

Characterization of Defense-Related Genes and Metabolite Profiling in Oil Palm *Elaeis guineensis* during Interaction with *Ganoderma boninense*

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Abstract : Basal stem rot (BSR) is the most devastating disease in oil palm. Among the oil palm pathogenic fungi, the most prevalent and virulent species associated with BSR is *Ganoderma boninense*. Early detection of *G. boninense* attack in oil palm wherein physical symptoms has not yet appeared can offer opportunities to prevent the spread of the necrotrophic fungus. However, poor understanding of molecular defense responses and roles of antifungal metabolites in oil palm against *G. boninense* has complicated the resolving measures. Hence, characterization of defense-related molecular responses and production of antifungal compounds during early interaction with *G. boninense* is of utmost important. Four month-old oil palm (*Elaeis guineensis*) seedlings were artificially infected with *G. boninense*-inoculated rubber wood block via sitting technique. RNA of samples were extracted from roots and leaves tissues at 0, 3, 7 and 11 days post inoculation (d.p.i) followed with sequencing using RNA-Seq method. Differentially-expressed genes (DEGs) of oil palm-*G. boninense* interaction were identified, while changes in metabolite profile will be scrutinized related to the DEGs. The RNA-Seq data generated a total of 113,829,376 and 313,293,229 paired-end clean reads from untreated (0 d.p.i) and treated (3, 7, 11 d.p.i) samples respectively, each with two biological replicates. The paired-end reads were mapped to *Elaeis guineensis* reference genome to screen out non-oil palm genes and subsequently generated 74,794 coding sequences. DEG analysis of phytohormone biosynthetic genes in oil palm roots revealed that at p-value ≤ 0.01 , ethylene and jasmonic acid may act in antagonistic manner with salicylic acid to coordinate defense response at early interaction with *G. boninense*. Findings on metabolite profiling of *G. boninense*-infected oil palm roots and leaves are hoped to explain the defense-related compounds elicited by *Elaeis guineensis* in response to *G. boninense* colonization. The study aims to shed light on molecular defense response of oil palm at early interaction with *G. boninense* and promote prevention measures against *Ganoderma* infection.

Keywords : *Ganoderma boninense*, metabolites, phytohormones, RNA-Seq

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