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Comparative study of the chemical composition of the essential oil of the *Lasiocephalus longepenicillatus* (Schultz-Bip. ex Sandw.) Cuatrec. (*Senecio longepenicillatus*) in two seasons of the year

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Abstract

The essential oil of the aerial parts of *Lasiocephalus longepenicillatus*, was analyzed by CG/EM. A quantitative difference on the chemical composition of the oil was observed between the two botanical samples collected in two different climatic seasons, the dry and rainy seasons. The main components reported for the dry season were germacrene-D (37.79%); α-pinene (26.36%) and α-humulene (12.29%), while the major components observed in the rainy season were α-humulene (33.54%), α- pinene (19.33%) and germacrene-D (17.82%)

Key words: Asteraceae; essential oil; germacrene-D; *Lasiocephalus longepenicillatus;* α-humulene; α-pinene.

Estudio comparativo de la composición química del aceite esencial del *Lasiocephalus longepenicillatus* (Schultz-Bip. ex Sandw.) Cuatrec. (*Senecio longepenicillatus*) en dos estaciones del año

Resumen

El aceite esencial de las partes aéreas del *Lasiocephalus longepenicillatus*, fue analizado por CG/EM. Una diferencia cuantitativa en la composición química de los aceites fue observada entre las muestras botánicas recolectadas en las dos estaciones climáticas del trópico, la estación seca y la estación lluviosa. Los componentes mayoritarios reportados para el aceite obtenido en la estación seca fueron D- germacreno (37,79%); α-pineno (26,36%), α-humuleno (12,29%), mientras que los observados como mayoritarios para el aceite obtenido en la estación lluviosa fueron α-humuleno (33,54%), α-pineno (19,33%) y D- germacreno (17,82%).

Palabras clave: Aceite esencial; Asteraceae; D-germacreno; *Lasiocephalus longepenicillatus*; α-humuleno; α-pineno.

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Introduction

The genus *Lasiocephalus* (Asteraceae) comprises about 27 species (1) that are distributed all around the mountain area of the Southamerica Andes and it grows between 3500-4800 m above the sea level. In the Venezuelan Andes four species of this genus have been reported (2) *Lasiocephalus cuencanus* (Hieron) Cuatrec., *L. doryphyllus* (Cuatrec.) Cuatec., *L. patens* (Kunth) Cuatrec. y *L. longepenicillatus* (Schultz-Bip. ex Sandw.) Cuatrec. (2). *Lasiocephalus longepenicillatus* is an annual plant of 50-60 cm of height approximately (3). It grows wildly and it is used by the local people as an infusion to treat bronchial diseases. The species *Lasiocephalus ovatus*, is used in Colombia in the folk medicine as vaginal wash and to regulate the vaginal flux while in Ecuador is used as diuretic, depurative and to treat syphilis (4). According to the bibliographic references available, there are only few reports regarding the chemical composition of the essential oil of *Lasiocephalus* species. This article reports for the first time the chemical composition of the essential oil of *L. longepenicillatus*. In addition the differences between the chemical composition of this species collected from the same location at two different seasons of the year are exposed.

Materials and Methods

Plant material

The aerial parts of *L. longepenicillatus* were collected in January (Sample A, dry season) and July (Sample B, rainy season) 2004 from Piñango, Mérida State, Venezuela. Identification of this species was confirmed by lecturer Pablo Meléndez. A voucher specimen (MER04) was deposited in the Herbarium of the Faculty of Pharmacy, University of Los Andes.

Oil isolation

Plant materials (1.5 kg each) were subjected to water distillation in a Clevenger-type apparatus for 4 h and the oils obtained were dried over anhydrous sodium sulphate. The yields were calculated based on the dry weight of the plant materials.

Gas Chromatography/Mass Spectrometry (GC/MS) analysis

GC/MS analysis was performed using a Hewlett Packard HP 6890 series GC system, equipped with a HP 6890 series injector using a HP-5MS fused-silica column (30 m × 0.25 mm, film thickness 0.25 μm, Hewlett Packard), coupled to a Hewlett Packard HP 5973 mass selective detector. Samples dissolved in diethyl ether, were injected in split mode ratio 100:1 using helium as carrier gas. Temperature programming was from 60°C-260°C at 4°C/min. Identification of the chemical components was based on their GC retention times and by comparison of their mass spectral data with the existing Wiley library system 6th edition.

Results and Discussion

The aerial parts of *L. longepenicillatus* collected in January 2004 (dry season) yielded 1 mL oil (0.06%) and the same species collected at the same location in July 2004 (rainy season) yielded 0.8 mL oil (0.05%). GC/MS analyses performed on the two oils showed the presence of 8 and 10 components, which represents 88.8% and 76.9% of the total composition of the oil, respectively. A list of identified components, along with their percentages of the total oil is showed in Table I. The main compounds of the oil from the January 2004 collection were germacrene-D (37.79%), α- pinene (26.36%) and α-humulene (12.29%), while in the oil of the July 2004 collection, the major components were α-humulene (33.54%), α-pinene (19.33%) and germacrene-D (17.82%).

Components such as β-patchoulene, β-caryophyllene and humulene were observed in the essential oil of *Lasiocephalus ovatus* (5), the only essential oil studied on this genus. On the other hand α-pinene, myrce-

Tabla 1
Composition of the essential oil of *Lasiocephalus longepenicillatus* collected in two seasons of the year

Compound	Sample A (%)*	Sample B (%)**	Rt (min)***
α-pinene	26.36	19.33	5.07
myrcene	0.85	-	6.31
n-decanal	-	1.13	12.67
1-tridecene	-	0.91	15.42
carvacrol	1.15	-	15.43
(-)-α-gurjunene	-	1.30	17.13
β-bourbonene	-	1.55	18.45
β-caryophyllene	1.35	3.14	19.53
β-patchoulene	-	1.48	20.30
α-humulene	12.29	33.54	20.57
γg-curcumene	1.93	-	21.33
germacrene D	37.79	17.82	21.42
trans-β-farnesene	5.05	6.53	21.50

*Sample A collected in January 2004, dry season. **Sample B collected in July 2004, rainy season. ***Rt. Retention time in minutes.

ne, *n*-decanal, 1-tridecene, carvacrol, (-)-α--gurjuneno, β-bourbonene, γg-curcumene, germecrene D and *trans*-β-farnesene were for the first time reported in these genus, whereas in the essential oil of *L. longepenicillatus*.

Conclusions

The results achieved in this investigation have demonstrated that exist an important difference regarding the proportions of the main components in the two oils collected in the two different climatic seasons from the same location. The sesquiterpenes were the main components in both collections (55.5%, sample A) and (53.8%, sample B) while the monoterpenes were the minor component (33.3%, sample A) and (23.0%, sample B).

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