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Studies On Screening Of *Pseudomonas*isolatefor Management Of Plant Disease.

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ABSTRACT

Plant growth promoting bacteria are capable of fixing atmospheric nitrogen, solubilizing phosphorus, iron and producing plant hormons viz., auxins, gibberellins and cytokinins and promote plant growth by directly affecting the metabolism of the plants by providing substances that are usually in short supply. Additionally they improve plant tolerance to drought high salinity and metal toxicity through the production of enzymes-amino cyclopropane carbonylate deaminase. PGPB prevents the deleterious effects of phytopathogenic microorganisms. They produce antibiotics that harm or inhibit other microbes, but not plants, by limiting the availability of iron to pathogens or by altering the metabolism of the host plant to increase its resistance to pathogen infection. In the present study forty pseudomonas isolates were screened for their biocontrol ability against *F. oxysporum* and *R.solani*. The isolate of TMPs-19 recorded a maximum antifungal activity against *F.oxysporum* and *R.solani* (23.55 in mm and 20.44 in mm) followed by TMPs-32, TMPs-35 and TMPs-1. The minimum antifungal activity *F.oxysporum* and *R.solani* noted with the isolate TMPS-41 (5.40 in mm and 5.18 in mm).

Key words: PGPB, Bio control, Screening, Pseudomonas, *F.oxysporum, R.solani.*

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INTRODUCTION

Microorganisms which are mainly considered as plant growth promoting bacteria include the members of the genera *Azotobacter*, *Azospirillum*, *Pseudomonas, Alcaligenes, Arthrobacter, Acinetobacter, Bacillus, Acetobacter, Achromobacter, Burkholderia, Enterobacter, Erwinia, Flavobacterium*, *Rhizobium, Clostridium, Frankia, Streptomyces* and *Serratia* (Bashan and Levanony, 1990; Tang, 1994; Kloepper, 1997; Bashan and de Bashan, 2005).

Shobha and Kumudini (2012) reported that the nineteen rhizosphere soil samples from various plants *viz.,* ragi, brinjal, paddy, tomato, beans, mango, chilly, lady's finger and marigold were collected from different regions in and around Bangalore and Krishnagiri. The seven isolates of *B. megaterium* JUMB1, JUMB2, JUMB3, JUMB4, JUMB5, JUMB6 and JUMB7 were screened in vitro for their plant growth promoting traits like production of indole acetic acid (IAA), ammonia, HCN, phosphate, siderophore and evaluated for the ability to suppress fusarial growth. In vitro screening for antagonism activity against *F. oxysporum* revealed significant inhibitory effects of mycelia radial growth by all the seven isolates. In the present study Pseudomonas isolated from the rhizosphere soils of tomato were screened for the bio control activity against *F. oxysporum* and *R.solani* under in vitro condition

MATERIALS AND METHODS

SCREENING OF *Pseudomonas*ISOLATES FOR THEIR BIOCONTROL ACTIVITY AGAINST *F. oxysporum* and*R. solani* UNDER *IN VITRO* CONDITION

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A loopful of culture of each *Pseudomonas* isolate was transferred aseptically to the centre of PDA plate, which has been pre-inoculated with *F. oxysporum* and *R. solani*. The plates were incubated at 28±2°C for 72 hr. After the incubation period, the diameter of inhibition zone was measured around the bacterial colonies. Three replications were maintained for each isolates.

EXPERIMENTAL RESULT

Screening of *Pseudomonas* isolates for their biocontrol ability gainst *F. oxysporum* and *R. solani* under *in vitro* condition

All the forty four *Pseudomonas* isolates were screened for their biocontrol ability against *F.oxysporum* and *R.solani.*

The results of the present study revealed the ability of all the forty four *Pseudomonas* isolates to antifungal activity against *F.oxysporum* and *R.solani*. But, a variation in their efficiency has been observed among the forty four isolates. The isolate of TMPs-19 recorded a maximum antifungal activity against *F.oxysporum* and *R.solani* (23.55 in mm and 20.44 in mm) followed by TMPs-32, TMPs-35 and TMPs-1. The minimum antifungal activity against *F.oxysporum* and *R.solani* noted with the isolate TMPs-41 (5.40 in mm and 5.18 in mm). The reference strain *P. fluorescens* MTCC-2268 recorded the antifungal activity against *F.oxysporum* and *R.solani* (22.00 in mm and 19.20 in mm) respectively.

Screening of *Pseudomonas* isolates for their biocontrol ability against *F. oxysporum* and *R. solani* under *in vitro* condition

S. No.	Name of the isolate	Antifungal activity in mm (dia^{+})

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		F. oxysporllm	***R. solani***
	TMPs-1	20.15	17.40
	TMPs-2	18.67	15.90
	TMPs-3	14.20	16.35
	TMPs-4	13.25	18.40
	TMPs-5	13.60	15.18
	TMPs-6	18.55	13.45
	TMPs-7	14.80	10.10
	TMPs-8	20.22	16.84
	TMPs-9	18.90	12.25
	TMPs-10	15.66	10.40
	TMPs-11	19.05	17.25
	TMPs-12	8.20	9.16
	TMPs-13	10.60	12.44
	TMPs-14	16.75	13.15
	TMPs-15	20.43	19.30
	TMPs-16	5.40	6.12
	TMPs-17	9.15	7.20
	TMPs-18	15.60	17.88
	TMPs-19	23.55	20.44
	TMPs-20	8.30	10.22

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	TMPs-21	11.84	10.66
	TMPs-22	12.00	15.75
	TMPs-23	10.55	8.60
	TMPs-24	7.33	9.20
	TMPs-25	12.50	13.15
	TMPs-26	17.50	Table Continue 15.25
	TMPs-27	13.46	10.55
	TMPs-28	11.30	13.44
	TMPs-29	11.10	8.26
	TMPs-30	8.35	5.18
	TMPs-31	9.80	7.10
	TMPs-32	21.90	19.35
	TMPs-33	12.16	10.35
	TMPs-34	7.20	9.37
	TMPs-35	20.55	18.40
	TMPs-36	16.20	12.75
	TMPs-37	12.46	9.64
	TMPs-38	15.30	11.15
	TMPs-39	18.20	15.33
	TMPs-40	10.44	8.30
	TMPs-41	5.40	5.18

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	TMPs-42	7.00	8.80
	TMPs-43	9.55	7.85
	TMPs-44	14.00	17.55
	* MTCC-2268	22.00	19.20
SED		0.65	0.43
CD (p=0.05)		1.48	0.97

*MTCC-2268- Reference strain of *Pseudomonas fluorescens*

DISCUSSION

Among the forty four *Pseudomonas* isolates, the isolate *Pseudomonas fluorescens* TMPS-19 recorded the maximum antifungal activity against *F. oxysporum* and *R. solani* followed by TMPs-32, TMPs-35 and TMPS-1. The minimum was recorded in the isolate TMPs-41.

Kloepper *et al.* (1980) to investigate the mechanism by which plant growth was enhanced. A previous study indicated that PGPR increase plant growth by antagonism to potentially deleterious rhizoplane fungi and bacteria, but the nature of this antagonism was not determined. They presented evidence that PGPR exert their plant growth-promoting activity by depriving native microflora of iron. PGPR produces extracellular siderophores which efficiently complex environmental iron, making it less available to certain native microflora.

Plant assay technique showed that *Pseudomonas aeruginosa* Sc1 was more effective in suppressing the growth of plant pathogens *viz.,Fusarium oxysporum* and

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Aspergillus flavus. The amount of siderophores produced by Sc1 and Sc4 was studied on different media and per cent siderophore units were calculated to be 57 and 50, respectively (Manwar *et al.,* 2000). The crown gall biocontrol agent *Agrobacterium rhizogenes* strain K-84 produced a hydroxamate iron chelator in large amounts (Penyalver *et al.,* 2001).

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