Research Paper :

Induced Systemic Resistance by *Methylobacterium extorquens* against *Rhizoctonia solani* in Cotton

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International Journal of Plant Protection, Vol. 2 No. 2 : 199-204 (October, 2009 to March, 2010)

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SUMMARY

The use of microorganisms for biological purposes has become an effective alternative to control plant pathogens. There are many examples of formulations using bacterial or fungal strains with biocontrol applications. Among them, members of the genus *Methylobacterium* are well-known growth regulator producers and also having *in vitro* biocontrol ability of against the phytopathogen, *Rhizoctonia solani.* Four Methylobacterial isolates CO-47, MV-10, AM1 and LE-1 were selected for assessing their *in vitro* biocontrol activity. Among the various isolates of *Methylobacterium* sp. screened, the isolate CO 47 significantly reduced the linear mycelial growth of *Rhizoctonia solani* to an extent of 52.2 per cent over control with an inhibition zone of 1.4 cm under *in vitro* conditions. Based on the result *in vitro* conditions CO-47 caused the maximum inhibition of *R. solani.* Under pot culture conditions, soil application with *Methylobacterium extorquens* CO-47 challenge inoculated with *R. solani* induced accumulation of peroxidase, polyphenoloxidase, phenylalanine lyase and phenols resulting in suppression of *R. solani.*

Key words : *Methylobacterium extorquens*, cotton, PR proteins,*R. solani*

Accepted :
August, 2009

Biological control is an enviroment friendly strategy to reduce crop damage caused by plant pathogens. Biological control of soil borne pathogens with antagonistic bacteria and fungi has been intensively investigated. Fluorescent Pseudomonads have revolutionized the field of biological control of soil borne plant pathogens. During the last 25 years, they have emerged as the largest potentially most promising group of plant growth promoting Rhizobacteria involved in the biocontrol of plant disease. In this view, a new bacterium pink pigmented facultative methylotrophs (PPFMs) having biocontrol activity. Pink pigmented facultative methylotrophs 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). Members of the genus *Methylobacterium* are ubiquitous in nature and are thus found in a variety of habitats (Green and Bousifield, 1981, 1983) including soil, dust, fresh water, lake sediments, leaf surfaces, nodules and rice grains.The beneficial effect of *Methylobacterium* in plants interms of seed germination, seedling establishment and plant productivity and also induce pathogenesis related proteins has been main focus in the recent past. Attack of pathogens due to production of diverse microbial metabolites like siderophore and plant growth enhancement IAA and cytokinin production.Biocontrol research has gained considerable attention and appears promising as a viable alternative to chemical control strategies. *Methylobacterium* can induce physiological changes throught out entire plants, making them more resistant to pathogens.This phenomenon, termed induced systemic resistance (ISR), has been demonstrated for various rhizobacteria in several plants.The induced systemic resistance reduces disease symptoms of wide range of pathogens and its physiological characterization is in progress.In some cases, ISR by rhizobacteria are characterized by systemic accumulation of pathogenesis related proteins that is also associated with an accumulation of pathogenesis related proteins.

MATERIALS AND METHODS

Bacterial, fungal and cotton seed collections:

Methylobacterium sp. strain Co-47, MV-10, LE-1 AM-1 and *Rhizoctonia solani* obtained from the Department of Agricultural Microbiology and plant pathogen were obtained from the Department of Plant pathology, Agricultural College and Research Institute,