

## ***Litchi sinensis* Seed Oil: A Source of Dihydrosterculic Acid and *cis*-9,10-Methylenehexadecanoic Acid**

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**Summary** Lychee seed oil (*Litchi sinensis*, Fam. Sapindaceae) contains 41% of dihydrosterculic acid (*cis*-9,10-methyleneoctadecanoic acid), and 8% of *cis*-9,10-methylenehexadecanoic acid, the highest concentration of cyclopropanoid acids ever recorded in a seed oil.

EXTRACTION of the lychee seed (*Litchi sinensis*, Fam. Sapindaceae) with light petroleum furnished a yellow oil (0.3%). G.l.c. analysis of the methyl esters derived from this seed oil showed two unusual peaks with ECL<sup>1</sup> values of 16.9 (8.1%) and 18.9 (41.6%) on OV-101; and 17.5 (7.9%) and 19.5 (44.8%) on Silar 10C stationary phases. Silver ion t.l.c. separation showed these compounds to be fully saturated, while the <sup>1</sup>H n.m.r. spectrum indicated the presence of a *cis*-cyclopropane structure [ $\delta$ (CDCl<sub>3</sub>) + 0.64 and -0.26 from Me<sub>4</sub>Si]. Treatment of a purified fraction (by urea fractionation) of the cyclopropanoid esters with 50% boron trifluoride-methanol complex gave methoxylated ester derivatives.<sup>2</sup> Preparative g.l.c. separation of the methoxylated esters (ECL: 20.2 and 22.2 on Silar 10C; 18.5 and 20.5 on SE-30) followed by mass spectral analysis of each component characterised the major component as *cis*-9,10-methyleneoctadecanoic acid (dihydrosterculic acid) and the minor component as *cis*-9,10-methylenehexadecanoic acid.

Other fatty acid components in this seed oil were: palmitic acid (15%), stearic acid (7%), oleic acid (18%), linoleic acid (3%) and linolenic acid (8%).

Cyclopropane acids are more commonly found in microorganisms<sup>3</sup> than in plant sources. S-Adenosylmethionine has been shown to effect the formation of the cyclopropane system from unsaturated fatty acid precursors.<sup>4</sup> The function of these acids remains a matter of speculation and has been postulated to protect the phospholipids at a time when resynthesis would be difficult owing to sluggish metabolism.<sup>5</sup> Another view proposed is that the cyclopropane ring may be formed to preserve the configuration around the double bond rendering the hydrocarbon chain less susceptible to oxidation than is the double bond.<sup>6</sup>

Dihydrosterculic acid was found in 17% yield in the seed oil of *Euphoria longana*, fam. Sapindaceae,<sup>7</sup> but *Litchi sinensis* seed oil is a more useful source of this acid.

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<sup>1</sup> T. K. Miwa, K. L. Mikolajczak, F. R. Earle, and I. A. Wolff, *Analyt. Chem.*, 1980, **32**, 1739; ECL = equivalent chain length.

<sup>2</sup> D. E. Minnikin, *Lipids*, 1972, **7**, 398.

<sup>3</sup> W. W. Christie, 'Topics in Lipid Chemistry', ed. F. D. Gunstone, Logos Press, London, 1970, vol. 1, p. 1.

<sup>4</sup> W. M. O'Leary, *J. Bacteriol.*, 1962, **84**, 967.

<sup>5</sup> J. E. Cronan, *J. Bacteriol.*, 1968, **95**, 2054.

<sup>6</sup> J. H. Law, H. Zalkin, and T. Kaneshiro, *Biochim. Biophys. Acta*, 1963, **70**, 143.

<sup>7</sup> R. Kleiman, F. R. Earle, and I. A. Wolff, *Lipids*, 1969, **4**, 317.