Exploitation of bioagents induced systemic resistance against wilt pathogen in safflower

Quantification of defense molecules induced by bioagents

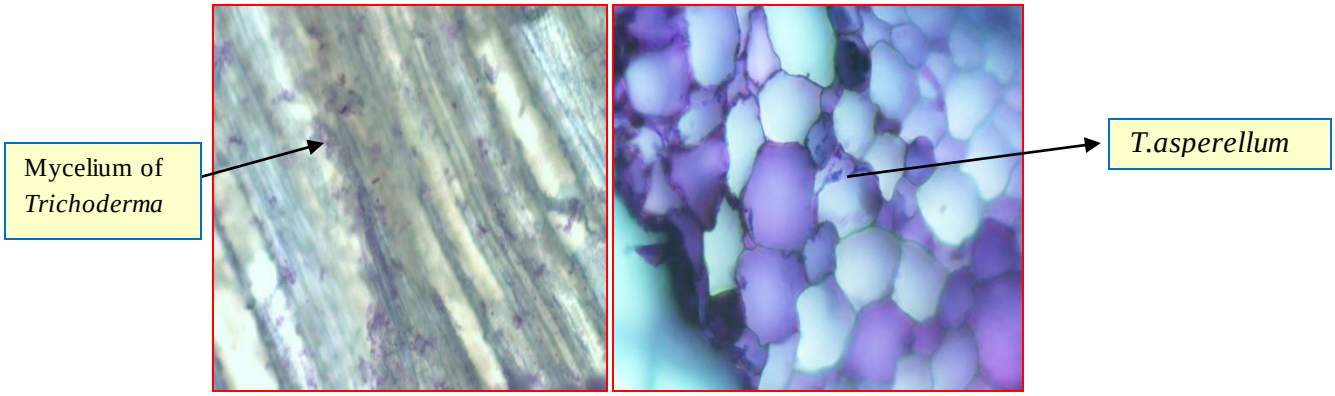
There are no reports on safflower which deal with enhancement of defense enzymes due to treatment of host with biocontrol agents imparting resistance against fusarial wilt. So, to study the role of defense enzymes *viz.*, peroxidase (PO), polyphenol oxidase (PPO), phenylalanine ammonia lyase (PAL) in safflower rinduced by biocontrol agents viz., *Trichoderma harzianum* Th4d, *Trichoderma viride* Tv5 and *T. viride* T7316 agreehouse study was conducted The bioagents were selected based on their disease suppression against safflower pathogens (Table. 1). The isolate *T. harzianum* (Th4d) was found to be more effective in producing more quantities of Phenylalanine Ammonia Lyase (PAL), Polyphenol Oxidase (PPO) and Peroxidase (PO) in treated safflower seedlings compared to pathogen and un-treated checks (Table. 1).

Role of *Trichoderma* elicitor preparations in induction of defense response in safflower

Elicitor preparations obtained from cell wall of *Trichoderma* strains *viz.*, *T.harzianum* (Th4d) and *T. asperellum* (T7316) significantly increased defense related enzymes in safflower plants *viz.*, peroxidases, polyphenol oxidases, phenylalanine ammonia-lyase activity at 30 days old seedlings of safflower resulting in reduction in wilt caused by *Fusarium oxysporum* f.sp. *carthami.T. asperellum* (T 7316) able to colonize the root epidermis and cortex cells of safflower and castor establish symbiotic association and reduce wilt incidence in safflower and castor.

Table 1: Estimation of Phenylalanine Ammonia Lyase (PAL), Polyphenol Oxidase (PPO) and Peroxidase (PO) activity in treated safflower

Treatment	**PAL ($gm^{-1}min$)**	**PPO (gm^{-1}dry wt.)**	**PO (g^{-1} protein/min)**
***T. harzianum* (Th4d)**	**0.37**	**39.0**	**12.1**
T. viride (Tv5)	0.26	30.5	11.8
T. viride (T7316)	0.33	34.3	12.5
Carbendazim	0.27	29.8	10.3
Th4d + *Fusarium*	**0.31**	**26.8**	**10.0**
Tv5 + *Fusarium*	0.20	21.0	9.7
T7316 + *Fusarium*	0.29	27.0	11.3
Carbendazim + *Fusarium*	0.24	25.5	8.9
Pathogen Check	0.18	16.0	7.1
Untreated Control	0.20	22.5	7.2



Root colonization of *Trichoderma asperellum* TaDOR 7316in safflower