

NMR-based metabolomics reveals effect of *Ganoderma boninense* infection on oil palm leaf at 30 days post-infection

ABSTRACT

Basal stem rot is the major disease in oil palm industry that caused by a fungal named *Ganoderma boninense* (*G. boninense*) species. Infected palms are symptomless at the early stage of this disease which imposes difficulties in detecting the disease. Therefore, this study was carried out to obtain the ¹H NMR metabolomic profiling of both non-infected and *G. boninense* infected oil palm leaf at 30 days post-infection (dpi). This combination has provided a rapid approach in investigating the changes in the compound variations of non-infected and *G. boninense* infected oil palm leaf. Non-infected and *G. boninense* infected oil palm leaf at 30 dpi was extracted using aqueous methanol (methanol: water, 80: 20 v/v). The crude extracts obtained were analyzed by ¹H NMR-based metabolomics approach. Analysis of metabolomics data from ¹H NMR was conducted by multivariate data analysis of principal component analysis (PCA). Significant differences were found between the two groups. Compared to the non-infected leaf, the *G. boninense* infected leaf had higher relative abundance of choline, asparagine, alanine, succinic acid, gallic acid, epicatechin, trimethylamine, N-acetylglucosamine, N-acetyltyrosine, β -sitosterol, 2,3-butanediol, lactic acid, caffeic acid, phydroxybenzoic acid, α -tocopherol, β -cryptoxanthin and kaempferol. The non-infected leaf showed higher level of sucrose, xylose, α -glucose, S-sulfocysteine and indole-3-acetic acid. NMR-based metabolomics applied in this study reveals that *G. boninense* alters a manifold of primary and secondary compounds in oil palm leaf.

Keyword: *Ganoderma boninense*; Leaf; Metabolomic profiling; Nuclear magnetic resonance; Oil palm; Principal component analysis