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Efficacy of Culture Filtrates of *Psuedomonas fluorescens* Strains on J_2 Mortality of *M. incognita* Association with Pomegranate Wilt Complex

Shreeshail Sonyal*, Ravichandra, N.G. and Reddy, B.M.R.
Dept. of Plant Pathology, UAS, GKVK, Bangalore-560065
*Corresponding Author E-mail: shailgkvk2012@gmail.com

ABSTRACT

Eight strains of Psuedomonas fluorescensviz., Pf1, Pf2, Pf3, Pf4, Pf5, Pf6, Pf7 and Pf8 were tested for their efficacyagainst mortality of J_2 of Meloidogyne incognitaassociation with wilt complex in pomegranate. Among eight strains, Pf3 recorded the 78.00 per cent mortality of M. incognita J_2 at an exposure time of 120 hours followed by Pf1 (68.33%), Pf4 (62.00%) and Pf8 (54.33%), Pf6 (50.67%) were on par with each other at 100 per cent concentration. Minimum mortality of second stage juvenile were observed in Pf2 (40.67%) at 100% concentration at an exposure period of 120 hours, followed by Pf5 (48.00%) and Pf7 (49.00%). All the bioagents evaluated had caused mortality of M. incognita J_2 with 50%, 75% and 100% concentration in comparison to the control

Key words: *Wilt complex, Psuedomonas fluorescens strains, Meloidogyne incognita and Culture filtrate*

INTRODUCTION

Pomegranate (*Punica granatum* L.) is Mediterranean ancient fruit, belonging to the smallest botanical family Punicaceae and is a native of Iran. In India, it is grown over an area of 1, 16,000 ha producing 89,000 MT fruits with an average productivity of 7.3 MT. In Karnataka state, pomegranate is cultivated in an area of 12,042 ha with a production of 1, 29,547 tonnes. Successful cultivation of pomegranate in recent years has met with different traumas such as emerging pests and diseases. Among diseases, wilt complex caused by *Ceratocystis fimbriata*and *Meloidogyne incognita* is a major threat. At present, the crop is severely affected by wilt incidence which is assuming greater impacts. In this context, the present study was taken up to develop management schedule through non-chemical methods.

MATERIAL AND METHODS

As a part of this study, eight strains of *Psuedomonas fluorescensviz.*,*Pf1*, *Pf2*, Pf3, Pf4, Pf5, Pf6, Pf7 and Pf8 were collected from Department of Plant Pathology, UAS, Dharwad.The mortality of *M. incognita* juveniles were tested in four concentrations of culture filtrate *viz*., 25, 50, 75 and 100 percent. The numbers of anesthetized nematodes were counted after 24, 48, 72, 96 and 120 hours of exposure. The nematodes were checked for their viability by probing with needle[3].

The percent mortality of juveniles was calculated by using the formula

Percent mortality = (M/T) X 100

Where, M = No. of dead juveniles in treatment group

T = Total no. of juveniles taken

RESULTS

The efficacy of culture filtrates of *P. fluorescens* strains on second stage juvenile mortality of *M. incognita* was carried under *in vitro* condition by using culture filtrates of antagonists. Culture filtrates of bioagents (Table 1) exhibited secondstage juvenile (J_2)mortality when compared with sterile distilled water (control) under *in vitro* condition. Among all the bioagents, Pf3 recorded the 78.00 per cent mortality of *M. incognita* J_2 at an exposure time of 120 hours followed by Pf1 (68.33%), Pf4 (62.00%) and Pf8 (54.33%), Pf6 (50.67%) were on par with each other at 100 per cent concentration. Minimum mortality of second stage juvenile were observed in Pf2 (40.67%) at 100% concentration at an exposure period of 120 hours, followed by Pf5 (48.00%) and Pf7 (49.00%). All the bioagents evaluated had caused mortality of *M. incognita* J_2 with 50%, 75% and 100% concentration in comparison to the control.

DISCUSSION

Biological control is considered as new efficient method that becomes widely used for controlling plant parasitic nematodes, as aim to decrease the extent of environment degradation and the effect of the excessive toxic nematicides. So, this study was done to investigate the role of some bacterial genera as biocontrol agent against Juvenile (J_2) mortality of *M. incognita*. The results of *in vitro* experiments indicated that, all tested bacteria have a greatly significant effectiveness for suppressing juveniles of *M. incognita*. *In vitro* results showed that all strains of *Bacillus subtilis* can achieve *M. incognita*juveniles mortality to 100 per cent at 120 hours exposure time.

The present findings are in confirmation with Jonathan *et al.*[4]who observed 72.23 per cent mortality of juveniles (J_2) of *M. incognita* to 100 per cent concentration at an exposure of 120 hours period. Native strains of *Pseudomonas fluorescens* were isolated from the rhizosphere of banana and tested for their efficacy to control *Meloidogyne incognita* infesting banana. *In vitro*, the greatest reduction in nematode mortality of *M. incognita* were observed in the culture filtrate of PfB 22 at 100% concentration.

Similar observations were also made by Becker *et al.*[2] and Tian and Riggs, who proved the antagonistic effect of culture filtrates of *P. fluorescens* on juveniles (J_2) of *M. incognita*. Aalten *etal.*[1] reported that the presence of secondary metabolites in the culture filtrates was responsible for the nematicidal action.

There have been remarkable attempts to investigate relationship between bacteria and the plant parasitic nematode. A study conducted by Siddiqui *et al*.,[5] showed that there was significant reduction in the juvenile mortality and eggs hatched by *M. javanica* when exposed to *P. fluorescens* culture filtrates. He also reported the substantial juvenile mortality of *M. incognita* by the culture filtrates of *P. fluorescens* CHAO and its genetically modified derivatives[6].

Table 1: Efficacy of culture filtrates of *Psuedomonas fluorescens* strains on second stage juvenile mortality of *Meloidogyne incognita*

Concentrations	Per cent mortality of juveniles at different exposer time							
	Pf1	**Pf2**	**Pf3**	**Pf4**	**Pf5**	**Pf6**	**Pf7**	**Pf8**
24 hours								
25%	4.00	0.00	8.00	6.00	5.00	6.00	4.33	6.33
50%	10.33	0.33	17.67	11.33	7.00	7.33	6.33	8.00
75%	11.67	1.00	25.33	15.00	8.33	10.00	7.67	10.00
100%	17.00	4.00	33.33	19.67	11.00	12.00	9.33	12.00
48 hours								
25%	7.67	0.33	19.33	11.33	8.00	9.33	6.67	8.33
50%	16.00	2.33	29.67	20.00	9.67	11.33	10.00	11.33
75%	22.67	5.00	37.33	25.67	11.33	14.33	13.00	17.00
100%	27.67	13.00	46.67	30.67	16.33	18.00	15.00	21.00
72 hours								
25%	12.00	2.67	30.00	22.67	16.00	19.33	14.33	17.33
50%	24.00	7.67	41.33	31.00	15.67	21.00	16.00	20.67
75%	29.00	11.67	47.67	36.33	20.33	24.00	22.00	27.00

100%	43.67	17.67	58.33	41.00	25.67	28.67	25.33	32.00
96 hours								
25%	17.00	7.33	39.67	32.33	24.00	30.00	25.33	27.33
50%	40.00	17.33	54.00	42.00	25.33	31.33	26.33	30.33
75%	51.33	23.67	58.67	46.33	30.00	34.67	32.67	38.33
100%	60.00	28.00	69.00	51.33	36.67	39.33	36.33	43.00
120 hours								
25%	27.33	16.33	51.67	43.33	34.67	41.00	35.00	37.67
50%	51.33	28.00	65.67	42.67	38.00	42.33	38.00	41.67
75%	60.33	34.67	69.00	55.00	42.00	46.67	44.33	50.00
100%	68.33	40.67	78.00	62.00	48.00	50.67	49.00	54.33

	SEm±	**CD@1%**
Exposure in hours (A)	0.22	0.66
Treatment (B)	0.19	0.59
Concentration (C)	0.27	0.83
A × B	0.44	1.32
A × C	0.62	1.86
B × C	0.55	1.67
A × B × C	1.24	3.73

CONCLUSION

Thus, the present study clearly indicated that *P. fluorescens* strains significantly caused the mortality of second stage juveniles of *M. incognita* to 100 per cent concentration at 120 hours exposure of time and at 50, 75 per cent concentrations also caused the mortality *M. incognita* juveniles after the third day of inoculation.

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