

Characterization of odor-active volatiles in grains of 42 scented and 19 non-scented rice accessions

Young-Sang Lee^{1*}, M M Chayan Mahmud¹, Ji-Chang Kim¹, Ji-Su Lim¹, Yoo-Jin Jung¹, Yejin Oh², Tae-Hyeong Kim², Yoo-Hyun Cho³ and Yong-Jin Park⁴

¹Department of Medical Biotechnology, Soonchunhyang University, Asan, 31538, KOREA

²CJ CheilJedang Corp, Seoul, 04560, KOREA

³Seedpia, Kwonsong-Gu, Suwon, 16395, KOREA

⁴Department of Plant Resources, Kongju National University, Yesan, 32439, KOREA

[Introduction]

Customers' preferences on rice are moving toward varieties offering higher palatability and health beneficial properties of grains, and recently scented rice is becoming popular in Korean market. Including a popcorn-flavoring 2-acetyl-1-pyrroline (2AP), over 300 volatiles contributing to aromatic property of rice have been identified. Most of volatile studies, however, have been conducted only with scented rice varieties, and rare information on difference in volatile profiles between scented and non-scented rice as well as relationships between volatiles and grain properties are available.

[Materials and Methods]

Internationally collected 61 rice accessions (42 scented and 19 non-scented) with known allele information on BADH2 gene, responsible for biosynthesis of 2AP, were selected and their grain properties such as fragrance intensity, color, shape, and embryo size were evaluated. Volatile profiles of brown rice were analysed by using a headspace solid phase microextraction (SPME) combined with GC/MS. Multivariate analyses were performed by using MetaboAnalysis 3.0 after mean-centered scaling and dividing by the standard deviation of each volatiles compound.

[Results and Discussions]

Out of total 154 volatiles identified, 81 odor-active compounds consisting of 4 alcohols, 5 bases, 5 esters, 1 furan, 51 hydrocarbons, 6 ketones, and 1 others were observed. Except for 2AP and furfural, all volatiles observed in scented rice could be also found in non-scented accessions. Partial least squares discriminant analyses (PLS-DA) of odor-active compounds could effectively discriminate scented rice from non-scented ones, as well as rice accessions of different fragrance intensities, grain colors, and embryo sizes. Although rices of different BADH2 allele types could not be discriminated by multivariate analyses, different amount of 2AP could be observed in that 7 bp deletion in exon 2 alone or in combination with 3 bp deletion in 5'-UTR increased 2AP, while 3 bp deletion in exon 12 could not effectively increase 2AP. All these results suggest similarities in volatiles in scented and non-scented accessions as well as possible relationship between volatiles profile and grain property of rice.

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*Corresponding author: Tel. +82-41-530-1287, E-mail. mariolee@sch.ac.kr