

Wintai Kamolsukyonyong 2014: Genomic and Functional Analysis of Sesquiterpene Synthase and Terpinoid Involved in Rice Brown Planthopper Resistance. Doctor of Philosophy (Genetic Engineering), Major Field: Genetic Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Apichart Vanavichit, Ph.D. 96 pages.

Brown planthopper (BPH) is the most serious insect pest for rice production worldwide. The most effective way to prevent rice plant from destructive damage caused by BPH is identification of resistance genes and other related genes involved in BPH resistance mechanisms of rice. More than 20 BPH-resistance genes have been localized on specific region of rice chromosome using molecular genetic analysis and genomic tools. In this study, BPH-resistance genes from Sri Lanka rice cultivar Rathu heenati (RH) were investigated by whole genome and classical positional cloning strategies.

Single-feature polymorphism (SFP) mapping was used to localize 84 candidate resistance related genes on chromosomes 1, 2, 3, 4, 6, 8, 10, and 12. An expression analysis of 15 selected candidate genes in the KDML105 (KD) and the isogenic line (IL) identified Os04g27430 as the BPH-resistance related gene. Os04g27430 encodes a putative *sesquiterpene synthase* (*STPS*) gene that was induced by BPH feeding in ILs. Functional SNPs in 5'UTR and exon 5 in the susceptible rice line were identified, which might explain the differential response of Os04g27430 during BPH infestation. Os04g27430 may play role in antixenosis mechanism of rice against BPH attacking.

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