

Research Article

Ditrophic Interaction of the Consortia - *Ochrobactrum intermedium* and *Klebsiella variicola* with the Necrotrophic *Pythium aphanidermatum* Alters the Diversity of Antimicrobial Nonvolatile Organic Compounds (NVOC) to Inhibit *Pythium aphanidermatum*

T Kaviyarathinam, S Nakkeeran, T Raguchander and M Kavino

Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore; Department of Fruit Crops, Horticultural College and Research Institute, TNAU, Coimbatore, India; E-mail:nakkeeranayya@tnau.ac.in

Abstract

Damping off caused by the necrotrophic *Pythium aphanidermatum* is a destructive disease in both the nurseries and field condition. In the present study, attempts were made to unveil the secret behind the suppression of *P. aphanidermatum* during ditrophic interactions with individual antagonists and the consortia of the antagonist for the effective management of damping off pathogen. Identity of the pathogen was confirmed through ITS 1 and 4. Sixteen bacterial antagonists were screened for their efficacy to control *P. aphanidermatum* *in vitro*. Among the different bacterial antagonists, *Ochrobactrum intermedium* and *Klebsiella variicola* were effective in the suppression of *P. aphanidermatum* *in vitro*. The zone of inhibition and percent inhibition of mycelia growth of the pathogen by the antagonistic *O. intermedium* and *K. variicola* was 6.3 mm, 12 mm and 39.19 per cent, 45.56 per cent over control, respectively. However, the zone of inhibition and percent inhibition of mycelial growth through the application of consortia mixture of bacterial cells comprising of the antagonistic *O. intermedium* and *K. variicola* was 16 mm and 48.89 per cent, respectively. Analysis of different antimicrobial compounds from the zone of inhibition during the ditrophic interactions with the effective bacterial antagonists *O. intermedium* and *K. variicola* and the consortia of the bacterial cells *O. intermedium* along with *K. variicola* indicated the diverse production of antifungal metabolite through GCMS analysis. Ditrophic interaction by *K. variicola* with *P. aphanidermatum* induced the production of microbial non volatile organic compounds (MNVOC), 1,3-Propanediol., Glafenin., Diisooctyl phthalate., Octadecanoic acid octyl ester and 1,3-Benzenedicarboxylic acid, bis(2-ethylhexyl) ester. Similarly, ditrophic interaction by *O. intermedium* with *P. aphanidermatum* induced the production of MNVOC compounds such as Clindamycin., Anastrozole., 10-Undecynoic acid, TMS derivative and Dimethyl palmitamine. Similarly, the consortia of the antagonistic bacterial cells comprising of *K. variicola* and *O. intermedium* with *P. aphanidermatum* produced an array of antimicrobial non volatile organic compounds including Succinamic acid; Ethanamine, N-ethyl-N-nitroso., 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy, 6-methyl; N-carbethoxy-n-methoxy methylamine; 5-Hydroxymethyl furfural; 1,3-Dioxolane, 2-propyl-, Desulphosinigrin; n-Hexadecanoic acid and Octadecanoic acid, which might be responsible for the synergistic action of the consortia towards the suppression of *P. aphanidermatum*, the incitant of damping off of tomato.

Key words: Ditrophic interaction, GC-MS, *Klebsiella variicola*, nonvolatile metabolites, *Ochrobactrum intermedium*, *Pythium aphanidermatum*

Citation: Kaviyarathinam T, Nakkeeran S, Raguchander T and Kavino M. 2019. Ditrophic interaction of the consortia - *Ochrobactrum intermedium* and *Klebsiella variicola* with the necrotrophic *Pythium aphanidermatum* alters the diversity of antimicrobial nonvolatile organic compounds (NVOC) to inhibit *Pythium aphanidermatum*. *J Mycol Pl Pathol* 49(2): 160-169.

Tomato (*Solanum esculentum* Miller) is the third largest solanaceous vegetable crop originated from

Tropical America. In India tomato is cultivated over an area of 7.89 lakh ha with the annual production