

Identification of Volatile Flavor Compounds in Perilla and Shiso Leaves

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들깨 및 소엽의 향기성분 동정

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Objectives

Recently because of special volatile flavor compounds, Perilla leaves have been widely utilized as fresh vegetable and food materials. However detailed analysis of volatile flavor compounds of perilla leaves have not been carried out yet. So, this study was executed to identify the composition and chemical structures of volatile flavor compounds in perilla and shiso leaves.

Materials and Methods

Plant materials : "Ipdkkae 1", "Green Shiso" and "Purple Shiso"

Simultaneous Distillation Extraction : A Likens and Nickerson method

GC conditions : A Hewlett-Packard Model 5890 series II gas chromatograph with a flame ionization detector(FID) and a 0.2mm i.d × 50m HP-FFAP capillary column was used. The oven temperature was raised from 50°C(5 min.) to 90°C at a constant rate of 5°C per min., 90°C to 110°C at a constant rate of 1°C per min., 110°C to 230°C(5 min.) at a constant rate of 7°C per min. The injector and detector port temperatures were kept at 230°C and 250°C, respectively. The carrier gas was He at a flow rate of 0.5ml per min. and the split ratio at the injector port was 50:1.

GC-MS conditions : The GC-MS spectra were recorded by a Hewlett-Packard Model 5971 Mass Spectrometer equipped with the same column as described above. The ionization voltage was 70eV and ion source temperature kept at 200°C.

Identification of volatile flavor compounds : Every flavor compound was identified by comparing its retention time in GC and reference mass data of NBS 75K and Wiley 138 library.

Results and discussion

1. The 27 volatile flavor compounds were isolated from perilla leaves, and 18 compounds were identified : They were composed of 11 hydrocarbons, 3 alcohols, 1 aldehyde, 1 ketone, 1 phenol and 1 other. The most abundant volatile flavor compound in perilla leaves was perilla ketone comprised about 72%.
2. The volatile flavor compounds of green shiso leaves were composed of 16 hydrocarbons, 5 alcohols, 5 aldehydes and 6 unknowns. Among them the major flavor compounds were perillaaldehyde(43%), limonene(21%), β -caryophyllene(8%) and linalool(4%).
3. As a result of identification of major volatile flavor compounds from the leaves of purple shiso, 2,3,5,6-Tetramethyl-p-benzoquinone(31%), 4-(1-Methyl-ethyl)-benzaldehyde(28%), 7-Octen-4-ol(8%), β -caryophyllene(7%) and linalool(4%) were estimated to be major compounds.

Table 1. The major volatile flavor compounds isolated from perilla, green shiso and purple shiso leaves by simultaneous steam distillation extraction method

	Rt.(min.)	Compound	Molecular formula	Molecular weight	Peak area (%)
Perilla leaves	18.864	β - Myrcene	C ₁₀ H ₁₆	136.23	0.652
	37.600	7-Octen-4-ol	C ₈ H ₁₆ O	128.00	4.104
	42.128	Linalool	C ₁₀ H ₁₈ O	154.14	2.009
	44.691	β - Caryophyllene	C ₁₅ H ₂₄	204.19	5.411
	48.661	2,6-Dimethyl-6-(4-methyl)-Bicyclo[3,1,1]hept-2-ene	C ₁₅ H ₂₄	204.19	2.780
	47.371	α - Farnesene	C ₁₅ H ₂₄	204.19	1.015
	50.661	Perilla Ketone	C ₁₀ H ₁₄ O ₂	166.22	72.024
Green Shiso leaves	21.372	Limonene	C ₁₀ H ₁₆	136.23	21.017
	42.147	Linalool	C ₁₀ H ₁₈ O	154.14	3.561
	44.755	β - Caryophyllene	C ₁₅ H ₂₄	204.19	8.431
	48.462	2,6-Dimethyl-6-(4-methyl-3-pentenyl)-Bicyclo[3,1,1]hept-2-ene	C ₁₅ H ₂₄	204.19	4.527
	50.984	Perillaldehyde	C ₁₀ H ₁₄ O	150.10	43.277
	52.085	4-Methyl-benzaldehyde,Oxime	C ₈ H ₉ NO	135.07	2.481
	53.063	7-(1-methylethylidene)-Bicyclo[4,1,0]heptane	C ₁₀ H ₁₆	136.12	4.183
55.042	Perilla alcohol	C ₁₀ H ₁₆ O	152.24	0.786	
Purple Shiso leaves	18.828	β - Myrcene	C ₁₀ H ₁₆	136.23	1.629
	37.572	7-Octen-4-ol	C ₈ H ₁₆ O	128.00	7.690
	42.107	Linalool	C ₁₀ H ₁₈ O	154.14	4.071
	44.627	β - Caryophyllene	C ₁₅ H ₂₄	204.19	6.875
	45.752	4-(1-methylethyl)-benzaldehyde	C ₁₀ H ₁₂ O	148.09	27.868
	46.001	2-Acetyl-5-methylfuran	C ₇ H ₈ O ₂	124.05	3.680
	52.283	2,3,5,6-Tetramethyl-p-behzoquinone	C ₁₀ H ₁₂ O ₂	164.08	31.070

Table 2. Identification of volatile flavor compounds isolated from perilla, green shiso and purple shiso leaves

	Hydro carbon	Alcohol	Aldehyde	Ketone	Phenol	Other	Unknown	Total
Perilla leaves	11	3	1	1	1	1	9	27
Green Shiso	16	5	5	-	-	-	6	32
Purple Shiso	7	3	4	4	1	-	10	29