HS-SPME-GC/MS analysis of volatile secondary metabolites of *Varronia curassavica* Jacq. and *Satureja viminea* L. leaves

Laisha Burgos Díaz[1], Diana Manrique López[1], Jairo René Martínez[1], Dora Gutiérrez Avella[2], Elena E. Stashenko[1*]

[1]Research Center for Chromatography and Mass Spectrometry, CIBIMOL-CENIVAM.
Building 45, Universidad Industrial de Santander, Carrera 27, Calle 9, 680002, Bucaramanga, Colombia.
[2]Faculty of Chemistry, Autonomous University of Queretaro, Avenida Universidad 3000, Coyoacán, Mexico.
*E-mail: elena@tucan.uis.edu.co

INTRODUCTION

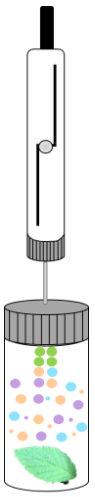
The volatile compounds emitted by aromatic plants have diverse biological functions such as chemical defense against herbivores, pathogens and microorganisms, also as pollinator attractants (Tholl et al., 2006). The aim of this work was to determine the chemical composition of the volatile fractions obtained by headspace solid-phase microextraction (HS-SPME) from leaves of two aromatic species *Varronia curassavica* (Fam. Boraginaceae) and *Satureja viminea* (Fam. Lamiaceae). Both are subshrubs, which grow in subtropical regions. (Gupta, 1995).

Varronia curassavica
Family: Boraginaceae
Nº *Voucher* : UIS 20892

Satureja viminea
Family: Lamiaceae
Nº *Voucher* : COL 566449

EXPERIMENTAL

The plant material was collected in Bucaramanga, Santander, Colombia (N 7°08'442; WO 73° 06'960), through the Contract for access to genetic resources and derived products for bioprospecting purposes N° 270.



HS-SPME (Stashenko et al., 2009)

The fresh leaves of *V. curassavica* (100 mg) and *S. viminea* (1.30 g), separately, were heated (60 °C, 10 min). The fiber was exposed to the vapor phase of the plant material for 30 min and then the volatiles were desorbed in the injection port of a gas chromatograph (250 °C, 15 min).

GC 6890N and MSD-5973 (AT, Palo Alto, CA, U.S.A.)

GC/MS ANALYSIS

Injection: split 1:30 (vol. 1 µL)
GC oven temperature: 50 °C (5 min) at 5 °C/min to 230 °C (30 min)
Carrier gas: helium (1 mL/min, constant flow)

Columns: DB-WAX, 60 m x 0.25 mm (ID), coated with PEG (0.25 µm) and DB-5MS, 60 m x 0.25 mm (ID), coated with 5%-phenyl-polydimethylsiloxane (0.25 µm). **Ionization:** Electron ionization, (EI, 70 eV). **Mass range:** *m/z* 30-350 u.

RESULTS

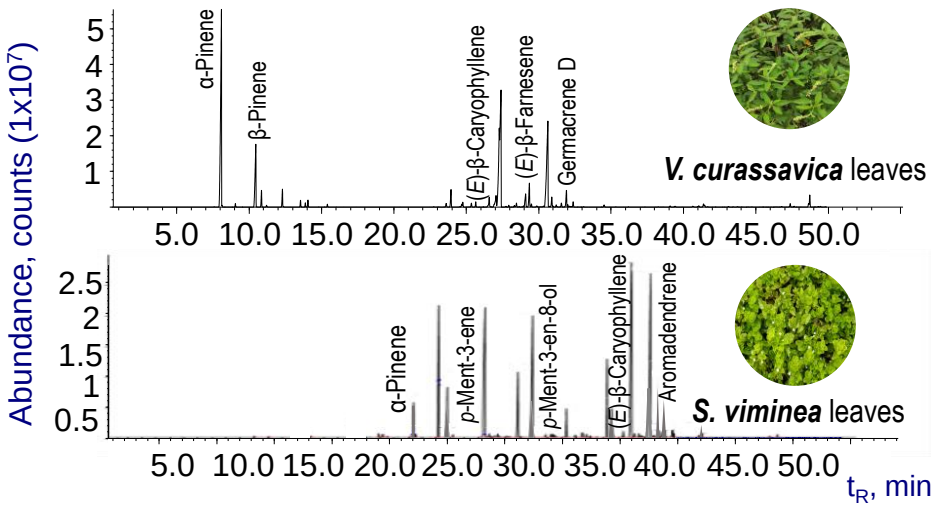


Fig 1. Chromatographic profiles of the **volatile fractions** of *V. curassavica* and *S. viminea* leaves, obtained by HS-SPME/GC/MS. DB-WAX column, 60 m. See peak identification in **Table 1.**

Table 1. Identification by GC/MS of the major compounds isolated by HS-SPME.

Compound*	LRI_{exp}		GC peak area (%, x±s, *n*=3)	
	DB5-MS	DB-WAX	*V. curassavica*	*S. viminea*
α-Pinene[a,b]	934	1024	24 ± 1	0.88 ± 0.17
β-Pinene[a,b]	978	1110	7.7 ± 0.5	0.45 ± 0.82
p-Ment-3-ene[a,b]	1075	1228	N.D.	9.83 ± 0.79
p-Ment-3-en-8-ol[a,b]	1158	1619	N.D.	14.6 ± 0.25
Pulegone[a,b]	1247	1667	N.D.	10.6 ± 0.21
(E)-β-Caryophyllene[a,b]	1424	1595	23 ± 2	18.0 ± 0.80
(E)-β-Farnesene[a,b]	1445	1660	6.6 ± 0.7	N.D.
Aromadendrene[a,b]	1460	1656	0.24 ± 0.41	10.5 ± 0.34
Germacrene D[a,b]	1481	1712	7.1 ± 0.6	3.4 ± 0.20

Identification criteria:
[a]Linear retention indices (LRI) were calculated using the series of *n*-C_6-C_{25} alkanes and comparison with those from databases (Babushok et al., 2009 and Adams, 2017).
[b]Experimental mass spectra (EI, 70 eV), study of fragmentation patterns and comparison with the mass spectra from the databases (Adams, 2017; NIST, 2014 and Wiley, 2008).

CONCLUSIONS

The fragrances of the leaves of two species studied had in common *(E)*-β-caryophyllene (23±2% for *V. curassavica* and 18.0±0.80% for *S. viminea*). This compound plays an important role in the pharmaceutical industry as a non-steroidal anti-inflammatory and in the flavour and fragrance industry. *V. curassavica* contained α-pinene (24±1%), β-pinene (7.7±0.5%) and germacrene D (7.1±0.6%) among other compounds; while *S. viminea*, *p*-ment-3-en-8-ol (14.6±0.25%), pulegone (10.6±0.21%) and aromadendrene (10.5±0.34%).

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