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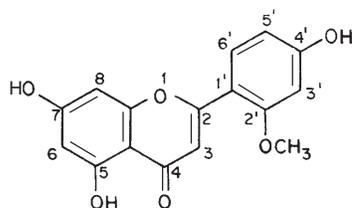
A FLAVONE FROM THE SEEDS OF *CARUM CARVI* L. (UMBELLIFERAE)

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Chalcones constitute an important group of natural products and some of them possess a wide range of biological activities such as antibacterial, anti-fungal, anti-inflammatory, antimicrobial, anti-cancer, anti-tumour, postaglandin binding and insect anti-feedant (Hossain 2001). *Carum carvi* L. is reported for its medicinal values (Kirtikar and Basu 1995). In this paper, we describe the isolation of a flavone from the methanolic extract of the seeds of *Carum carvi* L. and its characterization as 4', 5, 7-trihydroxy-2'-methoxyflavone (structure as given below).



The uncorrected melting point was determined using an electrothermal melting point apparatus (Gallenkamp). IR spectra were recorded (KBr discs) on a Pye-Union SP3-300 IR spectrophotometer (max: cm^{-1}), $^1\text{H-NMR}$ spectra on a Perkin Elmer R-32 (90 MHz) instrument in CDCl_3 with TMS as an internal standard (chemical shift in ppm). TLC was performed using silica gel 60G. Satisfactory elemental analysis was obtained for the compound and structures are in accord with the UV, IR and $^1\text{H-NMR}$. Mass spectra were recorded on VG 7070 E analytical mass spectrometer.

The seeds of the spice *Carum carvi* L. (Bengali name-Jira; English name-Caraway) were collected from traditional spice seller of Ananda Bazar of Dhaka, Bangladesh in March 1997.

The seeds were cleaned by removing dust materials, then they were dried in sunlight for two days. Finally seeds were ground to powder form using the grinding machine. The dried and powdered seeds were extracted successively with n-hexane and methanol. Examination of the n-hexane extract revealed the presence of waxy materials only. The methanolic extract (5.6 g) was fractionated by column chromatography over silica gel (60-120 mesh) using n-hexane-acetone-petroleum spirit (20:2:3) and acetone-n-hexane (5:27) gave the compounds 4', 5, 7-trihydroxy-2'-methoxyflavone (0.175 g) and myricetine (0.093 g) (Islam and Hossain 1993).

Compound (1) obtained from column was further purified by preparative TLC over silica gel 60G using n-hexane-acetone-petroleum spirit (12:5:2) as developing solvent. It was crystallized from petroleum spirit as yellow needles, m.p. 232°C (according to Islam and Hossain 1993, m.p. $230-234^\circ\text{C}$). Its identity as myricetine was confirmed by comparison (Co-TLC and m.m.p.) with an authentic sample.

Compound (2) obtained from column was further purified by preparative TLC over silica gel 60G n-hexane-acetone-petroleum spirit (19:2:1) as developing solvent. It was crystallized from petroleum spirit as yellow needles, m.p. 105°C . (M^+ , 300m/z), R_f 0.67 (n-hexane-acetone-petroleum spirit 19:2:1); UV: 228, 245, 355 nm; IR: 3520, 2912, 2295, 1645, 1605, 1595, 1473, 1365, 1115, 1060, 980, 710 cm^{-1} ; $^1\text{H-NMR}$ (DMSO- d_6 , δ): 3.99 (s, 3H, -OCH₃), 6.31 (s, 1H, H-3), 6.45 (s, 1H, H-8), 6.98 (s, 1H, H-6), 7.12 (m, 3H, H-3', 5' and 6'), 12.75 (s, 3H, -OH). [Found: C, 64.00; H, 4.00. $\text{C}_{16}\text{H}_{12}\text{O}_6$ requires: C, 64.37; H, 4.30%]. It was identified as 4',5,7-trihydroxy-2'-methoxyflavone.

A methanolic extract of the seeds of the spice *Carum carvi* L. yielded one known compound, myricetine and another unknown compound which is identified as 4',5,7-trihydroxy-2'-methoxyflavone. The known compound myricetine was identified by comparison of their spectral properties with those reported by Islam and Hossain (1993).

The new flavone analysed by VG 7070 E analytical mass spectrum for $[M]^+$ ion at 300m/z indicated an empirical formula of $\text{C}_{16}\text{H}_{12}\text{O}_6$. The characteristic infrared spectrum of 4',5,7-trihydroxy-2'-methoxyflavone showed absorption frequencies at 3520 and 1645 cm^{-1} , indicating the presence of hydroxyl group and the ketonic group in conjugation and the absorption peaks at 1605 and 1595 cm^{-1} indicated the presence of unsymmetric ethylene double bond and the aromatic rings, respectively. The $^1\text{H-NMR}$ spectrum of the flavone indicated the presence of *O*-methyl unit. A sharp singlet at δ 3.99 revealed the presence of methoxy group at aromatic ring. A singlet at δ 6.31 indicated the presence of H-3 for the flavone nucleus. Two singlets at δ 6.45 and δ 6.98 indicated the presence of H-6 and H-8 and a broad singlet at δ 12.75 indicated the presence of three -OH groups, respectively.

Key words: *Carum carvi* L., Flavones, 4', 5, 7-trihydroxy-2'-methoxyflavone.

References

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