In Vitro Biocontrol Activity of *Methylobacterium Extorquens* Against Fungal Pathogens

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SUMMARY

Four *Methylobacterial* isolates were tested for biocontrol potential against fungal pathogens. The isolates significantly reduced the linear mycelial growth of *Fusarium udum, F. oxysporum, Pythium aphanidermatum* and *Sclerotium rolfsii.* The effect of volatile antibiotics on the mycelial growth of *F. oxysporum a*nd *F. udum* was studied. AM1 and CO-47 produced highly effective antibiotic compared to others. All the *Methylobacterium* strains tested showed negative reaction to HCN production test. The isolate CO-47 produced maximum IAA (9.228 µg ml^{-1}). The isolate AM1 recorded higher salicylic acid production (0.218µg ml^{-1}). The four *Methylobacterium* strains tested for phosphate solubilization, no one produced a clearing zone in Pikovskyas medium. The growth of *Methylobacterium* in fungicides amended medium revealed that all are compatible with Blue copper in 0.1% and 0.2% but Mancozeb was compatible in 0.1% and not compatible in 0.2%. Biocontrol potential of *Methylobacterium* sp. for fungal pathogens was reported under *in vitro* condition.

Key words : *Methylobacterium*, Biocontrol, Fungal pathogens

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Biological control is an environmental-friendly strategy to reduce crop damage caused by plant pathogens. Increasing concerns about pesticide use by the general public and governmental agencies are severely limiting the availability and use of many important pesticides. Fungicides that have been used as standards in many disease control programme have been increasingly regulated. Research efforts with pathogens have indicated that most of the biocontrol organisms either did not control the pathogen or they did not perform as well as selected fungicides. Pink pigmented facultative methylotroph (PPFM) belonging to the genus *Methylobacterium* are a physiologically interesting group of bacteria that preferentially utilize methanol and other reduced one carbon compounds such as formate and formaldehyde as sole source of carbon and energy *via* serine pathway (Green, 1992).These are ubiquitous in nature and are thus found in a variety of habitats (Green and Bousifield, 1983), including soil, dust, fresh water, leaf surfaces and nodules. PPFMs isolated from the liverwort stimulated growth and development of the liverwort (*Scapania nemorosa)* and *Streptocarpus prolixus* (flowering plant) in tissue cultures, a positive commensal interaction was proposed (Corpe and Basile, 1982).The growth enhancing effects of PPFM on plants in a tissue culture system where they produced vitamin B_{12} and stimulated growth, they also produced growth hormones *viz.*, cytokinins (Koeing *et al.*, 2002) and auxins. *Methylobacterium* have been shown to stimulate seed germination, seedling establishment and increasing productivity of a plant by spraying PPFM bacteria on a plant (Holland, 1997). In the present investigation, biocontrol potential of *Methylobacterium* sp. has been tested against fungal pathogens under *in vitro* conditions.

MATERIALS AND METHODS

Bacterial and fungal collections:

Methylobacterium sp. strains Co-47, MV-10, LE-1 and AM-1 were obtained from the Department of Agricultural Microbiology, Agricultural College and Research Institute, Coimbatore, Tamil Nadu.The plant pathogens like *Sclerotium rolfsii, Pythium aphanidermatum, Fusarium oxysporum, F.udum, Macrpohomina* and *Phytophthora* were obtained from the Department of Plant pathology, TNAU,Coimbatore.

Cultivation condition:

Methylobacterium were grown for 72 h on Ammonium mineral salt (AMS) medium (pH 6.8) supplemented with methanol 0.5% and cycloheximide (30µg ml^{-1}) (Whittenbury *et al.*, 1970). All the fungal pathogens were