

Identification of non-ribosomal peptide synthetase in *Ganoderma boninense* Pat. that was expressed during the interaction with oil palm

ABSTRACT

Basal stem rot (BSR) of oil palm is a disastrous disease caused by a white-rot fungus *Ganoderma boninense* Pat. Non-ribosomal peptides (NRPs) synthesized by non-ribosomal peptide synthetases (NRPSs) are a group of secondary metabolites that act as fungal virulent factors during pathogenesis in the host. In this study, we aimed to isolate NRPS gene of *G. boninense* strain UPMGB001 and investigate the role of this gene during *G. boninense*-oil palm interaction. The isolated NRPS DNA fragment of 8322 bp was used to predict the putative peptide sequence of different domains and showed similarity with *G. sinense* (85%) at conserved motifs of three main NRPS domains. Phylogenetic analysis of NRPS peptide sequences demonstrated that NRPS of *G. boninense* belongs to the type VI siderophore family. The roots of 6-month-old oil palm seedlings were artificially inoculated for studying NRPS gene expression and disease severity in the greenhouse. The correlation between high disease severity (50%) and high expression (67-fold) of *G. boninense* NRPS gene at 4 months after inoculation and above indicated that this gene played a significant role in the advancement of BSR disease. Overall, these findings increase our knowledge on the gene structure of NRPS in *G. boninense* and its involvement in BSR pathogenesis as an effector gene.