Chemical Composition of Floral Essential Oils of Five Potato (*Solanum tuberosum* L.) Cultivars

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Fresh flowers (ca 300 g) of five different cultivars of potatoes, Gu-eui, Tae-dong, Su-mi, Bo-ra, and Ja-shim were collected during the flowering season in Chuncheon, Korea. They were put in a Likens-Nickerson simultaneous hydrodistillation extraction apparatus, and the essential oils were collected for 2 h [Choi *et al.*, 2007; Park and Kim, 2008]. The chemical components of the oils were analyzed by GC and GC-MS. GC analysis was carried out on a 0.25 mm×30 m capillary column VF-5MS. The helium was used as the carrier gas at a constant flow rate of 1.0 mL/min. The oven temperature was held at 50°C for 1 min, programmed to 150°C at 2°C/min, programmed to 220°C at 10°C/min, and finally kept constant at 220°C for 1 min. The injector temperature was kept at 250°C. GC/MS (Varian 1200L Quadrupole mass spectometer) was performed on a 0.25 mm×30 m capillary column VF-5MS and He at 1 mL/min using the same column temperature program as described above. All MS data were obtained at 70 eV. The identification of the GC peaks corresponding to the components of the essential oil was based on direct comparison of the retention times and the mass spectral data with those of the standard compounds and computer matching with the NIST library.

The yields of Gu-eui, Tae-dong, Su-mi, Bo-ra, and Ja-shim essential oils were 0.17, 0.18, 0.08, 0.13, and 0.05%, respectively. Gu-eui flowers contained 4,6-di(1,1-dimethylethyl)-2-methyl phenol (48.0%), *n*-hexadecanoic acid (20.4%), α-cadinol (11.3%), dibutyl phthalate (6.3%), methyl ester hexadecanoate (1.9%), decahydro-1,1,7-trimethyl-4-methylene-(1a,*R*-(1a.α,4a.α,7β,7a.β,7b.α))-1*H*-cycloprop(e)azulen-7-ol (4.7%), t-muurolol (3.6%), 1,2,3,4,4a,7,8,8a-octahydro-1,6-dimethyl-4-(1-methylethyl)-[1*R*-(1α,4β,4a.β,8a.β)] 1-naphthalenol (1.9%), and trachylobane (0.9%). These compounds gave aromas different from those of the off-flavors [Peterson *et al.*, 1999] and typical potato aroma [Peterson *et al.*, 1998]. Floral notes of the pink-colored Gu-eui flowers were soft, bitter, and spicy, and the fragrance of the essential oil was similar to that of the black pepper. Tae-dong flowers contained 4,6-di(1,1-dimethylethyl)-2-methyl phenol (73.0%), *n*-hexadecanoic acid (8.6%), α-cadinol (4.8%), dibutyl phthalate (6.0%), nonadecane (0.4%), farnesol isomer B (2.8%), and 2,6-bis(1,1-dimethylethyl)-2,5-cyclohexadiene-1,4-dione (2.5%). Floral notes of the light purple-colored Tae-dong flowers were heavy and green, and the fragrance of the essential oil was similar to those of benzyl acetate and jasmine. Su-mi flowers contained 4,6-di(1,1-dimethylethyl)-2-methyl phenol (70.2%), *n*-hexadecanoic acid (11.9%), α-cadinol (3.6%), dibutyl phthalate (5.4%), methyl ester hexadecanoic acid (0.5%), and octadecanoic acid (7.9%). Floral notes of the white-colored Su-mi flowers were light, green, and fresh. Bo-ra flowers contained 4,6-di(1,1-dimethylethyl)-2-methyl phenol (71.4%), *n*-hexadecanoic acid (17.0%), α-cadinol (4.4%), and dibutyl phthalate (7.1%). Floral notes of the white-colored Bo-ra essential oils were soft, sweet, bitter, and spicy. Ja-shim flowers contained 4,6-di(1,1-dimethylethyl)-2-methyl phenol (78.8%), *n*-hexadecanoic acid (10.1%), α-cadinol (5.1%), dibutyl phthalate (5.6%), and octadecanoic acid (0.1%). Floral notes of the pink-colored Ja-shim flowers were heavy, oily, and animalic. The overall fragrance of the Ja-shim essential oil was similar to that of indone in jasmine. Our results show that the floral essential oils of the five potato cultivars have different chemical compositions and contents, which could be responsible for the different fragrances given by the cultivars.

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Table 1. Chemical components of inflorescence essential oils of five potato cultivars. The essential oils were obtained using a Likens-Nickerson simultaneous hydrodistillation extraction apparatus, and the chemical components were analyzed by gas chromatography-mass spectrometry

Chemical components	Contents (%)				
	Gu-eui	Tae-dong	Su-mi	Bo-ra	Ja-shim
4,6-di(1,1-dimethylethyl)-2-methyl phenol	48.0	73.0	70.2	71.4	78.8
n-hexadecanoic acid	20.4	8.6	11.9	17.0	10.1
α-cadinol	11.3	4.8	3.6	4.4	5.1
dibutyl phthalate	6.3	6.0	5.4	7.1	5.6
methyl ester hexadecanoic acid	1.9	-	0.5	-	-
decahydro-1,1,7-trimethyl-4-methylene-(1a,*R*-(1a.α,4a.α,7β,7a.β,7b.α))-1*H*-cycloprop(e)azulen-7-ol	4.7	-	-	-	-
τ-Muurolol	3.6	-	-	-	-
1,2,3,4,4a,7,8,8a-octahydro-1,6-dimethyl-4-(1-methylethyl)-[1*R*-(1α,4β,4a.β,8a.β)]1-naphthalenol	1.9	-	-	-	-
trachylobane	0.9	-	-	-	-
nonadecane	-	0.4	-	-	-
farnesol isomer B	-	2.8	-	-	-
2,6-bis(1,1-dimethylethyl) 2,5-cyclohexadiene-1,4-dione	-	2.5	-	-	-
octadecanoic acid	-	-	7.9	-	0.1

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