

Coumarins from heartwood of *Atalantia monophylla*

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Manuscript received 06 February 2010, revised 02 July 2010, accepted 07 July 2010

Abstract : Two furocoumarins viz. pimpinellin, isopimpinellin and a C-prenylcoumarin coumurrayin have been identified from the heartwood of *Atalantia monophylla*. The ¹³C NMR of coumurrayin is reported.

Keywords : *Atalantia monophylla*, coumarins.

Introduction

Atalantia monophylla DC (Telugu : Adavinimma; Sanskrit : atavijambira) is a small treelet found throughout India, Sri Lanka and South East Asia. The berries of this plant yield oil, which is used for paralytic limbs and chronic rheumatism. Root is antispasmodic and also used in snakebite. Decoction of the leaves applied in itch and other skin complaints¹. The oil showed fungicidal activity against saprophytic fungi². Leaves showed antiviral activity³ and antifeedant activity⁴. Roots showed anti-allergic activity⁵. Several acridone alkaloids^{5,6}, coumarins^{5,6}, lemonoids⁶, terpinoids⁶, steroids⁶, carpachromene⁶ and pyropheophorbide³ were reported from different parts of this plant.

In this communication we report the isolation and identification of the two furocoumarins and one C-prenylcoumarin from the petroleum ether extract of heartwood of *A. monophylla*.

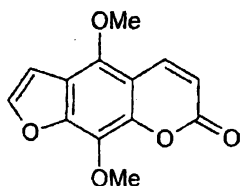
Compound 1, m.p. 148 °C, C₁₃H₁₀O₅ (M⁺ 246) did not respond to any usual phytochemical tests. IR and UV spectra indicated the presence of furocoumarin skeleton further EIMS and ¹H NMR confirmed the compound is isopimpinellin⁷.

Compound 2, m.p. 157 °C, C₁₆H₁₈O₄ (M⁺ 274) also did not respond to any usual phytochemical tests. IR and UV spectra indicated the coumarin skeleton. EIMS and ¹H NMR further confirmed the presence of C-prenyl moiety in the skeleton and confirmed it as coumurrayin⁸. It is the first report of isolation of coumurrayin from *A. monophylla*, and rare report from the nature⁹. C-Prenylcoumarins are precursors for furocoumarins¹⁰.

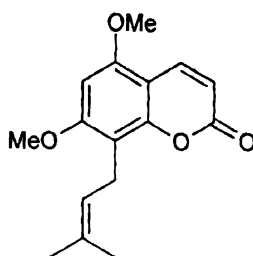
Compound 3, m.p. 118 °C, C₁₃H₁₀O₈ (M⁺ 246). The physical, UV, IR, EIMS and ¹H NMR data are identical to those reported for pimpinellin¹¹. It is the first report of isolation of pimpinellin and isopimpinellin from the heart wood of *A. monophylla*.

Experimental

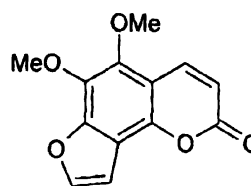
All the m.p.s were uncorrected. The IR spectra and UV were recorded on Perkin-Elmer (Infrared model 337) and Shimadzu (UV-Vis 1601) spectrophotometers respectively. The ¹H NMR spectra were recorded operating at 200 MHz on Varian Gemini spectrophotometer using TMS as internal standard. ¹³C NMR spectrum was recorded operating at 75.47 MHz on Bruker AM 300L instrument. Mass spectra were recorded at 70 eV on VG micro mass 7070-H instrument by direct inlet method.



1



2



3

A. monophylla heart wood was procured from Mannanoor forest, Mahaboob Nagar district, Andhra Pradesh, India during February and identified by Dr. Ramachandra Chari, Department of Botany, Osmania University where the voucher specimen was deposited.

Shade dried and coarsely powdered heart wood (2 kg) was exhaustively extracted with petroleum ether (60–80°), chloroform, and methanol in a Soxhlet extractor successively. The petroleum ether extract yielded as dark brown semi solid (20 g). The solid was charged over the silica gel (finer than 200 mesh) and chromatographed using petroleum ether (60–80°), benzene, chloroform, ethyl acetate and methanol as eluates using different ratios of 200 ml each as eluant.

Compound 1, benzene (58–62) fractions yielded isopimpinellin (1)⁷ (50 mg) EIMS m/z (%) M^+ 246 (80%), 231 (100%), 203 (18%), 188 (20%), 160 (22%); ^1H NMR δ ppm (CDCl_3): 4.20 (6H, s, $2 \times -\text{OCH}_3$), 6.30 (1H, d, J 9.5 Hz, H-6), 7.00 (1H, d, J 2.5 Hz, H-3), 7.65 (1H, d, J 2.5 Hz, H-2), 8.15 (1H, d, J 9.5 Hz, H-5).

Compound 2, chloroform-ethyl acetate 1 : 1 (v/v) (132–137) fractions yielded coumurrayin (2)⁸ (60 mg) EIMS m/z (%) M^+ 274 (70%), 259 (100%), 231 (15%), 219 (10%), 206 (10%); ^1H NMR δ ppm (CDCl_3): 1.82 (3H, d, J 1 Hz, H-5'), 1.95 (3H, d, J 1 Hz, H-4'), 3.40 (2H, d, J 2.5 Hz, H-1'), 3.95 (6H, s, $2 \times -\text{OCH}_3$), 5.21 (1H, t, J 6, 1 Hz, H-2'), 6.15 (1H, d, J 9.5 Hz, H-3), 6.31 (1H, s, H-6), 8.00 (1H, d, J 9.5 Hz, H-4); ^{13}C NMR δ ppm (CDCl_3): 160.92 (C-2), 110.65 (C-3), 138.57 (C-4), 155.26 (C-5), 90.59 (C-6), 161.41 (C-7), 110.32 (C-8), 153.58 (C-9), 103.83 (C-10), 25.60 (C-1'), 121.90 (C-2'), 131.04 (C-3'), 21.36 (C-4'), 17.74 (C-5'), 55.86 and 55.95 ($2 \times -\text{OCH}_3$).

Compound 3, chloroform-ethyl acetate 1 : 4 (v/v) (164–

169) fractions yielded pimpinellin (3)⁹ (50 mg) EIMS m/z (%) M^+ 246 (75%), 231 (100%), 203 (30%), 188 (25%), 160 (35%); ^1H NMR δ ppm (CDCl_3): 4.20 (6H, s, $2 \times -\text{OCH}_3$), 6.28 (1H, d, J 9.5 Hz, H-3), 6.98 (1H, d, J 2.5 Hz, H-9), 7.62 (1H, d, J 2.5 Hz, H-8), 8.20 (1H, d, J 9.5 Hz, H-4).

Acknowledgement

The authors are thankful to Professor G. Srimannarayana, Department of Chemistry for helpful discussions, Dr. T. Prabhakar, Scientist, IICT, Hyderabad for ^1H NMR spectra and C. S. Sundaram, Scientist, CCMB, Hyderabad for ^{13}C NMR spectrum.

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Note

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