

RESEARCH REPORT

**Uruguayan Essential Oils. Part IX.  
Composition of Leaf Oil of *Blepharocalyx tweediei*  
(Hook. et Arn.) Berg var. *tweediei* (Myrtaceae)**

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**Abstract**

*Blepharocalyx tweediei* leaf oil, obtained by hydrodistillation, was analyzed by GC and GC/MS. Fifty four components were identified in the oil. The main components were: 1,8-cineole (55.7%), caryophyllene oxide (4.1%) and  $\alpha$ -terpineol (3.9%). Eighteen sesquiterpene hydrocarbons were identified in the sesquiterpene fraction of the oil.

**Key Word Index**

*Blepharocalyx tweediei*, Myrtaceae, essential oil composition, 1,8-cineole.

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**Introduction**

*Blepharocalyx tweediei* is a woody shrub which can reach a height of 8 meters. It blooms in the spring (September-November) and its flowers have a delicate and intense odor. It grows in sandy soils near the rivers and is widespread in Uruguay, Argentina and Brazil (1). The composition of leaf oil of *B. tweediei* is reported in this paper. An oil of *B. tweediei* of Argentinian origin has been the subject of previous study (2-4), and one of these papers (4) reports results on the composition of the oil. There are no previous references in literature on the oil of Uruguayan plants.

**Experimental**

The fresh leaves of *Blepharocalyx tweediei* var. *tweediei* (known locally as Arrayan) were collected near the Atlantic Coast, around the Laguna Negra, Rocha Department, Uruguay, in August 1995. Voucher specimens (MVFQ 3524) have been preserved in the Herbarium of Institute of Botanica, Faculty of Chemistry, University of Montevideo, Uruguay. The leaves were air-dried and the oil was isolated by

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Table I. Chemical composition of *Blepharocalyx tweediei* (Arrayan) oil

Peak No.	Compound	Percentage	Peak No.	Compound	Percentage
1	$\alpha$ -thujene	t	32	$\alpha$ -humulene	0.6
2	$\alpha$ -pinene	0.1	33	aromadendrene	0.2
3	$\beta$ -pinene	t	34	$\gamma$ -muurolene	1.3
4	myrcene	0.1	35	$\beta$ -selinene	0.9
5	p-cymene	0.7	36	$\alpha$ -selinene	1.3
6	1,8-cineole	55.7	37	$\alpha$ -muurolene	0.4
7	(E)- $\beta$ -ocimene	0.1	38	$\delta$ -cadinene	1.7
8	$\gamma$ -terpinene	0.4	39	cadina-1,4-diene	0.1
9	cis-linalool oxide* + <i>m</i> -cresol	<0.1	40	$\alpha$ -cadinene	0.2
10	terpinolene	0.3	41	$\alpha$ -calacorene	0.3
11	linalool	2.3	42	caryophyllene alcohol	0.2
12	cis-pinene hydrate	0.1	43	caryophyllene oxide	4.1
13	trans-pinene hydrate	0.1	44	globulol	1.5
14	camphor	0.1	45	guaiol	0.3
15	terpinen-4-ol	3.9	46	humulene epoxide II	0.6
16	p-cymen-8-ol	0.5	47	1-epi-cubenol	2.8
17	$\alpha$ -terpineol	3.2	48	cubenol	1.0
18	trans-piperitol	t	49	$\alpha$ -muurolol	1.1
19	trans-carveol	0.1	50	himachalol	0.4
20	geraniol	t	51	$\beta$ -eudesmol	0.8
21	$\alpha$ -cubebene	t	52	selin-11-en-4 $\alpha$ -ol	1.8
22	$\alpha$ -ylangene	0.3	53	14-hydroxy-9-epi- $\beta$ -caryophyllene	0.2
23	$\alpha$ -copaene	0.4		Monoterpene hydrocarbons	1.6
24	(E)-methyl cinnamate	0.5		Sesquiterpene hydrocarbons	11.2
25	geranyl acetate	0.1		Total hydrocarbons	12.9
26	$\beta$ -elemene	<0.1		Alcohols	20.1
27	methyl eugenol	t		Esters	0.5
28	$\alpha$ -gurjunene	0.1		Ethers and oxides	60.4
29	$\beta$ -caryophyllene	2.9		Total oxygenated compounds	81.1
30	$\beta$ -gurjunene	0.3		Total	93.8
31	$\alpha$ -guaiene	0.3			

\* Correct isomer not determined; t = trace

hydrodistillation using a modified Clevenger-type apparatus. The leaves were dried by exposure to the air and then the oil was isolated by hydrodistillation in a modified Clevenger apparatus. The *B. tweediei* leaf oil was analyzed by GC and GC/MS.

**GC:** Fisons chromatograph 5160 Mega Series equipped with a Shimadzu data processor C-R 3A; silica fused capillary column, 25 m x 0.32 mm, coated with SE-52, 0.40-0.45  $\mu$ m film thickness (Mega, Legnano, Italy); column temperature, 45°C (6 min) to 240°C at 3°C/min; injector temperature 250°C; detector temperature 280°C; injection mode, split; split ratio 1:50; volume injected, 0.2  $\mu$ L of the oil; carrier gas, He, 100 KPa.

**GC/MS:** Shimadzu QP 5000 equipped with Adams library (5), silica fused capillary column, 30 m x 0.25 mm coated with DB-5, 0.25  $\mu$ m film thickness (J&W, Folsom, California, USA); column temperature, 60°C to 240°C at 3°C/min; injector temperature, 250°C; injection mode, split; split ratio, 1:30; volume injected, 0.2  $\mu$ L of the oil; carrier gas, He, 61.6 KPa; linear velocity 33.5 cm/s; interface temperature 250°C; detector 1.5 kV; acquisition mass range 41-300; solvent cut, 2 min.

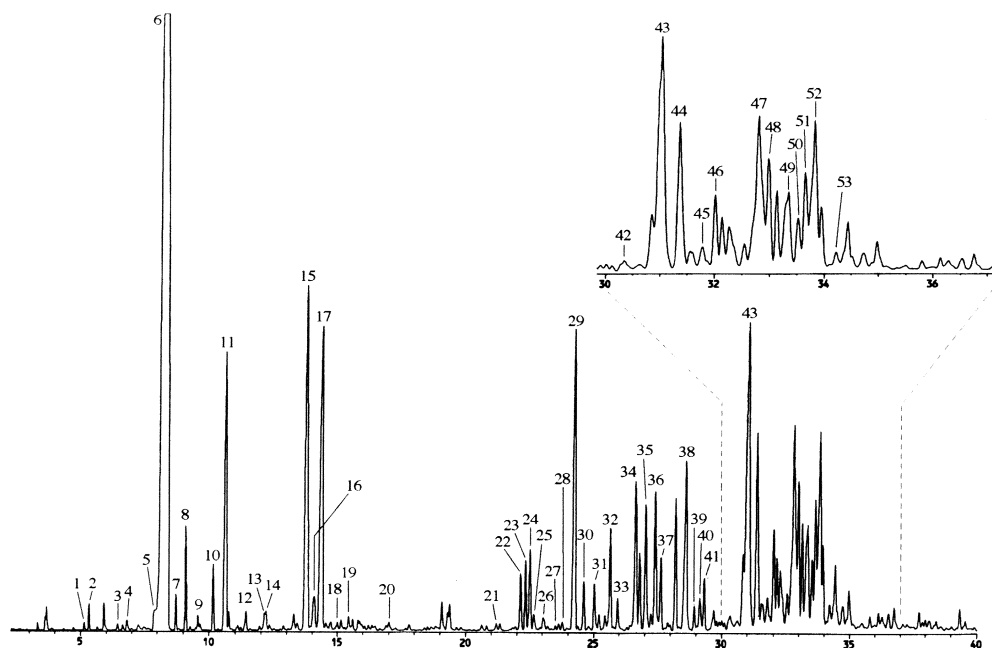


Figure 1. GC/MS/TIC chromatogram of *Blepharocalyx tweediei* leaf oil. For peak identifications, see Table I

## Results and Discussion

*B. tweediei* oil is yellow and has a pleasant persistent spicy odor which initially covers the aromatic note of 1,8-cineole. Table I gives the relative percentages of single components and classes of compounds of *B. tweediei* oil, while the chromatogram of this oil can be seen in Figure 1. Figure 1 and Table I show the presence of 54 identified components which represent about 94% of the whole oil. Most of the unidentified components were sesquiterpene alcohols.

The oil was found to be rich in oxygenated compounds (81.05%), while the sesquiterpene hydrocarbons and monoterpene hydrocarbons represented 11.17% and 1.54% respectively. The main component was 1,8-cineole (55.7%) followed by caryophyllene oxide (4.1%). In addition to 1,8-cineole, the monoterpene oxygenated fraction was made up especially of alcohols such as terpinen-4-ol (3.9%),  $\alpha$ -terpineol (3.2%) and linalool (2.3%).

The sesquiterpene fraction was so rich in components, especially in hydrocarbons and alcohols, that good peak resolution of all components was not possible. In fact, 18 sesquiterpene hydrocarbons have been identified, and among them  $\beta$ -caryophyllene (2.9%),  $\delta$ -cadinene (1.7%),  $\gamma$ -muurolene (1.3%) and  $\alpha$ -selinene (1.3%) were the principal. Eight sesquiterpene alcohols have also been identified with 1-epi-cubenol (2.8%), selin-11-en-4 $\alpha$ -ol (1.8%),  $\alpha$ -muurolol (1.1%) and cubenol (1.04%) being the main components of this fraction.

Moreover, two esters, (E)-methyl cinnamate (0.45%) and geranyl acetate (0.06%), were present, while camphor (0.07%) was the only carbonyl compound identified. The oil analyzed in this study showed many differences in composition from the Arrayan oil obtained from plants growing in Argentina (4). Many components previously found in the Argentina oil, such as verbenol, myrtenal, carvone, elimicine and anethole were not detected in the oil analyzed here, while many sesquiterpene hydrocarbons and alcohols, previously not found, were detected.

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