

## Assay of chitinase and $\beta$ -1,3 glucanase in *Gossypium hirsutum* seedlings by *Trichoderma* spp. against *Fusarium oxysporum*

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### SUMMARY

The *Fusarium oxysporum* is one among the dangerous pathogen that cause wilt in cotton. In this regard the six species of *Trichoderma* namely *T.viridae*, *T.virens*, *T.hamatum*, *T.harzianum*, *T.koningii* and *T.reesi* were evaluated for its bio-control properties and induction of defense related enzymes namely Chitinase and  $\beta$ 1-3 glucanase in 30 days old cotton seedlings. The results revealed that *Trichoderma* spp. could efficiently control growth rate of *Fusarium oxysporum*. *In vitro* assay of Chitinase and  $\beta$ -1, 3 glucanase revealed the maximum production by *T.harzianum* (56U/ml) and *T.hamatum* (80U/ml), respectively. It also produced appreciable quantities of defense enzymes. Maximum induction of Chitinase and  $\beta$ 1-3 glucanase in plants found to be (80 Units/ml) when challenged with *T. harzianum*, in addition to the enhancement of defense mechanism in plants, *Trichoderma* spp., improved germination rate of seedlings.

**Key words :** *Trichoderma*, *Fusarium oxysporum*. Enzyme, Chitinase,  $\beta$ 1-3

Phytopathology is the scientific study of plant diseases and the “Disease triangle” is the central concept of plant pathology. Cotton is a leading cash crop in the US and the developing countries like India. *Fusarium* wilt is a major problem in most cotton growing regions of the world which is caused by *Fusarium oxysporum* which belongs to the class Ascomycetes, (Agrios, 1988) may induce yellow rot and damping. The use of microorganisms to control plant pathogens known as biological control is accepted as a durable and environmental friendly alternative in plant disease management.

*Trichoderma* belongs to sub-division *Deuteromycotina*. *Trichoderma* are among the most common saprophytic fungi and is used as bio-control agents. It is used in the commercial production of the enzyme cellulase and this capability makes the *Trichoderma* very valuable in controlling certain other pathogenic fungi such as *Rhizoctonia*, *Botrytis*, *Pythium*, *Sclerotinia* and *Armillaria*.

Chitinase and  $\beta$  1, 3 glucanase have long been

suggested to belong to the antifungal defenses of plant, serves as natural substrate for plant hydrolyses (Felix mauch *et al.*, 1988; Everett *et al.*, 1980). The purified plant Chitinase and  $\beta$  1, 3 glucanase can degrade fungal cell wall. These plant defense enzymes were commonly present in trace quantities in healthy plant, but its concentration increase many a folds during infection (or) when the diseased plant is challenged with a bio-control agent like *Trichoderma* spp. Thus, these bio-control agents protect the plant from phyto-pathogens and favors better growth and yield in an eco-friendly approach.

In this scenario, the present investigation was attempted to evaluate the efficiency of six *Trichoderma* spp. in inducing plant immune mechanism mediated through Chitinase and  $\beta$ 1-3 glucanase.

### MATERIALS AND METHODS

#### *Isolation and characterization of phytopathogen:*

The wilted cotton plants were collected from a farm and brought to the laboratory for further studies. The fungal pathogen namely *F.oxysporum* was isolated from the wilted shoots of *Gossypium hirsutum*, using PDA and further characterized based on macroscopic and microscopic observation (LPCB staining).

#### *Mass cultivation of bio-control agents:*

Six *Trichoderma* spp., obtained from MTCC Chandigarh were mass multiplied using maize and 1 per cent dextrose solution.

#### *Procuring seeds and raising seedlings:*

Surface sterilized cottonseeds procured from Seed

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