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A Flavonol from the root of *Moringa oleifera*

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ABSTRACT

A novel flavonol m.p. 162^{0}C, molecular formula $C_{19}H_{18}O_8$, [$M^{+\cdot}$] 374 (FABMS) has been isolated from water soluble ethanolic extract of the root of *Moringa oleifera*. This compound has been characterized as 5-hydroxy-7,3',4',5'-tetramethoxy flavonol by elemental, chemical and different spectral analysis.

1. Introduction

Moringa oleifera belongs to a single genus family Moringaceae[1,2] and it is also known as drumstick, saijna, saonjna, segva, sojna in different regional languages. In the family Moringaceae there are 14 species of *Moringa* tree. It is widely cultivated in Africa, Asia and many other tropical part of the world. It is also popular as mother's best friend in east Africa. The different parts of this tree are use as vegetable [3-5] in different areas. It is a perennial tree with dropping branches and about 10 to 12 m long, slender, deciduous stem. The stems, branches are brittle with corky bark. The flower production occurs from January to March. The flowers are white to creamy white and approx. 2.5 in diameter with soothing fragrance. The pods are produces in March to April and are triangular in cross section. The size of pod is about 30 to 50 cm in length, which contains black, oily winged seeds. The leaves[6] are feathery, alternate, 20-60 cm long with many 1-2 cm long leaflets. The different parts[7] of this tree is used for different purposes like as fertilizer, blue dye, green manure, sugar cane juice clarifier and for making perfumes and hair care products[8]. The seeds of this plant are also used for flocculate contaminants and for purification of drinking water[9-11]. Almost every part of this tree shows pharmacological properties such as: anti diarrhea[12,13], anti-inflammatory[14-18], anti-microbial[19-21], anti-spasmodic[22]. It also shows anti-oxidant property[23,24]. In this paper we report the isolation and characterization of a new flavonol, 5-hydroxy-7,3',4',5'-tetramethoxy flavonol from the root of *Moringa oleifera*.

2. Experimental

Experimental procedure:

The melting point of compound was determined by open glass capillary method and is uncorrected. The ^{1}HNMR spectra were recorded at 400 MHz and ^{13}C NMR spectra at 90 MHz in $CDCl_3$ using TMS as an internal reference and mass spectra recorded on JEOL- JMS-D 300 instrument. UV spectra were recorded on Beckmans DK2 spectrophotometer and IR spectra run in KBr on a Perkin-Elmer spectrometer.

Plant material:

The root of Moringa oleifra were collected from the field area of Phaphamau, Allahabad and the tree was identifying by Botanical Survey of India (BSI), Allahabad.

Extraction and Isolation method:

The air dried and powdered root (4 kg) of Moringa oleifera was extractes with 95% ethanol in a soxhlet apparatus for about 12 h. The ethanolic extract was concentrated under reduced pressure by using a rotatory evaporator. This concentrated ethanolic extract was mix with different solvent in increasing polarity in a separating funnel and separated in to organic and aqueous layer. The aqueous solution was concentrated and chromatographed over a silica gel flash column using different organic solvents in increasing order of polarity, viz. hexane, benzene, chloroform, ethyl acetate and methanol respectively.

All ethyl acetate: methanol fractions were concentrated and loaded over a flash column using different solvents of increasing polarity. It shows one spot on TLC examination using the solvent system benzene: chloroform (6:4, v/v). The compound was separated by column chromatography and purified by preparative TLC method.

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Study of Compound:

The compound was recrystallized from methanol as white needles. Mol. formula: $C_{19}H_{18}O_8$, m. p. 162 ^{0}C, m/z: 374 [M^+], 346, 195, 192, 167; found (%) : C, 57.90, H, 6.72; Calcd. (%) : C, 57.92, H, 6.32; UV(MeOH) λ_{max} (nm): 358, 265 ; (CH_3OH / $AlCl_3$) 378, 277sh; (CH_3OH / $AlCl_3$ / HCl) 358, 310sh; IR λ_{max} (KBr): 3450, 2860, 1655, 1585, 1190cm^{-1}; ^{1}HNMR (400 MHz, $CDCl_3$) δ (ppm): 6.58 (1H, d, *J* = 2.2 Hz, H-6), 6.99 (1H, d, *J* = 2.2, H-8), 7.58 (1H, d, *J* = 2.5 H-2'), 7.77 (1H, d, *J* = 2.5, H-6'); ^{13}CNMR (90 MHz, $CDCl_3$) δ (ppm): 156.2 (C-2, s), 135.2 (C-3, s), 182.3 (C-4, s), 162.52 (C-5, s), 103.25 (C-6, d), 137.89 (C-7, s), 110.02 (C-8, d), 112.00 (C-9, s), 108 (C-10, s), 129.56 (C-1', s), 123.00 (C-2', d), 147.4 (C-3', s).

3. Results and discussion

The ethanolic extract of his plant afforded a flavonol, mol. Formula: $C_{19}H_{18}O_8$, m.p. 162^{o}C, and m/z: 374 [M^+], 346, 195, 192, 167. The compound did not give Molisch's test, thus ruling out the presence of any sugar moiety. The UV spectrum showed two absorption maxima at 358 nm (band I) and 265 nm (band II) are characteristic of flavonol. There was bathochromic shift in both bands (band I and II) in the presence of $AlCl_3$ indicated the presence of two hydroxy groups at position C-3 and C-5. The hydroxy group at C-5 was further confirmed by 45 nm bathochromic shift of band – II with the addition of $AlCl_3$-HCl. No shift with boric acid-sodium acetate confirmed the absence of orthohydroxy system. The IR spectrum of compound showed an absorption peak of hydroxy group at 3450 cm^{-1} and two absorption bands at 1655 and 1585 cm^{-1} for α, *β*-unsaturated ketone (C_4 of flavonol). The absorption peak at 2860 and 1190 cm^{-1} showed the presence of methoxy group. In ^{1}H NMR spectrum, four singlets at δ 3.60, 3.82, 3.75 and 3.96 corresponding to three protons, showed the presence of four methoxy groups in the compound. It also showed four protons in aromatic region at δ 6.58 (1H, d, *J* = 2.2 Hz), 6.99 (1H, d, *J* = 2.2 Hz), δ 7.58 (1H, d, *J* = 2.5 Hz) and 7.77 (1H, d, *J* = 2.5 Hz) of H-6, H-8, H-2' and H-6' respectively. The coupling constant (*J*) values of these protons indicated that all these protons H-6, H-8, H-2' and H-6' are meta coupled. The presence of methoxy groups were further confirmed by ^{13}C NMR signals which showed quartet signals at δ 60.2, 61.03, 61.52 and 61.97 ppm and four singlet at δ 137.89, 147.4, 148.8 and 148.95 ppm were assigned the presence of methoxy groups at 7,3',4', and 5' respectively. These results shows that hydroxy groups were present at C-3 and C-5 position and methoxy at C-7, C-3', C-4' and C-5' position of compound in Figure 1.

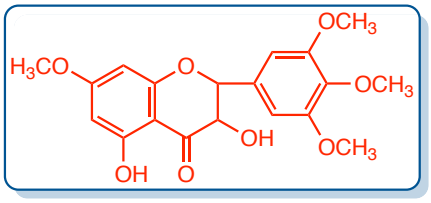

Figure.1. 5-hydroxy-7,3',4',5'-tetramethoxy flavonol

4. Conclusion

Plants are working as a natural factories, they synthesizes compounds in themselves. The *Moringa oleifera* is used as a traditional medicine that's leads a bioactive compound 5-hydroxy-7,3',4',5'-tetramethoxy flavonol.

References

1. B. N. Sastri, *The Wealth of India*, Council of Scientific and Industrial Research, New Delhi, **1962**, 1,425.
2. S. A. A. Jahn, *J. Ame . Water Works Assoc*., **1998**, 80, 43, 1988.
3. W. Dymock, C. J. H. Warden and D. Hooper, *Pharmcographia Indica*, **1890**, 1, 396.
4. K. M. Nadkarni, revised by A. K. Nadkarni, *The Indian Material Medica*, Popular Prakashan, Bombay, **1976**, 810.
5. R. N. Chopra, S. L. Nayar and I. C. Chopra, *Glossary of Indian Medicinal Plants*, Council of Scientific and Industrial Research, New Delhi, **1956**, 170.
6. R. N. Chopra, R. L. Badhawar and S. Ghosh , *Poisonous Plants of India*, Council of Scientific and Industrial Research , New Delhi, **1965**, 1, 286.
7. L. J. Fuglie, *The Miracle Tree: Moringa oleifera: Natural nutrition for the Tropics*, Church World Service, Dakar, **1999**, 68.
8. J. Tsaknis, S. Lalas , V. Gergis, V. Douroglou, and V. Spiliotis, *Journal of Agricultural and Food Chemistry*, **1999**, 47, 4495-4499.
9. M. R. Berger, M. Habs, S. A. Jahn, S. Schmahl, *East African medical Journal*, **1984**, 61, 712.
10. U. Gassenschmidt, K. D. Jany, B. Tauscher and H. Niebergall, *Biochimical Biophysica Acta*, **1995**, 1243, 477-481.
11. A. Olsen, *Water Research*, **1987**, 21(5), 517-522.
12. S. L. Jadhav, *Indian Drugs*, **2000**, 3, 37.
13. Lubna Hameed Un Nisa, *New Trends in Natural Proudcts Chemistry*, Harwood Academic Publishers, Amsterdam, **1998**, 269-276.
14. S. Faizi, B. Siddiqui, R. Saleem, S. Siddiqui, K. Aftab, *New Trends in Natural Products Chemistry*, **1998**, 175-183.
15. S. L. Udupa, A. L. Udupa, and.D.R. Kulkarni, *Fitoterapia*, **1994**, 65, (2), 119-123.
16. A. Casceres, A. Saravia, S. Rizzo, L. Zabala, E. DeLeon, F. Nava, *J. of Ethnopharmacology*, **1992**, 36,233-237.
17. I. C. Ezeamuzie and A. W. Ambakederemo, *International Journal of Pharmacognosy*, **1996**, 34 (3), 207-212, 1996.
18. K. N. V. Rao, V. Gopalakrishanan, V. Loganathan and S. Shanmugganathan, *Ancient Science of life*, **1999**, 18(3-4), 195-198.
19. V. Spiliotis and S. Lalas, *Pharmaceutical and Pharmacological Letters*, **1998**, 8 (1), 39-40.
20. X. Haristoy, J. W. Fahey, I. Scholtus and A. Lozniewski, *Planta Medica*, **2005**, 71, 326-330.
21. A. Caceres, O. Cabrera, O. Morales, P. Mollinedo and P. Mendia, *J. of Ethnopharmacology*, **1992**, 36, 233-237.
22. Anwar H Gilani, Khalid Aftab, *Phytotherapeutic Research*, **1994**, 8(2), 87-91.
23. A. Caceres, O. Cabrera, O. Morales and P. Mollinedo, *P. Medica*, **1991**, 33, 213-216.
24. O. U. Njoku and M. U. Adikwu, *Acta Pharmaceutica Zagreb*, **1997**, 47(4), 287-290.