

## COMPOSITION OF THE CO<sub>2</sub> EXTRACT OF *Eryngium planum*

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Tea of *Eryngium planum* L. has long been used in European folk medicine to treat whooping cough and coughing [1, 2]. The use of this plant for tuberculosis and as a diuretic has been reported [2]. The effect of its extract on several leukemia strains was studied [3]. Thus, a study of the chemical composition of *E. planum* is of practical interest.

Organic acids [4], saponins [5-8], carboxylic acids [9], and flavonoid glycosides [10-12] were isolated previously from *E. planum*. Essential oil of *E. planum* and the composition of extracts obtained by supercritical CO<sub>2</sub> extraction have not been studied.

We used GC/MS to study the composition of the extract of the aerial part of *E. planum* collected in Pavlodar Oblast (Republic of Kazakhstan) that was obtained by supercritical CO<sub>2</sub> extraction.

Table 1 shows that 55 components were observed in the extract. The principal ones were hexadecanoic acid (26.5%), 7-(3-carboxybutyl-2-epoxy)coumarin (11.29), hexadecanoic acid methyl ester (8.05), dibutylphthalate (3.80), diisobutylphthalate (3.66), and phytone (3.08).

Thus, the component composition of the CO<sub>2</sub>-extract of *E. planum* was studied for the first time by GC/MS and its principal components were identified.

The raw material for the study was collected in the National Park near Bayanaul, Pavlodar Oblast, Republic of Kazakhstan on August 9, 2007. Herbarium specimen No. 2001.02.08.01.12 was deposited in AO "SPC Fitokhimii", Karaganda.

The yield of extract was 2.11%. The method for preparing the CO<sub>2</sub> extract and its analysis by GC/MS were analogous to those published [13].

Mass spectra of unidentified components (EI-MS, 70 eV, *m/z*, *I*<sub>rel.</sub> %): 1) 207 (2), 91 (1), 79 (2), 73 (2), 67 (2), 61 (100), 58 (4), 53 (1); 2) 347 (2), 281 (2), 177 (2), 157 (3), 137 (3), 137 (3), 127 (100), 121 (4), 109 (2), 99 (9), 83 (3), 73 (7), 55 (9); 3) 220 (75), 205 (12), 196 (15), 187 (27), 177 (31), 159 (100), 151 (21), 131 (54), 123 (54), 123 (54), 105 (59), 93 (71), 81 (64), 67 (55), 55 (30); 4) 549 (12), 475 (8), 462 (5), 445 (4), 431 (3), 415 (74), 349 (4), 388 (3), 355 (8), 351 (36), 327 (22), 311 (6), 281 (39), 267 (9), 251 (8), 236 (3), 221 (10), 207 (82), 193 (48), 162 (7), 148 (23), 135 (15), 121 (8), 111 (9), 98 (12), 82 (12), 73 (100), 55 (26); 5) 549 (6), 500 (49), 415 (24), 401 (24), 355 (36), 341 (13), 327 (12), 281 (46), 267 (9), 251 (5), 221 (7), 207 (78), 193 (44), 178 (6), 147 (36), 135 (9), 123 (6), 109 (10), 95 (12), 82 (17), 72 (100), 55 (24); 6) 460 (4), 430 (6), 399 (4), 355 (9), 341 (7), 295 (3), 281 (26), 267 (5), 248 (5), 235 (6), 220 (11), 207 (18), 178 (7), 168 (6), 151 (11), 137 (10), 126 (16), 111 (17), 99 (21), 81 (26), 71 (69), 59 (100).

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TABLE 1. Composition of CO<sub>2</sub> Extract of the Aerial Part of *E. planum* L.

Component	RT	%	Component	RT	%
Unident. 1*	1.17	1.12	Longifolene aldehyde	37.71	0.44
2-Methylhexanal	1.26	1.42	Tetradecanoic acid, methyl ester	37.98	Tr.
2-Methyl-2-propenal	1.38	2.46	Methylisoeugenol	38.85	1.18
2-Butenal	1.63	0.36	Tetradecanoic acid	38.92	0.77
1,1-Dimethoxypropane	1.74	0.35	<b>Phytone**</b>	<b>41.04</b>	<b>3.08</b>
4-Methyl-2,3-dihydrofuran	2.28	Tr.	<b>Diisobutylphthalate</b>	<b>41.40</b>	<b>3.66</b>
3-Methyl-2-butenal	2.60	0.48	1-Eicosene	42.98	1.06
Hexanal	2.80	1.58	<b>Hexadecanoic acid, methyl ester</b>	<b>43.17</b>	<b>8.05</b>
$\alpha$ -Pinene	6.19	Tr.	<b>Dibutylphthalate</b>	<b>43.76</b>	<b>3.80</b>
( <i>E</i> )-2-Heptenal	7.25	1.52	<b>Hexadecanoic acid</b>	<b>44.09</b>	<b>26.51</b>
1,1-Dimethoxydodecane	8.40	1.00	Hexadecanoic acid, ethyl ester	44.84	1.90
( <i>E,E</i> )-2,4-Heptadienal	9.61	Tr.	Methoxalene	45.30	0.63
<i>p</i> -Cymene	11.47	Tr.	Unident. 4	47.01	1.57
Limonene	11.77	1.23	Methyl-8,11-octadecadienoate	47.10	1.55
Camphor	18.13	Tr.	Methylinolenate	47.23	2.36
$\alpha$ -Terpinene	22.17	Tr.	Phytol	47.49	1.47
<i>trans</i> -Chrysanthenyl acetate	22.97	0.48	<b>7-(3-Carboxybutyl-2-epoxy)coumarin</b>	<b>47.62</b>	<b>11.29</b>
Thymol	24.28	1.35	14-Methylheptadecanoic acid, methyl ester	47.93	Tr.
2,4-Dodecadienal	24.44	0.69	<i>cis</i> -Piperitol	48.15	0.79
2,4-Decadienal	25.30	1.70	Unident. 5	50.49	1.19
Methylphthalate	29.85	Tr.	$\delta$ -Undecalactone	53.03	Tr.
Eicosane	30.23	Tr.	Unident. 6	53.34	1.29
Dihydroactinoliolide	32.06	1.02	Dotriacontane	59.03	Tr.
Unident. 2	33.32	1.43	<i>bis</i> -(2-Ethylhexyl)phthalate	59.99	2.76
Spatulenol	33.64	2.06	3-Ethyl-5-(2-ethylbutyl)octadecane	62.15	Tr.
Benzophenone	35.08	0.88	Eicosane	62.16	Tr.
$\beta$ -Selinene	36.00	Tr.	Heptacosane	62.18	Tr.
Unident. 3	36.91	0.91	Total		97.39

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