P071

Volatile Flavor Components of Aromatic versus Non-aromatic Rice Varieties

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Objectives

This experiment was carried out to compare the compositions of volatile flavor components in cooked rice of aromatic and non-aromatic varieties for employing it in a rice breeding program.

Materials and methods

The experimental materials were six aromatic rice varieties: 'Hyangnam' ('HN') and 'Hyangmi 1' ('HM1') from South Korea, 'Miyakaori' ('MK') from Japan, 'Basmati 370' ('BM') from Pakistan, 'Azucena' ('AC') from Nepal, and 'Sanghaehyanghyeolla' ('SH') from China. For comparison, four non-aromatic varieties were also used: 'Ilpum' ('IP'), 'Samkwang' ('SK'), 'Hwaseong' ('HS') and 'Dasan' ('DS'). For quantification of rice flavor compounds, a rapid and accurate analytical technique using Tenax, automated thermal desorption, cryofocusing and an internal standard for the identification was used. Relative quantification of the flavor volatiles from cooked rice can be measured by GC-MS.

Results

Volatiles (69 in 'HN', 81 in 'HM1', 66 in 'MK', 90 in 'BM', 80 in 'AC' and 63 in 'SH') were identified and divided into groups based on their chemical classes (e.g., aliphatic hydrocarbons, aliphatic alcohols, aliphatic aldehydes, aliphatic ketones, aromatics, esters, nitrogen compounds, sulfur compounds and others (Table 1). In non-aromatic rice, 58, 80, 75 and 77 volatiles were identified in 'IP', 'SK', 'HS' and 'DS', respectively.

Figure 1 shows that 'SH', which has a black color, contained the highest relative 2-AP concentration (392.4 ng/g) of the aromatic varieties. 'HN' and 'HM1', also aromatic varieties, contained 184.6 and 166.5 ng/g of 2-AP, respectively. Although all aromatic varieties had 2-AP, they have very different aromas indicating that other volatiles contribute to their respective flavors. 3-Methyl-2-butenal and nitrogen compounds such as pyridine, 2-methyl pyridine and hexanenitrile were only identified in aromatic varieties and 3-heptanol in non-aromatic varieties.(Table 2).

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Table 1. Identification of volatile compounds from aromatic and non-aromatic varieties using Tenax trapping, thermal desorption, cryofocusing and GC-MS.

Compounds	Aromatic rice(ug/g)						Non-aromatic rice(ug/g)			
	Japonica		Indica			Pigment	Japonica		Indica	
	HN	MK	HM1	BM	AC	SH	IP	SK	HS	DS
Alphatic hydrocarbons	10	5	15	18	13	3	5	12	11	12
Alphatic alcohols	6	8	8	6	6	6	8	6	9	4
Alphatic aldehydes	10	10	10	12	11	10	7	11	9	10
Aliphatic ketones	4	3	5	7	5	7	5	8	6	5
Aromatics	31	30	30	31	29	25	24	30	30	35
Esters	2	3	3	3	4	2	3	5	4	4
N-containing compounds	2	3	4	6	7	4	2	2	1	2
S-containing compounds	1	1	1	2	1	1	1	1	1	1
Others	3	3	5	5	4	5	3	5	4	4
Total	69	66	81	90	80	63	58	80	75	77

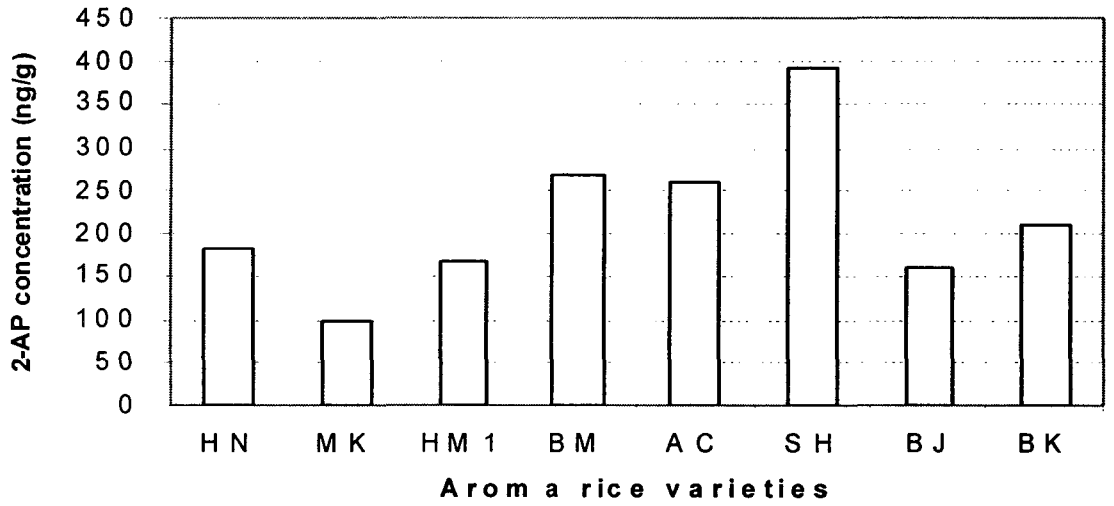

Fig.1. Comparison of 2-AP concentrations in aromatic rice varieties.

Table 2. Major volatile compounds in aromatic and non-aromatic varieties.

Varieties	Major volatile compounds
Aromatic varieties	3-Methyl-2-butenal, Pyridine, 2-methyl pyridine and hexanenitrile, 2-AP
Non-aromatic varieties	3-heptanol