Genome-wide identification and expression analysis of banana RBOH genes in response to Fusarium oxysporum f. sp. cubense Tropical Race 4

ABSTRACT

Respiratory burst oxidase homologs (RBOH) is the key enzyme responsible for the production of reactive oxygen species which act as important signal during plant responses to abiotic and biotic stresses. However, RBOH homologs have not been characterized in banana. In this study, we have identified twelve Rboh genes distributed on eight chromosomes of Musa acuminata subsp. malaccensis (DH Pahang) through a genome-wide analysis. MaRbohs exist as sibling paralogs with variable exon-intron structures and highly conserved functional domain. Phylogenetic analysis clustered MaRBOH into four distinct subgroups (I, II, III and IV). The expression ofMaRbohs following 24 hours of inoculation with Fusarium oxysporium f. sp. cubense Tropical Race 4 revealed diverse patterns in root tissues. MaRbohH1 and MaRbohA2 were strongly upregulated and downregulated, respectively in response to the root-dip inoculation. This is the first report on genome-wide characterization of Rboh genes from banana and their expression in response to the fungal pathogen TR4. This research provides a basis for exploration of the role of NADPH oxidase in banana defence against the root pathogen.

Keyword: Respiratory burst oxidase homologs (Rbohs); NADPH oxidase; Musa acuminata cv. Berangan; Fusarium oxysporum f. sp. cubense Tropical Race 4 (TR4)