

**Identification of *Trichoderma harzianum* T3.13 and its interaction with *Neoscytalidium dimidiatum* U1, a pathogenic fungus isolated from dragon fruit (*Hylocereus polyrhizus*) in Malaysia**

ABSTRACT

Endophytes can produce enzymes which facilitate their initial colonisation of plant tissues and direct interactions with microbial pathogens. In this study, endophytic fungus from the stem of healthy dragon fruit (*Hylocereus* spp.) was successfully identified as *Trichoderma harzianum* T3.13. *T. harzianum* T3.13 was shown to have the ability to produce antagonistic activity against *Neoscytalidium dimidiatum* U1, a pathogen fungus from the stem of unhealthy dragon fruit. The chitinolytic activities of *T. harzianum* T3.13 were 0.194 U/ml in a medium containing 3% (w/v) of colloidal chitin as sole carbon source. Semi-quantitative RT-PCR was used to quantify the expression patterns of the genes during the interaction of *T. harzianum* T3.13 with pathogen *N. dimidiatum* U1 and control pathogen *Colletotrichum gloeosporioides*, respectively. The expression of the *exc1* and *chit42* genes were observed to be present before and after the interaction occurred in the presence of *N. dimidiatum* U1. However, the expression of the *bgn13.1* gene increased after 24 hours up to 96 hours of interaction in the presence of *N. dimidiatum* U1. In the presence of *C. gloeosporioides*, the expression of *bgn13.1* and *chit42* gradually decreased during the interaction although the expression of the *exc1* gene did not change. The results suggested that the endophytic fungus *T. harzianum* T3.13 has the potential as a good biological control agent against *N. dimidiatum* U1 and *C. gloeosporioides*. Thus, the study provided an insight into cellular and molecular interactions between *T. harzianum* T3.13 and pathogenic fungi.

**Keyword:** Antagonistic activity; Biocontrol agent; Chitinase; Dragon fruit; Endophytic fungi; *Neoscytalidium dimidiatum*