Endophytic*Trichodermaatroviride* as biocontrol agents and growth promoters of the rice variety Bg 360

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Fungal endophytes that reside symbiotically inside plant tissues are ubiquitous in nature and are known for their multifaceted functional roles against biotic and abiotic stresses in plants, thus recognized as a valuable tool in sustainable agriculture. In view of this, the current study attempted to evaluate the potential of fungal endophytes isolated from wild rice varieties in Sri Lanka to enhance rice plant growth and reduce the disease incidence and severity of sheath blight disease caused by *Rhizoctoniasolani*. Putative fungal endophytes isolated during a previous study were screened for antagonism against *R. solani* under in vitro conditions using the dual culture assay and the ability to produce plant growth hormone Indole-3-Acetic Acid (IAA). Amongst them, *Trichodermaatroviride* (isolated from wild rice species *Oryzanivara*), identified via ITS sequencing, demonstrated significant ($P<0.05$) antagonistic activity against *R. solani* and IAA production ability (22.57 ±0.32 µg/ml) in culture. Prior to conducting pot trials, pathogenicity of *R. solani* on rice variety Bg 360 was evaluated by following Koch's postulates and a procedure to obtain endophyte free rice plants by soaking seeds in systemic fungicide carbendazim (for 48 hours in 0.3% w/v) was developed. Direct contact of seedlings with actively growing mycelia as oppose to dipping in a spore suspension proved to be the best method to inoculate seedlings of rice variety Bg 360 with putative endophyte*T. atroviride*. Re-isolation of *T. atroviride* solely from roots (88%) of inoculated mature rice plants indicated that the fungus is able to establish a stable endophytic relationship with the root system. Preliminary pot trials conducted using *T. atroviride* infected Bg 360 rice plants exhibited a significant increase ($P<0.05$) in shoot length and a significantly ($P<0.05$) lower disease incidence compared to the non-inoculated plants. Furthermore, dual culture assays conducted as an extension to this study indicated that *T. atroviride* isolate has significant ($P<0.05$) antagonistic activity against four putative pathogens isolated from rice plant samples displaying characteristic symptoms of sheath rot, blast, grain discoloration and false smut diseases. Accordingly, investigations conducted thus far have indicated that putative endophytic fungal isolate, *T. atroviride* has promising biocontrol and growth enhancement potential in commercial rice variety Bg 360.

Keywords: Endophytes, Biocontrol, Sheath blight, Disease incidence, Indole Acetic Acid