masses and gall indices were observed in plants treated with *P. fluorescens* at the rate of 10 g, 20 g and in carbofuran treatments. The combined treatment of *P. fluorescens* together with carbofuran were not synergic. The enhanced plant growth and reduction in nematode infestation evident in the present study may be due to induced systemic resistance or multiple potential defense mechanism due to the interaction between the host, the bacterium and the nematode (Wei *et al.*, 1996). The experimental data show the potential of *P. fluorescens* in repressing *M. incognita* infestation and reproduction. The bacteria also resulted in enhanced plant growth in tomato and brinjal plants due to nematode control.

LITERATURE CITED

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