

Characterizing the Plant Volatiles in Susceptible and Resistant Rice Varieties against Rice Field Rats

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Abstract

Rice field rats (*Rattus rattus*) pose a significant threat as destructive pests in rice-growing countries worldwide, affecting economies and livelihoods. Despite the development of various biological, chemical and physical management methods, concerns remain regarding their predictability, with previous studies indicating varying levels of damage between rice varieties. Therefore, understanding the factors that influence susceptibility and resistance is crucial for developing sustainable rat management systems. Plant volatiles are known for their role in pest and disease resistance. This study examines differences in volatile compounds emitted during two crucial developmental stages, the vegetative phase and the beginning of flowering (budding phase), in five rice varieties: BG 360, BG 310, BG 379-2, BG 403 and BW 367. Volatile profiles during these phases were collected using dynamic headspace collection and solvent extraction methods and analyzed by GC-MS. The results suggest different volatile profiles within varieties at both stages, with significant differences observed between varieties. Furthermore, the concentrations of volatiles emitted varied depending on the cultivar and growth stage. Notably, PCA analysis revealed a separate clustering of volatiles at the booting stage of the resistant BG 310 and the susceptible BG 403, while other cultivars showed an intermediate clustering. This suggests a possible link between the susceptibility and resistance of rats and the volatile compounds released during the booting stage of rice. Further behavioural studies are required to gain conclusive findings.

Keywords: GC-MS analysis, Plant resistance, Rice field rats, Rice varieties, Volatile compounds