

✿ Occurrence of Punicic Acid in *Trichosanthes bracteata* and *Trichosanthes nervifolia* Seed Oils

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The seeds of *Trichosanthes bracteata* and *Trichosanthes nervifolia* (Cucurbitaceae) contained 31.6 and 27.9% oil and 18.8 and 16.7% protein, respectively. Spectral, chromatographic and chemical analyses showed the punicic acid to occur to an extent of 41.8% in *T. bracteata* and 51.7% in *T. nervifolia* seed oils.

As a part of our search for new sources of oils, the seeds of *Trichosanthes bracteata* Voigt. syn. *T. palmata* Roxb. (Cucurbitaceae), a large, perennial, dioecious climber (1), and *Trichosanthes nervifolia* Linn. (Cucurbitaceae), a twining, dioecious perennial (2), have been analyzed for characteristics and fatty acid composition.

EXPERIMENTAL METHODS

AOCS methods were used to determine oil and protein contents (3). The oils were examined qualitatively for the presence of hydroxy, epoxy and cyclopropene fatty acids by the sulfuric acid turbidity (4), picric acid (5) and Halphen (3) tests, as well as by ultraviolet (UV), infrared (IR) and ¹H and ¹³C-NMR spectroscopy. The oils were converted to methyl esters with methanolic sodium methoxide at room temperature (6) and analyzed by gas liquid chromatography (GLC) using both SE-30 and Silar-10C columns at 200 C. The procedural details are described elsewhere (7,8). The conjugated trienoate was isolated from the total methyl esters by TLC using n-hexane/diethyl ether (93:7, v/v). The ester was hydrogenated using Pd/C in methanol at room temperature and analyzed by GLC. The *cis*- and *trans*-monoene esters, obtained by partial reduction with hydrazine hydrate (9) and separation on 0.8-mm layers of Silica Gel G containing 10% silver nitrate using benzene/petroleum ether (9:1, v/v), were analyzed as bromomethoxy derivatives for double bond positions by mass spectrometry (10).

RESULTS AND DISCUSSION

The characteristics and fatty acid compositions are given in Table 1. The qualitative tests indicated the absence of hydroxy, epoxy and cyclopropene fatty acids in the seed oils. The UV spectra of both the oils in cyclohexane showed maxima at 265, 275 and 287 nm, indicating *cis*, *trans*, *cis* configuration (11). The IR spectra showed bands at 982 and 932 cm⁻¹, indicating conjugated *trans* double bonds (11). The ¹H-NMR spectra showed the following signals (τ): 9.13 (terminal CH₃); 8.7 [-(CH₂)_n-]; 7.7 (-CH₂-COOCH₃); 7.29 (=CH-CH₂-CH=); 5.8 (CH₂ O- of glyceride); 4.65 (CHO- of glyceride) and 3.7 characteristic of (-CH=CH-CH=CH-CH=

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TABLE 1.

Characteristics of *T. bracteata* and *T. nervifolia* Seeds and Fatty Acid Compositions of the Seed Oils

	<i>T. bracteata</i> ^c	<i>T. nervifolia</i>
Wt of 100 seeds (g)	6.1	8.0
Volume of 100 seeds (ml) ^a	6.5	9.8
Oil (%) ^b	31.6	27.9
Protein (%) ^b	18.8	16.7
Fatty acid (wt%)		
Palmitic	13.1	5.6
Stearic	5.3	7.1
Oleic	8.6	17.5
Linoleic	30.0	16.8
Arachidic	0.0	1.3
Punicic	41.8	51.7

^aBy displacement in water.

^bDry basis.

^cAlso present in *T. bracteata* seed oil were 14:0, 17:0, 18:3, 20:1 and 22:0 (0.1-0.4%).

CH-) (12). The chemical shifts of ¹³C-NMR spectra were similar to those reported for *Fevillea trilobata* (13), *T. anguina* and *Diplocyclos palmatus* (8) seed oils, which are known to contain the same fatty acid component, namely punicic acid. The mass spectra of the isomeric methoxylated derivatives of *trans* monoenes showed peaks at m/e 129 and 229 due to primary fragments and peaks at m/e 97 and 197 due to the fragments arising by the loss of methanol from the primary fragments. These fragments were similar to those expected from the *trans*-11-octadecenoic ester. The mass spectra of methoxy derivatives of *cis*-monoenes showed peaks at m/e 157, 201, 101 and 257 due to the primary fragments from which loss of methanol gave rise to peaks at m/e 125, 169, 69 and 225. This fragmentation pattern resembled that expected from *cis*-9 and *cis*-13 octadecenoic esters. The conjugated trienoate after hydrogenation was found by GLC to have 18 carbons in the carbon-chain. These data confirmed that the seed oils of *T. bracteata* and *T. nervifolia* contain 41.8 and 51.7% of punicic acid, respectively.

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