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COMPONENT COMPOSITION OF ESSENTIAL OIL FROM *Artemisia taurica*

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Artemisia taurica Willd. is being studied in Ukraine as a source of essential oil with valuable properties for medical use. It is known that essential oil of this plant contains the monoterpenes sabinene, myrcene, 1,8-cineol, α- and β-thujones, and borneol, with the thujones dominating. However, there are different races with essential oil of varying quality owing to the presence of nerol, neral, geraniol, and geranial [1]. Sesquiterpene-like compounds, which are chemically lactones, such as tauremisin, mibulactone, and taurine have been observed in plants of this species [2, 3].

We investigated the qualitative composition and established the quanitative content of the components and the mass fraction of essential oil from *A. taurica* isolated from wild flora of Crimea in all vegetation stages including spring sprouting of runners (I), budding (II), mass flowering (III), and seed ripening (IV).

We observed 42 compounds in essential oil and established that they all, with the exceptions of 1-octen-3-ol, 1,1-dimethyl-3-methylen-2-vinylcyclohexane, and anethole, were mono- and sesquiterpenes (Table 1).

The main components of essential oil during the whole vegetative period of *A. taurica* were bicyclic terpene ketones α- and β-thujones and 1,3-cineol oxide.

The accumulation dynamics in essential oil were different for each of these. From spring sprouting of runners to seed ripening, the content of α-thujone increased (69.61, 69.86, 75.15, and 72.32%); 1,8-cineol decreased (10.57, 7.75, 5.69, and 2.68%); and β-thujone varied insignificantly (12.69, 16.36, 12.37, and 10.89%). Besides the main components, essential oil also contained sporadically appearing compounds [α- and β-pinenes, camphene, carene, *cis*-pinocorveol, sabinol, camphor, sabinoketone, pinocarvone, 2(10)-pinen-3-one, and methyleugenol] and continuously present minor compounds (sabinene, 1-octen-3-one, cuminic alcohol, *p*-isopropylbenzaldehyde, *p*-cymene, γ-terpinene, *trans*-pinocorveol, and terpinen-4-ol). During seed ripening, the component composition of essential oil was enriched in additional compounds [limonene, 1,1-dimethyl-3-methylen-2-vinylcyclohexane, 5(*E*)-2,6-dimethyl-1,5,7-octatrien-3-ol, *cis*-*p*-menth-2-en-7-ol, 1,5,5-trimethyl-6-methylenecyclohex-1-ene, carvone, anethole, spatulenol, and caryophyllene oxide].

Essential oil was prepared by steam distillation of freshly collected and ground aerial part of *A. taurica* Willd. collected in Prisivashe of the Autonomous Republic of Crimea. The distillation was carried out four times during the whole vegetation period including spring sprouting of runners, budding, mass flowering, and seed ripening. The mass fraction of essential oil was 0.95% (2.14%), 1.2 (2.98), 0.90 (2.18), and 0.7 (1.86), respectively (data calculated per dry weight are given in parentheses). The qualitative and quantitative investigations of the essential oil component composition were performed using GC—MS on an Agilent Technologies 6890 chromatograph with a 5973 mass spectrometer and the NIST 02 database. The chromatography conditions were quartz column (30 m × 0.25 mm), He carrier gas, carrier gas flow rate 1 mL/min, vaporizer temperature 249°C, programmed temperature from 50 to 230°C (3°C/min), and injected sample volume 0.1 μL.

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TABLE 1. Qualitative Composition and Quantitative Content of Essential Oil from *Artemisia taurica* During the Whole Vegetative Period (I-IV)

Component	I		II		III		IV	
	w, %	t, min	w, %	t, min	w, %	t, min	w, %	t, min
α-Pinene	-	-	-	-	0.12	7.02	-	-
Camphene	-	-	-	-	0.09	7.51	-	-
Sabinene	0.42	8.36	0.91	8.34	0.58	8.36	0.15	8.38
β-Pinene	-	-	-	-	0.06	8.47	-	-
1-Octen-3-ol	0.37	8.59	0.13	8.61	0.12	8.62	0.16	8.66
Myrcene	-	-	-	-	0.64	9.00	0.61	9.03
Carene	-	-	0.85	9.95	-	-	-	-
p-Cymene	0.37	10.27	0.46	10.27	0.33	10.28	0.33	10.32
Limonene	-	-	-	-	-	-	0.36	10.48
1,8-Cineol	10.57	10.56	7.75	10.55	5.69	10.57	2.68	10.59
γ-Terpinene	0.24	11.67	0.14	11.66	0.14	11.67	0.17	11.71
α-Thujone	69.61	13.87	69.86	13.88	75.15	13.89	72.32	14.25
β-Thujone	12.69	14.23	16.36	14.25	12.37	14.24	10.89	14.50
2(3)-Thujon-10-one	0.41	14.36	0.40	14.37	0.58	14.38	-	-
cis-Pinocorveol	0.23	15.09	-	-	-	-	-	-
trans-Pinocorveol	0.54	15.17	0.25	15.12	0.22	15.12	0.53	15.23
Sabinol	-	-	0.19	15.19	-	-	-	-
1,1-Dimethyl-3-methylen-2-vinylcyclohexane	-	-	-	-	-	-	1.15	15.34
Camphor	-	-	-	-	0.94	15.36	-	-
Isothujol	-	-	0.10	15.65	-	-	0.20	15.73
Sabinoketone	-	-	0.19	15.99	-	-	-	-
5(*E*)-2,6-Dimethylocta-1,5,7-trien-3-ol	-	-	-	-	-	-	1.97	16.11
Pinocarvone	-	-	0.15	16.15	-	-	0.28	16.23
Verbenol	0.86	16.17	-	-	-	-	-	-
2(10)-Pinen-3-one	-	-	-	-	0.17	16.18	-	-
Borneol	-	-	0.14	16.33	0.32	16.31	0.39	16.41
Terpinen-4-ol	0.93	16.81	0.41	16.83	0.58	16.83	0.51	16.91
α-Terpineol	0.20	17.41	-	-	-	-	0.21	17.51
α-Thujenal	0.31	17.64	-	-	-	-	0.26	17.70
Myrtenol	0.19	17.74	-	-	-	-	0.26	17.70
cis-*p*-Menth-2-en-7-ol	-	-	-	-	-	-	0.30	18.14
Cuminic alcohol	-	-	-	19.11	0.15	19.16	-	-
p-Isopropylbenzaldehyde	-	-	0.19	19.54	0.37	19.56	-	-
1,5,5-Trimethyl-6-methylenecyclohex-1-ene	-	-	0.19	-	-	-	0.65	19.58
Carvone	-	-	-	-	-	-	0.15	19.82
Anethole	-	-	-	-	-	-	0.27	21.65
Thymol	-	-	-	-	0.10	22.42	0.18	21.96
cis-Jasmone	-	-	0.27	26.50	0.13	26.51	0.64	26.52
Methyleugenol	0.20	26.74	-	-	-	-	-	-
Germacrene D	0.32	29.77	-	-	0.17	29.77	0.47	29.80
Spatulenol	-	-	-	-	-	-	0.24	33.63
Caryolphyllene oxide	-	-	-	-	-	-	0.22	33.82

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w, content (%); t, retention time.

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