Isoricinoleic Acid in *Annona squamosa* Seed Oil

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ABSTRACT

Annona squamosa seed was found to contain 23% oil, of which 9.8% was a hydroxy acid. After isolation from the other acids using silica gel column chromatography, it was identified as isoricinoleic acid. The fatty acid composition and analytical data on the oil are given.

INTRODUCTION

Annona squamosa Linn. (Annonaceae) is a shrub or small tree, nearly evergreen and native to tropical America and the West Indies. It is widely cultivated for its fruit throughout India.

Many reports have appeared about isoricinoleic acid, the occurrence of which has generally been noted in the seed glycerides of Apoyanaceae (1). This paper deals with the fatty acid composition of *A. squamosa* seed oil and describes for the first time the presence of isoricinoleic acid in the Annonaceae family.

EXPERIMENTAL

The chromatographic and spectroscopic methods used have been described earlier (2). Analytical values of oil and seeds were determined by AOCS (3) procedures and are given in Table I. Methyl esters were silylated with hexamethyldisilazane and trimethyl chlorosilane (4). Deoxygenation and chromic acid oxidation of the saturated hydroxy acid and permagnate-periodate cleavage of the original hydroxy acid were carried out according to published procedures (5-7). Hydroxy acid was acetylated with Ac_2O-pyridine (8).

TABLE I

Analytical Data on *A. squamosa* Seeds and Oil

Oil, %		23.0
Moisture, %		5.1
Unsaponifiable, %		1.6
Iodine value		58.8
Saponification value		191.8
Refractive index		1.4826
Fatty acid composition (wt. %)		
Myristic	12:0	1.5
Palmitic	16:0	25.1
Palmitoleic	16:1	3.1
Stearic	18:0	9.3
Oleic	18:1	37.0
Linoleic	18:2	10.9
Arachidic	20:0	3.3
Isoricinoleic	–	9.8

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RESULTS AND DISCUSSION

The oil was obtained from *A. squamosa* seeds in 23% yield. Preliminary screening of oil revealed the presence of oxygenated acid (2). The pure hydroxy acid was isolated from total mixed fatty acids using silica gel column chromatography. Its R_f, IR, NMR and MS characteristics were found to be identical to those of isoricinoleic acid isolated from *Wrightia tinctoria* seed oil (9). The isolated hydroxy acid found as mono-acetate and the mass spectrum of trimethylsilyl (TMS) derivative of its methyl ester was also identical to the TMS derivative of authentic methyl isoricinoleate.

The catalytic hydrogenation (Pd/C) of hydroxy acid gave saturated 9-hydroxyoctadecanoic acid (m.p. and mixed m.p. 81-82 C). Reductive deoxygenation (5) of 9-hydroxyoctadecanoic acid yielded stearic acid as identified by GLC and Co-TLC. Chromic acid oxidation (6) of this acid afforded 9-oxooctadecanoic acid (m.p. and mixed m.p. 79-80 C). Permagnate-periodate cleavage (7) of hydroxy acid afforded hexanoic acid and γ-lactone (IR: 1775 cm^{-1}), thus confirming the position of double bond at C12 and hydroxyl group at C9. Thus, on the basis of these physical and chemical data, the hydroxy acid isolated from *A. squamosa* seed oil was characterized as 9-hydroxy-*cis*-12-octadecenoic (isoricinoleic) acid.

Quantitation of the isoricinoleic and other usual fatty acids was made by GLC separation of the methyl ester as their TMS derivative by comparing their retention time with those of the corresponding reference standards (Table I).

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