Asian Journal of Chemistry; Vol. 25, No. 8 (2013), 4701-4702

ASIAN JOURNAL OF CHEMISTRY

http://dx.doi.org/10.14233/ajchem.2013.13945

NOTE

Analysis of the Essential Oil from Seed of *Heracleum moellendorffii Hance* Cultivated in Northeast China

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(*Received*: 23 April 2012; *Accepted*: 26 February 2013) AJC-13048

Essential oil from seed of *Heracleum moellendorffii Hance* was obtained by hydrodistillation and analyzed by gas chromatography and gas chromatography mass spectrometry. In total, 69 components were detected, 41 components (98.60 %) were identified, among of which the major components were octyl acetate (63.80 %), octyl butyrate (12.23 %) and *n*-octanol (11.51 %).

Key Words: Umbelliferae, *Heracleum moellendorffii Hance*, Essential oil, Octyl acetate.

Heracleum L. belongs to subtribe tordyliinae of tribe Peucedaneae, subfamily Apioideae Apiaceae. It comprises 70 species mainly distributed in temperate areas of Asia and Europe. Caueasus mountains and Hengduan mountains are the two distribution centre of Heracleum in the world[1]. There are 29 species together with 4 varieties in China[2].

Heracleum moellendorffii Hance is one specie of genus Heracleum. It is an herbaceous perennial plant that grows in the hurst brim and valley[3]. The tender leaf of plant has been served as edible delicious vegetable by people in Northeast of China, component of the root are coumarins that possess pharmic activity, it has been used for the treatment of proliferative arthritis, psoriasis and arrhythmia *etc*.[4-7]. The main component of essential oils composition from flowers of plants are octyl acetate[8].

Up to now, study on *Heracleum moellendorffii Hance* are still scanty. Here we reported the chemical composition of the essential oil from the seed of *Heracleum moellendorffii Hance*.

The seed of *Heracleum moellendorffii Hance* was cultivated in Northeast of China in 2007 and purchased from Taoshan Medicinal Materials Plantation in Tieli city, Heilongjiang province, China, in 2008. The seed was stored in cloth bag.

Extraction of essential oil: Essential oil from crushed seed was isolated in a Clevenger's apparatus by hydrodistillation for 4 h when there was no increase in tube collected. The raw product was transferred by pipette into 4 mL sample flask and dried over anhydrous sodium sulfate. The essential oil was obtained by filtrate and stored at 4 ºC before analysis. The oil yield was 6.39 % (v/w).

Gas chromatography (GC): Gas chromatography analysis were performed on a Agilent GC6890 gas chromatograph (FID), fitted with a 30 m × 0.25 mm × 0.25 μm HP-5MS capillary column, using nitrogen as the carrier gas. The inlet temperature was 260 ºC, the split was 50:1, the volume of injection was 0.2 μL. The oven tempe-rature was programmed from 60 ºC (after 1 min) to 240 ºC at 6 ºC/min and the end temperature was held for 10 min. Peaks area percents were used for obtaining quantitative data.

Gas chromatography mass spectrometry: The GC-MS analysis of the oil was carried out on an Agilent HP-6890N gas chromatograph equipped 5973N mass spectrometry detector and HP-5MS capillary column (30 m × 0.25 mm, 0.25 μm) in the electron impact mode(Ionization energy: 70 eV) operating under the same conditions as described above. The retention indices were calculated relative to C6-C24 *n*-alkanes. The data aquired were analyzed by AMDIS software, The constituents of the oils were identified by matching with the NIST2005.L and Wiley275.L libraries, also by comparing their Kovat's retention indices with reference libraries[9].

The volatile constituents identified in the oil of *Heracleum moellendorffii Hance* are listed in Table-1 in order of their elution from the HP-5MS column. Hydrodistillation of the seed of *Heracleum moellendorffii Hance* afforded colourless oil with srong pungent odor, but aroma was smelt by a little, yield 6.39 % (v/w), 69 components were detected, 41 components (98.60 %) were identified. Among of which the content

TABLE-1
COMPONENTS IDENTIFIED IN THE OIL FROM SEED OF *Heracleum moellendorffii Hance*

Compounds	RI[a]	%[b]
Ethanol	543	0.01
3-Buten-2-ol, 2-methyl-	611	0.02
2-Buten-1-ol, 3-methyl-	773	0.03
n-Hexanal	802	0.01
1-Hexanol	865	0.15
Octanal	997	0.50
Acetic acid, hexyl ester	1007	0.10
Butyl 2-methylbutanoate	1043	0.02
1-Butyl isovalerate	1042	0.03
Butanoic acid, 2-methylbutyl ester	1056	0.04
3-Octen-1-ol	1060	0.68
1-Octanol	1070	11.51
α-Linalool	1102	0.02
Butanoic acid, 2-methyl-, 2-methylbutyl ester	1105	0.08
Butanoic acid, 3-methyl-, pentyl ester	1109	0.03
Acetic acid, heptyl ester	1113	0.03
Propanoic acid, 2-methyl-, hexyl ester	1149	0.08
3-Methyl-2-butenoic acid, 2-pentyl ester	1186	0.03
Butanoic acid, hexyl ester	1193	2.18
3-Octen-1-ol, acetate	1200	2.83
Decanal	1207	0.26
Acetic acid, octyl ester	1217	63.80
3-Octen-1-ol, acetate	1226	0.11
Butanoic acid, 2-methyl-, hexyl ester	1238	0.13
Butanoic acid, 3-methyl-, hexyl ester	1243	0.13
(Z)-4-Decen-1-ol	1259	0.04
1-Decanol	1273	0.07
Propanoic acid, octyl ester	1303	0.04
2-Butenoic acid, 3-methyl-, hexyl ester	1322	0.02
Propanoic acid, 2-methyl-, octyl ester	1346	0.21
Butanoic acid, 1-ethenylhexyl ester	1378	0.74
Octyl butyrate	1440	12.23
5-Decen-1-ol, acetate, (E)-	1398	0.14
Z-7-Decen-1-yl acetate	1402	0.19
Acetic acid, decyl ester	1410	0.58
Butanoic acid, 2-methyl-, octyl ester	1435	0.27
Pentanoic acid, octyl ester	1440	0.18
2(3H)-Furanone, 5-hexyldihydro-	1472	0.08
3-Methyl-2-butenoic acid, octyl ester	1522	0.10
Hexanoic acid, octyl ester	1584	0.80
5-Dodecen-1-ol, acetate, (Z)-	1589	0.10
Esters		85.21
Alcohols		12.62
Aldehydes		0.77
Total		98.60

[a]Retention indexes were calculated by AMDIS software.
[b]Per cent was achived from area percent integred of GC-FID regardless of corrected factor.

according sort were listed as follow esters (85.21 %), alcohols (12.62 %), aldehydes (0.77 %). Octyl acetate (63.80 %) was the major constituent in the oil, followed by 1-octanol (11.51 %) and octyl butyrate (12.23 %). Esters dominated in constituents of oil, octyl acetate is reported as main component in most species of Heracleum L.[10-12]. It was obvious different between the constituent of seed and flower or leaf that no terpenes were determined in oil of the seed[8]. The seed could be considered as a material source of natural octyl acetate and a sort of spice for its aroma.

ACKNOWLEDGEMENTS

The authors thank the Aid Program for Science and Technology Innovative Research Team in Higher Educational Instituions of Heilongjiang Province (2010td04), the Heilongjiang Provincial Funds for Distinguished Young Scientists (JC201106) and the Heilongjiang Province Natural Science Fund Project (B201001).

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