***Trichoderma harzianum* Thar23 induced defense mechanism against *Sclerotium rolfsii* causing stem rot of groundnut in tripartite interaction system**

**Raja M1&3\*, Rakesh Kumar Sharma1, Prashant Prakash Jambhulkar2 and Pratibha Sharma3**

1Department of Biosciences, Manipal University Jaipur, Dehmi Kalan- Jaipur- 303007, Rajasthan- INDIA

2Department of Plant Pathology, Rani Lakshmi Bai Central Agricultural University, Jhansi- 284003, Uttar Pradesh- INDIA

3Department of Plant Pathology, Sri Karan Narendra Agriculture University, Jobner- Jaipur- 303328, Rajasthan- INDIA

Email: [rshola396@gmail.com](mailto:rshola396@gmail.com)

*Sclerotium rolfsii* Sacc. is one of the important soil borne pathogen causing stem rot of groundnut prevalent in all growing area worldwide. The use of multifunctional native *Trichoderma* spp. in the biological management of stem rot of groundnut could be an alternate for the use of chemicals. Keeping this in view, the research was focused on the induction of defense related enzymes and genes in groundnut during pathogen infection by quantitative real time analysis. The leaves of biocontrol agents treated groundnut plants challenged with stem rot pathogen were collected for the estimation of following defense-related enzymes phenylalanine ammonia-lyase (PAL), peroxidase (PO) and, polyphenol oxidase (PPO). The enzyme activity was observed after 30 days of sowing with respective treatments of *T. asperellum* Tasp49, *T. harzianum* Thar23, *T. longibrachiatum* Tlongi5, *T. citrinoviride* Tcitri2 and un-inoculated control. The leaf samples were collected at 0 h, 24 h, 48 h, 72 h, 96 h, and 120 h up to 7 days at 24 h interval. Among the selected isolates, *T. harzianum* Thar23 (31.36 U/ml) significantly produced higher amount of phenylalanine ammonia lyase (31.36 U/ml), peroxidase (4.1 U/ml) and polyphenol oxidase (2.76 U/ml) on day 7 after challenge inoculation with pathogen. The defense related genes namely PR2, PR3 and PAL genes were quantified using quantitative real time PCR. The treatment with *T. harzianum* Thar23 and *S. rolfsii* challenged inoculation (T3) expressed higher degree of fold increase of pathogenesis-related genes in host. PR2 gene was increased up to 15.92±1.68 fold, PR3 (22.12±1.98) and PAL (41.28±1.02) in comparison with housekeeping gene α-actin. The obtained results suggest that *T. harzianum* Thar23 enhanced the defense related enzymes and genes during pathogen infection in groundnut.