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Fatty acid composition of *Brunfelsia uniflora* (*Solanaceae*) seed oil

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RESUMEN

Composición de ácidos grasos del aceite seminal de *Brunfelsia uniflora (Solanaceae).*

Las semillas de *Brunfelsia uniflora* contuvieron 30.5% de aceite. El aceite fue analizado y los componentes fueron indentificados por espectroscopía de infrarrojo (IR), cromatografía gaseosa-espectrometría de masa (CG-EM) y métodos químicos. Predominó el ácido linoleico (75.5%) seguido por el oleico (11.8%) y el palmítico (7.25%). El ácido ricinoleico estuvo presente en pequeñas cantidades (0.52%).

PALABRAS-CLAVE: Aceite de semilla — Acido graso (composición) — Brunfelsia uniflora (Solanaceae).

SUMMARY

Fatty acid composition of *Brunfelsia uniflora (Solanaceae)* seed oil.

The seeds of *Brunfelsia uniflora* contained 30.5% of oil. The oil was analysed and components were identified by infrared (IR), gas chromatography-mass spectrometry (GC-MS) and chemical methods. Linoleic acid predominated (75.5%) followed by oleic (11.8%) and palmitic (7.25%) acids. Ricinoleic acid was present in small quantities (0.52%).

KEY-WORDS: Brunfelsia uniflora (Solanaceae) — Fatty acid (composition) — Seed oil.

1. INTRODUCTION

Brunfelsia uniflora (Pohl) Don, belonging to *Salpiglossideae* tribe of the *Solanaceae* family (Hunziker, 1979), is cultivated as an ornamental plant. In a recent work (Daulatabad and Hosamani, 1991), *B. americana* was found to contain ricinoleic acid together with cyclopropenoid fatty acids.

To date, there are no studies about *B. uniflora* seed oil. Therefore, as a part of our search for new sources of oil, an investigation was carried out to determine its fatty acid composition.

2. MATERIAL AND METHODS

Seeds of *B. uniflora* were collected from different places in Argentina: Córdoba province: surrounding Córdoba city (1 BU); Alta Gracia (CORD 154); Agua de Oro (CORD 153); Santa Fe province: Las Rosas (CORD 151); Tucumán province: El Cadillal (CORD 152). Voucher specimens are deposited in the Herbarium of the Botanical Museum of Córdoba (CORD), Argentina.

Seed were milled and extracted with n-hexane in a Soxhlet apparatus. The extracted oil was dried over anhydrous sodium sulphate and the solvent removed under reduced pressure in a rotary film evaporator. The analytical characteristics of the oils were determined according to AOAC (1980) methods. The infrared (IR) spectra were obtained in KBr discs.

Preparation of fatty acid methyl esters (FAME): total fatty acids were converted to methyl esters by transesterification with absolute methanol containing 0.5 N sodium metoxide (Pelick and Mahadevan, 1975) and analised by gas-liquid chromatography (GLC) with a fused silica capillary column AT-WAX (30m x 0.25 mm), nitrogen carrier gas (10 ml/min), and a temperature gradient of 4°C/min from 180 to 240°C. Injector and detector temperatures were 250°C; a FID was used. The GLC analyses was carried out with *Ricinus communis* esters as reference standard for ricinoleic acid. Fatty acids were also analysed by gas chromatography-mass spectrometry (GC-MS) using a SE-54 column (15m x 0.25mm), from 80 to 290°C (8°C/min); carrier gas nitrogen at 20 ml/min; injector and detector temperatures 250°C; ionizing voltage 70 eV; trap current 60 μA; accelerated high voltage 3500 V. The identification of the compounds was carried out by a built-in NIST Peak Matching Library Search System, and by comparison of the retention times with those of reference compounds.

3. RESULTS AND DISCUSSION

The oil content of seeds was high (30.5%) similar to that observed in *B. americana*. The purified lipids had the following physicochemical characteristics: refractive index, 1.46; relative density, 0.94; unsaponifiable matter, 2.05; saponification value, 193.2. The iodine value was 149.8; hence, these oils are placed into the semidrying class (Table I).

The oils did not respond to picric-acid (Fioriti *et al.*, 1966) thin-layer chromatography (TLC) and Halphen (AOAC, 1980) tests (Table I), indicating the absence of epoxy and cyclopropenoid fatty acids, respectively.

Table I
Analytical data of *Brunfelsia uniflora* seed oil

Oil content (%)	30.5±1.1
Refractive index (25°C)	1.46
Relative density (25°C)	0.94±0.01
Unsaponifiable matter (%)	2.05±0.08
Saponification value	193.2±1.1
Iodine value	149.8±2.1
Halphen test	–[a]
Picric acid test	–

[a] Indicates negative response to the test. Results are means (standard desviation) of five determinations.

Table II
Fatty acid composition of *Brunfelsia uniflora* seed oil

Fatty acid	Percentage
Myristic	tr
Palmitic	7.25±0.2
Palmitoleic	0.55±0.02
Stearic	2.94±0.3
Oleic	11.8±0.4
Linoleic	75.5±0.8
Linolenic	0.46±0.02
Arachidic	tr
Behenic	0.54±0.9
Lignoceric	0.29±0.1
Ricinoleic	0.52±0.3

tr, traces (less than 0.1%).
Results are means (standard desviation) of five determinations.

The IR spectra from the extracted oils and the FAME had a strong absorption band at 3447 cm^{-1}, indicating the presence of hydroxyl functional group. The fragmentation pattern of the mass spectra of the hydroxy fatty acid was basically similar to that observed in castor oil.

Thus, the hydroxy fatty acid was characterized as 12-hydroxy-cis-octadec-9-enoic (ricinoleic) acid.

Brunfelsia uniflora seed oil thus contains a small amount of ricinoleic acid (0.52%). The predominant fatty acids were palmitic (7.25%), oleic (11.8%) and linoleic (75.5%) acids. Besides these constituents, myristic, palmitoleic, stearic, linolenic, arachidic, behenic and lignoceric acids were also detected in small quantities (Table II).

Gas chromatography analysis of the FAME showed a pattern very different to that observed in the oil of *B. americana.* Fatty acid profiles revealed that the distribution of major acids is typical for *Solanaceae,* whereas minor components varied considerably. Some fatty acids (palmitoleic, linolenic, arachidic, behenic and lignoceric) were present in *B. uniflora* and absent in *B. americana.* On the contrary, *B. uniflora* seed oil lacked cyclopropenoid fatty acids (malvalic and sterculic) found in *B. americana.* These species are closely related from a botanical point of view, however they are not completely related by their oil chemistry.

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