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Antimicrobial activity of *Pseudomonas fluorescens* against root knot nematode, *Meloidogyne incognita* in tomato, *Lycopersicon esculentum* Mill.

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Soil samples were collected from the rhizosphere region of healthy tomato plants grown in different districts of Tamil Nadu viz., Coimbatore, Tiruchirapalli, Erode, Theni, Madurai, Karur, Cuddalore and Krishnagiri. A total of 35 strains of *Pseudomonas* species were obtained. The strains were tested for their plant growth promotion efficacy by roll towel and pot culture studies in rice seeds. Among the 35 native strains tested, Pf 128 was found to be effective in increasing the plant growth promotion when compared to other strains both in roll towel and pot culture studies.

Phenotypic and biochemical characterization of the strains revealed that Pf 128 comes under the group of *Pseudomonas* spp. The strain proved positive for siderophore and hydrogen cyanide production. The strain was molecularly characterized and confirmed as *P. fluorescens* using 16S-23S rRNA intervening sequence specific ITSIF (5' AAGTCGTAACAAGGTAG 3'); ITS2R (5' GACCATATATAACCCCAAG 3') primers with an amplicon size of 560 bp.

Antibiotic production viz., 2, 4 DAPG, phenazine and pyocyanine were also well pronounced in the *Pseudomonas* strain, Pf 128 through thin layer chromatography. Crude antibiotics were extracted from the Pf 128 strain and prepared in different concentrations viz., 25, 50 and 100 per cent and its efficacy was tested against the root knot nematode, *Meloidogyne incognita in vitro*. Among the different concentrations tested, 100 per cent concentration of the crude antibiotic extract was found to be highly effective in inhibiting the egg hatching and enhancing the juvenile mortality of the nematode when compared to other concentrations tested. Effect of the antibiotics were found to increase with increase in concentration and exposure period.

The *P. fluorescens* strain, Pf 128 was prepared in liquid formulation with nutrient amendments viz., glycerol (10 mM), trehalose (5 mM), sorbitol (5 mM), glycine (10 mM) and mannitol (10 mM) and the stickers viz., starch (2 %), liquid paraffin (2 %), PVP

(2 %) and gum acacia (2 %). Addition of these amendments enhanced and maintained the population level during longer period of storage, whereas the control (without any amendments) recorded the population level upto one month. Among the different amendments tested, addition of glycerol (10 mM) recorded maximum number of bacterial colonies and enhanced the viability of the cells for a maximum period of one year.

The effect of liquid formulation of *P. fluorescens* strain, Pf 128 was tested under greenhouse condition using split root bioassay. The bacterial suspension was applied as seedling root dip and soil application (2 ml/plant) for one half of the roots and other half was maintained as control. Nematode juveniles were inoculated into both halves at one J2/g soil. *P. fluorescens*, Pf 1 was applied as a standard check and Carbofuran was added as a chemical check. The result indicated that half the root treated with *P. fluorescens* strain was observed with reduced nematode population when compared to other half of the root, not treated with

P. fluorescens. But, a significant reduction of nematode population was observed in non treated root portion which depicted the induced systemic resistance mechanism of the bacteria. Similarly, in field studies, tomato plants treated with the *P. fluorescens* strain, Pf 128 as soil application (1000 ml/ha) recorded significant increase in plant growth parameters, fruit yield and significant reduction in nematode infestation when compared with the standard check, Pf 1. Untreated control plants recorded the lowest plant growth, yield and severe infestation of nematode. Application of *P. fluorescens* significantly increased the activity of defense related enzymes viz., peroxidase, polyphenol oxidase, phenylalanine ammonia lyase and total phenol content in the plant roots which was confirmed by the presence of bands in the Native PAGE and SDS Page analysis. These defense enzymes induced systemic resistance of the plants against nematodes and reduced nematode population in the roots.
Keywords: Biological control, *P. fluorescens*, root knot nematode, tomato.

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