

## **An *in vitro* study of the antifungal activity of *Trichoderma virens* 7b and a profile of its non-polar antifungal components released against *Ganoderma boninense***

### ABSTRACT

*Ganoderma boninense* is the causal agent of a devastating disease affecting oil palm in Southeast Asian countries. Basal stem rot (BSR) disease slowly rots the base of palms, which radically reduces productive lifespan of this lucrative crop. Previous reports have indicated the successful use of *Trichoderma* as biological control agent (BCA) against *G. boninense* and isolate *T. virens* 7b was selected based on its initial screening. This study attempts to decipher the mechanisms responsible for the inhibition of *G. boninense* by identifying and characterizing the chemical compounds as well as the physical mechanisms by *T. virens* 7b. Hexane extract of the isolate gave  $62.60\% \pm 6.41$  inhibition against *G. boninense* and observation under scanning electron microscope (SEM) detected severe mycelial deformation of the pathogen at the region of inhibition. Similar mycelia deformation of *G. boninense* was observed with a fungicide treatment, Benlate<sup>®</sup> indicating comparable fungicidal effect by *T. virens* 7b. Fraction 4 and 5 of hexane active fractions through preparative thin layer chromatography (P-TLC) was identified giving the best inhibition of the pathogen. These fractions comprised of ketones, alcohols, aldehydes, lactones, sesquiterpenes, monoterpenes, sulphides, and free fatty acids profiled through gas chromatography mass spectrometry detector (GC/MSD). A novel antifungal compound discovery of phenylethyl alcohol (PEA) by *T. virens* 7b is reported through this study. *T. virens* 7b also proved to be an active siderophore producer through chrome azurol S (CAS) agar assay. The study demonstrated the possible mechanisms involved and responsible in the successful inhibition of *G. boninense*.

**Keyword:** *Ganoderma boninense*; Endophytic *Trichoderma*; Non-polar; Antifungal activities; Siderophore