

Supplementary material for the article:

Dodoš, T.; Rajčević, N.; Janačković, P.; Vujisić, L.; Marin, P. D. Essential Oil Profile in Relation to Geographic Origin and Plant Organ of *Satureja Kitaibelii* Wierzb. Ex Heuff. *Industrial Crops and Products* **2019**, *139*. <https://doi.org/10.1016/j.indcrop.2019.111549>

Supplemental Table 1. The composition of the essential oil of the plant parts of *Satureja kitaibelii* using GC/MS

Compound ^a	RI ^b	Leaf	Calyx	Corolla	Aerial parts
<i>α</i> -Thujene	923	0.16	-	-	0.24
<i>α</i> -Pinene	929	1.24	0.33	0.28	2.00
Camphene	943	0.51	-	0.49	0.93
<i>β</i> -Pinene	971	0.25	-	-	0.37
Myrcene	987	0.30	-	-	0.51
<i>α</i> -Terpinene	1013	tr	-	-	tr
<i>p</i> -Cymene	1019	15.46	-	-	13.16
Limonene	1024	3.21	0.53	0.52	4.55
1,8-Cineole	1025	0.95	-	-	0.80
<i>cis</i> - <i>β</i> -Ocimene	1034	0.38	-	-	0.87
<i>trans</i> - <i>β</i> -Ocimene	1046	0.44	-	-	1.65
<i>γ</i> -Terpinene	1054	0.45	-	-	1.05
<i>cis</i> -Sabinene hydrate	1062	0.38	-	-	0.30
<i>cis</i> -Linalool oxide (furanoid)	1068	1.48	-	-	0.78
<i>trans</i> -Linalool oxide (furanoid)	1093	1.53	-	-	0.81
Linalool	1101	42.52	38.34	48.38	47.27
<i>trans</i> - <i>p</i> -Mentha-2,8-dien-1-ol	1124	tr	-	-	tr
allo-Ocimene	1129	0.14	-	-	0.63
<i>cis</i> -Limonene oxide	1130	0.26	-	-	0.19
<i>trans</i> -Pinocarveol	1133	0.16	-	-	tr
Camphor	1138	0.45	-	-	0.18
Borneol	1158	3.11	1.58	0.47	2.21
<i>cis</i> -Linalool oxide (pyranoid)	1161	0.39	-	-	0.23
<i>trans</i> -Linalool oxide (pyranoid)	1167	0.26	-	-	0.13
Terpinen-4-ol	1170	0.23	-	-	0.14
<i>p</i> -Cymen-8-ol	1177	0.87	-	-	0.33
<i>α</i> -Terpineol	1183	0.24	-	-	0.13
<i>cis</i> -Dihydro carvone	1188	0.43	-	-	0.22
<i>trans</i> -Dihydro carvone	1196	1.30	0.21	-	0.79
<i>trans</i> -Carveol	1211	0.37	-	-	0.12
Carvone	1236	0.25	-	-	0.12
Thymoquinone	1243	0.48	-	-	0.17
Thymol	1286	0.79	-	-	0.50
Carvacrol	1294	1.12	-	-	0.87
Unknown #1	1316	-	0.67	-	tr
<i>δ</i> -Elemene	1329	0.24	5.85	0.38	0.91
<i>α</i> -Copaene	1368	0.28	0.28	0.32	0.20
<i>β</i> -Bourbonene	1377	1.13	0.52	0.37	0.61
<i>β</i> -Elemene	1384	0.29	2.52	1.78	0.52
<i>α</i> -Gurjunene	1403	tr	0.21	-	tr
(<i>E</i>)-Caryophyllene	1411	2.16	17.14	21.33	3.78
<i>β</i> -Copaene	1421	0.49	3.52	3.32	0.78
<i>trans</i> -Muurolo-3,5-diene	1445	0.25	1.41	1.32	0.33
<i>α</i> -Humulene	1445	0.22	2.07	2.06	0.42
<i>cis</i> -Cadin-1(6),4-diene	1456	tr	0.55	0.61	tr
<i>γ</i> -Muurolole	1469	0.11	0.45	-	0.13
Germacrene D	1473	1.11	16.04	15.93	3.02
Bicyclogermacrene	1489	0.27	4.83	1.25	0.88
<i>β</i> -Bisabolene	1502	0.79	-	-	0.34
<i>γ</i> -Cadinene	1506	0.15	-	-	tr
<i>δ</i> -Cadinene	1516	0.15	0.52	-	0.13
Spathulenol	1569	2.00	1.41	-	0.97
Caryophyllene oxide	1574	3.40	0.57	-	1.40
Unknown SO (MW220)	1604	0.41	-	-	0.13
Caryophylla-4(12),8(13)-dien-5- <i>β</i> -ol	1628	0.27	-	-	tr
<i>α</i> -Muurolole (=Torreyol)	1637	0.25	-	-	tr
<i>α</i> -Cadinol	1644	0.22	0.45	-	tr
14-hydroxy-(<i>Z</i>)-Caryophyllene	1661	0.39	-	-	0.15
Eudesma-4(15),7-dien-1- <i>β</i> -ol	1677	0.72	-	-	0.32
Total monoterpenes		80.23	40.99	50.13	82.43
<i>Monoterpene hydrocarbons</i>		23.76	0.86	1.29	26.51
<i>Monoterpene oxygenated</i>		56.47	40.13	48.85	55.91
Total sesquiterpenes		15.39	58.34	48.68	15.52
<i>Sesquiterpene hydrocarbons</i>		7.73	55.92	48.68	12.29
<i>Sesquiterpene oxygenated</i>		7.66	2.42	-	3.23
Unknown		-	0.67	-	0.10
Total:		95.62	100.00	98.81	98.05
Number of compounds:		58.00	23.00	16.00	59.00

^a Contents of the total essential oil composition are given as percentages (mean ± SD); tr: trace (0.05<tr<0.10%); -: not detected; compounds with contents <0.05% are not listed.

^b The RIs were experimentally determined using the standard method involving retention time (Rt) of *n*-alkanes, which were injected under the same chromatographic conditions.

Supplemental table 2. ANOVA and *post-hoc* test of 15 uncorrelated essential oil components in three *S. kitaibelii* populations

	<i>F</i>	<i>P</i>	Đerdap n=14	Poganovo n=15	Temšica n=15
<i>p</i>-Cimene	15.1	***	21.9±9.4 ^a	16.9±10.5 ^a	5.5±2.6
Limonene	2.4	-	8.0±2.4 ^a	7.4±5.4 ^a	5.2±2.3 ^a
1,8-Cineole	0.2	-	2.7±1.2 ^a	1.3±0.8 ^a	1.8±0.7 ^a
<i>γ</i>-Terpinene	12.3	***	1.0±0.7 ^a	1.0±1.4 ^a	0.4±0.2 ^a
<i>cis</i> -Sabinene hydrate	3.5	**	9.0±9.1 ^a	3.2±4.6 ^b	2.0±1.6 ^{ab}
Terpinolene	1.3	-	3.8±11.2 ^a	- ^a	- ^a
Linalool	29.3	***	- ^a	22.2±15.5	0.3±0.2 ^a
Borneol	0.0	-	7.7±2.6 ^a	7.6±3.2 ^a	7.7±3.4 ^a
Terpinen-4-ol	0.9	-	3.8±2.9 ^a	2.5±3.3 ^a	3.2±1.5 ^a
<i>p</i> -Cimen-8-ol	0.2	-	1.5±0.7 ^a	1.4±1.2 ^a	1.6±0.5 ^a
Carvacrol methyl ether	5.3	***	3.0±4.5 ^a	- ^{ab}	- ^b
Carvacrol	8.3	***	0.4±0.2	0.6±0.4	0.9±0.4
Germakrene D	13.6	***	1.6±0.9 ^a	0.9±0.9 ^a	2.8±1.3
<i>β</i> -Bisabolene	3.0	-	0.8±0.5 ^a	0.5±0.5 ^b	1.0±0.6 ^{ab}
Caryophyllene oxide	27.0	***	5.9±2.4	1.6±0.7	3.8±1.1

ANOVA and post-hoc test (Tukey's), *a, b* are grouped according to post-hoc test (*p* < 0.05);

Values are given as mean ± SD; statistically significant components are given in boldface;

****p* < 0.01, **0.01 < *p* < 0.05

Supplemental table 3. Simple linear correlation test between selected essential oil components and bioclimatic parameters

	<i>p</i> -Cimene	Limonene	1,8-Cineole	γ -Terpinene	<i>cis</i> -Sabinene hydrate	Terpinolene	Linalool	Borneol	Terpinen-4-ol	<i>p</i> -Cimen-8-ol	Carvacrol methyl ether	Carvacrol	Germakrene D	β -Bisabolene	Caryophyllene oxide
ALT	-0.5	-0.2	-0.1	-0.6	0.4	-0.2	0.3	0.0	-0.2	0.0	-0.5	0.5	0.1	-0.3	-0.6
BIO1	0.7	0.3	0.1	0.5	-0.2	0.2	0.2	0.0	0.0	-0.1	0.3	-0.5	-0.5	0.1	0.2
BIO2	-0.2	-0.1	-0.1	-0.5	0.4	-0.2	0.6	0.0	-0.2	-0.1	-0.4	0.2	-0.2	-0.4	-0.8
BIO3	-0.1	0.0	-0.1	-0.4	0.3	-0.2	0.7	0.0	-0.2	-0.1	-0.3	0.1	-0.3	-0.3	-0.7
BIO4	0.3	0.1	0.1	0.6	-0.4	0.2	-0.5	0.0	0.2	0.0	0.4	-0.3	0.1	0.3	0.7
BIO5	0.7	0.3	0.1	0.5	-0.2	0.2	0.2	0.0	0.0	-0.1	0.3	-0.5	-0.5	0.1	0.2
BIO6	0.6	0.3	0.1	0.6	-0.3	0.2	-0.1	0.0	0.1	0.0	0.4	-0.5	-0.3	0.2	0.5
BIO7	-0.1	0.0	-0.1	-0.5	0.4	-0.2	0.7	0.0	-0.2	-0.1	-0.4	0.2	-0.3	-0.4	-0.8
BIO8	0.5	0.2	0.1	0.6	-0.4	0.2	-0.3	0.0	0.2	0.0	0.5	-0.5	-0.2	0.3	0.6
BIO9	0.4	0.2	0.0	-0.1	0.2	0.0	0.7	0.0	-0.1	-0.1	-0.1	-0.2	-0.6	-0.2	-0.5
BIO10	0.6	0.3	0.1	0.6	-0.3	0.2	-0.2	0.0	0.1	0.0	0.4	-0.5	-0.3	0.2	0.5
BIO11	0.3	0.2	0.0	-0.2	0.2	-0.1	0.8	0.0	-0.2	-0.1	-0.1	-0.2	-0.6	-0.3	-0.6
BIO12	0.2	0.1	0.1	0.5	-0.4	0.2	-0.6	0.0	0.2	0.1	0.4	-0.3	0.2	0.4	0.7
BIO13	0.4	0.2	0.1	0.6	-0.4	0.2	-0.5	0.0	0.2	0.0	0.4	-0.4	0.0	0.3	0.7
BIO14	0.0	0.0	0.1	0.4	-0.3	0.2	-0.7	0.0	0.2	0.1	0.3	-0.1	0.4	0.3	0.7
BIO15	0.4	0.2	0.1	0.6	-0.4	0.2	-0.5	0.0	0.2	0.0	0.4	-0.4	0.0	0.3	0.7
BIO16	0.3	0.1	0.1	0.6	-0.4	0.2	-0.6	0.0	0.2	0.0	0.4	-0.3	0.1	0.3	0.7
BIO17	-0.2	-0.1	0.0	0.3	-0.3	0.1	-0.8	0.0	0.2	0.1	0.2	0.1	0.5	0.3	0.7
BIO18	0.3	0.1	0.1	0.6	-0.4	0.2	-0.6	0.0	0.2	0.0	0.4	-0.3	0.1	0.3	0.7
BIO19	0.0	0.0	0.1	0.4	-0.3	0.2	-0.7	0.0	0.2	0.1	0.3	-0.1	0.4	0.3	0.7

Statisticaly significant values ($p < 0.05$) higer than -0.6 and 0.6 are showed in boldface ($-0.6 < r > 0.6$).

Supplemental table 4. Simple linear correlation test between morphological characters and selected essential oil components

	Leaf length	Leaf width	Leaf length width ratio	Distance between widest part of leaf and leaf top	Number of glandular trichomes on leaf adaxial side 1mm ²	Number of glandular trichomes on leaf abaxial side 1mm ²	Calyx length	Calyx width	Calyx length width ratio	Calyx upper teeth length	Calyx lower teeth length	Number of calyx glandular trichomes on 1mm ²
<i>α</i> -Pinene	0.0	-0.1	0.1	0.0	-0.2	0.0	0.0	-0.2	0.2	-0.1	-0.2	0.0
<i>p</i> -Cimene	0.4	0.4	0.0	0.3	0.1	0.1	-0.1	0.2	-0.2	-0.2	-0.3	-0.1
Limonene	0.0	-0.1	0.1	-0.1	0.0	0.2	0.1	0.0	0.0	0.0	0.0	-0.1
1,8-Cineole	0.0	0.0	0.1	0.0	-0.1	0.0	0.0	0.1	-0.1	0.0	0.0	-0.3
<i>γ</i> -Terpinene	-0.1	0.0	0.1	-0.1	0.0	0.1	0.1	-0.1	0.2	0.1	0.1	-0.2
<i>cis</i> -Sabinene hydrate	-0.1	0.0	0.0	-0.1	0.1	0.2	0.3	0.2	0.0	0.3	0.3	-0.3
Terpinolene	-0.1	-0.1	0.0	-0.2	0.3	0.1	0.1	0.3	-0.2	-0.2	0.0	-0.1
Linalool	0.1	-0.1	0.1	0.3	-0.4	-0.2	-0.3	-0.6	0.5	-0.4	-0.4	0.1
Borneol	-0.1	0.0	0.0	0.1	-0.1	0.2	0.0	0.1	-0.1	-0.2	-0.2	-0.2
Terpinen-4-ol	-0.2	-0.1	0.1	-0.2	0.1	0.1	0.0	0.0	0.0	0.1	0.1	-0.1
Neral	-0.2	-0.1	-0.2	-0.3	0.4	-0.1	0.0	0.3	-0.3	0.1	0.1	0.1
<i>p</i> -Cimen-8-ol	0.3	0.3	0.0	0.2	0.3	0.2	0.0	0.1	-0.2	-0.1	-0.1	0.0
Carvacrol methyl ether	-0.1	0.1	-0.1	0.0	0.1	0.1	0.4	0.3	0.1	0.3	0.3	-0.1
Geraniol	-0.2	-0.1	-0.1	-0.3	0.1	-0.3	0.0	0.0	-0.1	0.3	0.3	0.2
Carvacrol	-0.1	-0.1	-0.1	-0.1	0.1	-0.1	-0.1	-0.1	0.0	0.0	-0.1	0.1
Geranyl acetate	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1,5-di- <i>epi</i> - <i>β</i> -burbonene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(E)-Caryophyllene	-0.2	-0.2	0.0	-0.3	0.0	-0.1	0.3	0.2	0.0	0.5	0.6	0.1
Germakrene D	-0.1	0.0	-0.1	-0.3	0.0	-0.1	0.3	0.2	0.1	0.6	0.7	0.0
<i>β</i> -Bisabolene	0.1	0.1	0.0	0.1	0.1	0.1	0.2	0.4	-0.2	0.4	0.3	0.1
Caryophyllene oxide	0.1	0.4	-0.4	0.0	0.3	0.2	0.2	0.6	-0.5	0.3	0.3	-0.2

Statistically significant values ($p < 0.05$) higher than -0.6 and 0.6 are showed in boldface ($-0.6 < r > 0.6$).