

Isolation and identification of different *Trichoderma* species and their effect on plant growth and development

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Trichoderma spp. are fast growing fungi, widely used as bio-control agents for controlling soil borne diseases of plants as well as growth promoters. They are preferred in this aspect due to their ability to enhance growth and development of the plant crop productivity, resistance to abiotic stresses, and uptake and use of nutrients. The present investigation was carried out to isolate different fast growing and efficient *Trichoderma* spp. from soil and decomposing plant litter materials collected from Sinharaja rain forest and surrounding areas, and to assess their effect on the growth and development of selected crop plants. Using serial dilution spread plate method, several fungal spp. were isolated from the collected samples on to PDA plates. Colony morphology and microscopic features of sporulating structures were compared among the *Trichoderma* isolates. The growth rate of each *Trichoderma* isolate on PDA plates were studied. Fast growing *Trichoderma* spp. were confirmed to species level at the Genentech institute following PCR and sequencing. Selected *Trichoderma* spp. were mass produced separately, in 250 g of parboiled rice, the selected carrier material. Two inoculum bags (250 g × 2) of *Trichoderma* spp. were incorporated in to 100 Kg of prepared organic potting media (2:1:1:1 ratio of coir dust, *Panicum maximum*, *Tithonia diversifolia* and *Mikania scandans*) and covered with black polythene for 14 days. Effect of five *Trichoderma* spp. amended with the selected potting media were evaluated using *Basella alba* and *Amaranthus viridis* by measuring several growth parameters 45 days after seeding. The above pot experiments were carried out using a Completely Randomized Design with five replicates of each treatment including controls without *Trichoderma* amendments. Data obtained were analyzed by one-way ANOVA using MINITAB version 16. Twelve *Trichoderma* isolates were identified up to generic level using morphological and microscopic characteristics. Among them five *Trichoderma* isolates were identified as fast growing species based on their growth rates. Following molecular characterization, identities of these five *Trichoderma* spp. were confirmed as *T. viride*, *T. asperellum*, *T. virens*, *T. longibrachiatum* and *T. harzianum*. As per the results obtained for growth and development of *B. alba* and *A. viridis*, no significant differences were observed among the five *Trichoderma* spp. tested. However, *B. alba* and *A. viridis* treated with *Trichoderma* spp. showed significantly higher growth rates along with high foliage quality (disease free) compared to the controls. The highest growth performance of *B. alba*; (plant height: 16.3 cm, leaf area: 8.5 cm², number of leaves: 16, fresh weight: 32.3 g and dry weight: 1.8 g) and *A. viridis*; (plant height: 23.6 cm, leaf area: 10.5 cm², number of leaves: 11, fresh weight: 8.4 g and dry weight: 1.2 g) were shown in *T. asperellum* inoculated potting media compared to the potting media amended with other *Trichoderma* species. Based on the findings of present investigation all five *Trichoderma* incorporated potting media could be recommended for growing leafy vegetables which are suitable for urban agriculture and home gardening due to cost effectiveness and environment friendly nature.

Keywords: Growth and development, Organic potting media, *Trichoderma*,