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Research Article

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Isoprenyl Flavone from *Sida Rhombifolia*

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Abstract A new isoprenyl flavone has been isolated from the ethyl acetate fraction of the leaves of the *Sida rhombifolia*. The structure of the new compound has been established as 5, 7, 3', 4',-tetra hydroxy-3-isoprenyl flavone based on the spectral (UV, IR, ^{1}H, ^{13}C-NMR and Mass) data.

Keywords Isoprenyl Flavone, *Sida Rhombifolia*, Isolation

Introduction

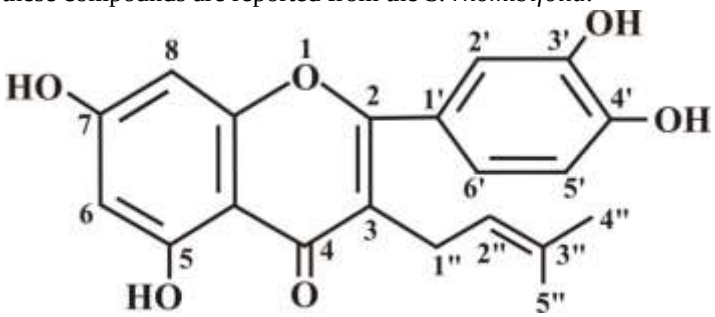
Sida rhombifolia is the member of the genus sida belonging to the family malvaceae. Local names are called bala, mahabala (India), guri, sidaguri, saliguri (Sumatra), sadaguri, otok-otok, taghuri, sidaguri (java), Kahindu, mistaken (Nusatenggara), and hutugamo, bitumudigo, sosapu (maluku) [1].

It grows to a height of about 1.5 meter and found in tropical and warm region and distributed throughout the tropics [2] and is used as a common herbal drug in the Indian subcontinent. For instance, it is used for treating sting and bites of scorpion, snake.

The roots, leaves, fruits, stem, flower of *S. rhombifolia* is used in traditional medicine against chromic disease like, skin disease, sore, stomach disorder, digestion problem, malaria, diarrhea, dysentery, gastric, diabetes, chicken pox, blood cleaning [3,4] headache migraine, headache, eye problem, fever, gum infection, swelling [5] ophthalmia and swilling, cuts and wounds [6-8].

Earlier phytochemical investigations showed the presence of ecdysteroid and their glycosides [9-10]. Daucosterol [11] alkaloid [12] steroids and n-alkane [13-15].

In this communication, we report the isolation and characterization of 5, 7, 3', 4'- tetrahydroxy-3-isoprenyl flavone. This is the first time that these compounds are reported from the *S. rhomibifolia*.



5,7,3',4'-tetrahydroxy-3-isoprenyl flavone

Result and Discussion

Compound (60 mg) was isolated as a yellow amorphous powder, mp 160-168 °C it gave positive color reaction in the aqueous NaOH (yellow), conc. H_2SO_4 (yellow to orange) and mg- HCl Solution (yellow to red for flavones [16]. The IR spectrum of compound showed absorption at 3435 (OH) and 1664 (α, β,-unsaturated carbonyl) cm^{-1}. The molecular formula of the compound was deduced as $C_{20}H_{20}O_6$ from its mass (m/z356, M^+) and ^{13}C NMR Spectra. The UV Spectrum of the compound in methanol showed characteristic absorption band at 330, 271, 241 nm for flavones [17]. The absorption of shift reagent anhydrous $AlCl_3$ Suggested the presence of free hydroxyl group at C5 and C7 of flavones Moiety (18) and also red shift of band I increases accordingly when the no of hydroxyl group located at ring B increases the sift change to orange, after pulverization with an ethanolic solution of compound λ_{max} (400), indicating the presence of an ortho-dihydroxyl group in the B-ring.

The UV shift on addition of diagnostic reagent confirm the presence of free hydroxyl group at C-3' and C-4' and suggested the presence of free hydroxyl groups of position C-5 and C-7 [20]. Therefor the position of linkage between compound and other moiety occurs at C-3.

^1H NMR Spectrum shows metacoupled doublet at δ 5.7-6.9 for aromatic proton δ 6.0-62 (1H, d, H-6) δ 6.3-6.5 (1H, d, H-8). Ring B showed one ABX coupling system is formed by three aromatic protons and three group of signal are displayed at δ 7.5(1H, d, J= 2.0 H_z, H-2) δ 7.7 (1H, d, J=8.0 Hz H-5[1]) 7.8 (1H, dd, J=2.0, 8.0 Hz, H-6) and these signals are consistent for the proton attach to carbons C_6, C_8, C_2, C_5, C_6 of flavones nucleus respectively.

^1H NMR spectrum of the compound further showed two 3H ($2xCH_3$) signals at δ 1.23 singlets and one proton triplet at 5.14 suggesting the presence of an isoprene unit in it. Absorption of one methylene carbon at δ 47.48 (C_1) two methyl carbons at 28.67 (C_4) and δ 28.34 (C_5) in the DEPT spectrum are also gives information about the presence of an isoprene unit More cleared structural information was obtained from the mass spectral data The EIMS of compound gave two major product ions at M/z 170 and 152 by cleavage of ring C, which is the characteristics cleavage of flavones moiety [21] Based on above spectral data and comparing the ^{13}C NMR signals of its nucleus with those of published data [22] the compound is characterized as 5,7,3',4'-tetra hydroxy-3-isoprenyl flavones and this is new one being reported for the first time in the present study.

Experimental

Plant Material

The leaves of *S. rhombifolia* were collected from NRIPT, Telear Gaj, Prayagraj, India and identified by Dr. B.K. Shukla, Taxonomist, Botanical survey of India (BSI) Prayagraj it is widely distributed through India and Nepal, specially in moist region ascending to an altitude of 1800cm in the Himalayas.

Extraction and Isolation

The air-dried plant Material *Sida rhambifolia* Linn. (4 kg) was alternatively extracted in the 80% EtOH (3x24L) respectively. The EtOH extract was concentrated under reduced presser at a temp < 50 °C. The concentrated extract was then partioned with n-hexane, DCM, EtOAC and n-butanol. The EtOAC extract yielded a yellowish mass (4g) on removal of solvent. The extract was adsorbed on silica gel and eluted with C_6H_6 –EtOAC (9:1) The eluent was monitored by TLC and divided in to the two fractions.

Fraction 1 (1-10) gave a pure compound (60mg).

UV λ_{max}^{MeOH}	:	330, 271, 241 nm
IR υ_{max}^{KBr}	:	3435 (O-H) 1664 (α,β-unsaturated ketone) cm^{-1}
^1H NMR ($CDCl_3$)	:	δ 1.23(2x3H, S, H-4",5"), 2.26(2H, d, H-1"), 5.10(1H, t, H-2"), 6.2 (1H, d, H-6), 6.5 (1H, d, H-8), 7.5 (1H, d, J=20 Hz, H-2'), 7.7 (1H, d, J=8.0 H_Z, H-5), 7.8 (1H, dd, J=2.0, 8.0 H_2, H-6), 12.26 (1H, S, C_5-OH), 9.85 (1H, C_7-OH)
^{13}C NMR ($CDCl_3$)	:	δ 164.52 (C-2) 102.08(C-3) 185.37 (C-4) 157.70 (C-5) 99.15 (C-6) 162.16(C-7) 95.30(C-8) 160.16 (C-9) 103.41(C-10) 128.25(C-1') 127.73 (C-2") 126.57 (C-3')

128.21 (C-4') 126.53 (C-5') 125.08 (C-6') 49.48 (C-1") 120.74 (C-2") 135.68 (C-3") 27.69 (C-4") 29.35 (C-5").

Mass spectra : EIMS70ev: M/z 356,170,152, 136.

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