

## Flavonoids of *Murraya paniculata* (Linn.) Jack

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(Date of receipt : 18 December, 1979)

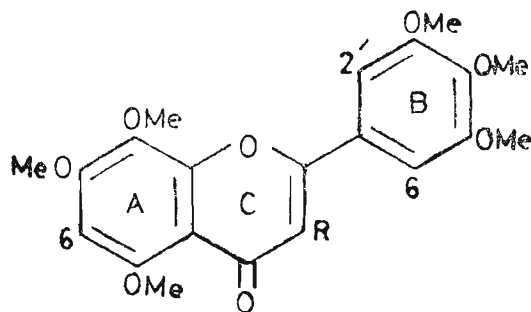
(Date of acceptance : 20 June, 1980)

**Abstract :** The Sri Lankan *Murraya paniculata* has been examined for flavones and found to contain 3', 4', 5, 5', 7, 8 - hexamethoxyflavone and 3, 3', 4', 5, 5', 7, 8 - heptamethoxyflavone.

### 1. Introduction

*Murraya* is a genus of the family Rutaceae native to south-east Asia. *Murraya koenigii* Spreng (Sinh. Karapincha) has been investigated intensively in recent years and as many as thirteen carbazole alkaloids have been isolated from the leaf, bark and root.<sup>2,3,8,10,12</sup> The closely related flowering plant *Murraya paniculata* (Linn.) Jack (Sinh. Etteriya) has yielded several coumarins<sup>4,13,14</sup> and a permethylated flavone 3, 3', 4', 5, 5', 6, 7 - heptamethoxy flavone.<sup>5</sup>

The local variety of *M. paniculata* has been examined for flavonoid constituents and found to contain two flavones, 3', 4', 5, 5', 7, 8 - hexamethoxyflavone (1) and 3, 3', 4', 5, 5', 7, 8 - heptamethoxyflavone (2).



1 R = H

2 R = OMe

Figure 1

The residue obtained from the methanolic extract of the leaves was extracted with HCl. The acid extract was basified and extracted with chloroform. The residue from the extract was dissolved in benzene and chromatographed on alumina. The fraction that was eluted with benzene-chloroform (20:3) was a solid which was found to contain two components. These were separated by P. L. C. The compound with the lower Rf was a pale yellow solid m.p. 196°. A positive Shinoda reaction and a u.v. spectrum of the compound indicated it to be a flavonoid. A high resolution mass spectrum of the compound showed that the putative molecular ion, m/e 402 had a molecular formula  $C_{21}H_{22}O_8$ . The  $^1H$  n.m.r. spectrum of the compound in  $CDCl_3$  was particularly useful in elucidating a number of structural features. The multiplet at  $\delta$  3.90 indicated the presence of six aromatic methoxyl groups. The aromatic region of the spectrum indicated the presence of four aromatic protons. Two of these protons are located in the B ring as indicated by the presence of a two proton singlet at  $\delta$  7.15. This is a characteristic feature<sup>7</sup> of a 3', 4', 5' trioxygenated flavone where the 2' and 6' protons are equivalent. The other two aromatic protons appear as two singlets at  $\delta$  6.60 and  $\delta$  6.43 which can be attributed to the 3 proton of ring C and the 6 proton of ring A. The correctness of these assignments follows from data available for other flavones.<sup>6,11</sup> The compound of lower Rf therefore has the structure 3', 4', 5, 5', 7, 8 - hexamethoxyflavone (1).

The compound of higher Rf, a white crystalline solid m.p. 192°-3° also gave a positive Shinoda reaction and has a u. v. spectrum indicative of a flavonoid. A high resolution mass spectrum of the compound showed that the molecular ion at m/e 432 had a probable formula  $C_{22}H_{24}O_9$ . The  $^1H$  n.m.r. spectrum exhibited a two proton singlet at  $\delta$  7.56 attributable to the 2' H and 6' H protons and singlet at  $\delta$  6.44 attributable to the proton at C-6. A multiplet at  $\delta$  4.0 is attributable to seven methoxy groups. The compound therefore has the structure 3, 3', 4', 5, 5', 7, 8 heptamethoxyflavone. The compound was identical (mp. mixed mp. tlc) with an authentic specimen provided by Professor J. R. Lewis and has been isolated previously<sup>9</sup> from the leaves of *Murraya exotica*.

## 2. Experimental

$^1H$  n.m.r. spectra were determined on a Jeol PS 100 spectrometer. Chemical shifts were reported in p.p.m. relative to T.M.S. ( $\delta=0$ ). Mass spectra were recorded with a Varian CH5 instrument. Plant material was identified by Professor B. A. Abeywickrama, University of Sri Lanka, and a herbarium specimen is deposited in the Botany Department.

### 2.1 Isolation of 3', 4', 5, 5', 7, 8-hexamethoxyflavone (1) and 3, 3', 4', 5, 5', 7, 8-heptamethoxyflavone (2)

Powdered, air-dried leaves (1kg) collected in Colombo were defatted with light petroleum (b.p. 62° - 82°) and then extracted exhaustively with methanol. The methanolic extract was evaporated to dryness and the residue extracted repeatedly

with 10% HCl. The combined extracts were basified with ammonia and extracted with chloroform. This extract was dried, evaporated to dryness and the residue was dissolved in benzene and chromatographed on neutral alumina using benzene containing increasing amounts of chloroform as eluent. The fractions eluted with benzene-chloroform (20:3) crystallised on standing and the solid was found to be a mixture of two compounds which were separated by P.L.C. (Silica, ethanol : chloroform (1:3)). The compound with lower Rf, 3', 4', 5, 5', 7, 8 - hexamethoxyflavone crystallised from benzene - petrol as fine, pale yellow needles (250 mg), m.p. 196° (lit<sup>1</sup> 196-7°); u.v.  $\lambda_{\max}$  (MeOH) 327, 310 (sh), 271, 262 (sh) nm;  $\epsilon$  16,100 : 14,500; 17,900; 16,400 respectively; m.s. m/e 402, 387, 373, 359, 358, 357, 195, 167 and 130; high resolution m.s. m/e 402, 1299 ( $C_{21}H_{22}O_8$  requires 402. 1315); <sup>1</sup>Hn.m.r (CDCl<sub>3</sub>) : 7.15 (2H, s, 2'H, 6'H): 6.60 (1H, s, 3H): 6.43 (1H, s, 6H); 3.90 (18H,m, 6x OCH<sub>3</sub>).

The compound of higher Rf, 3, 3', 4', 5, 5', 7, 8 - heptamethoxyflavone, was crystallised from chloroform - pet. ether as a white crystalline solid (100mg), m.p. 192° - 193° (lit<sup>6</sup> m.p. 190°); u.v.  $\lambda_{\max}$  (MeOH) 348, 310, 272, 262 nm;  $\epsilon$  23,300; 20,700; 29,100; 27,650 respectively; m.s. m/e 432, 417, 402 and 387; high resolution m.s. m/e 432. 1385 ( $C_{22}H_{24}O_9$  requires 432. 142). <sup>1</sup>Hn.m.r. (CDCl<sub>3</sub>): 7.56 (2H, s, 2H', 6H') ; 6.44 (1H, s, 6H); 4.0 (21H, m, 7 x OCH<sub>3</sub>).

### Acknowledgements

The authors thank Professor J. R. Lewis for a sample of (2), Dr. F. A. Mellon for mass spectra and P.E. Meadows for n.m.r. spectra.

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