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# Gossypetin-7-0-β-D-Glucopyranoside, A Novel Flavonoid Glycoside from *Impatiens Scabrida* D.C.

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Phytochemical examination of *Impatiens scabrida* resulted in the isolation and identification of a novel flavonoid glycoside Gossypetin-7-0-β-D-glucopyranoside.

*Impatiens scabrida*[1] D.C. (N.O. Balsaminaceae) is distributed throughout India. It is an annual herb with sessile and narrow leaves. The Ayurvedic system of medicines describes the oil of the plant to be used as a semidrying oil. The present paper deals the isolation and structural elucidation of a novel flavonoid glycoside.

The methanolic extract of the water soluble part of the 95% concentrated ethanolic extract of dried and powdered plant, when worked up by C. C. gave crude glycoside (0.48%). Methanolic extract on TLC examination showed two spots which was separated by column chromatography on Si-gel G. One of the compd. eluted with ethylacetate : methanol (1 : 3) gave a brown amorphous compound m.pt. 208°C, molecular formula $C_{21}H_{20}O_{13}$, $M^+$480 ($R_f$ = 0·64). It gave positive Molisch test and responded to all the colour tests for flavonoidal glycoside[2,3] [1], the study of another compd is in progress.

[1] On acid hydrolysis with 7% ethanolic $H_2SO_4$ gave an aglycone [2] and the sugar moiety, which was indentified as D-glucose (by Co-Pc and Co-TLC).

The aglycone $C_{15}H_{10}O_8$, m.pt. 308°, $M^+$318, m/e = 290, 288, 169, 168, 140, 143, 132, crystallised in yellow needle, UV. $\lambda_{max}^{MeOH}$ 256, 270, 375 nm, $\lambda_{max}^{AlCl_3}$ 257, 272, 446 nm, $\lambda_{max}^{NaoAC+H_3BO_3}$ 266, 395 nm, IR $\nu_{max}^{KBr}$ 3388, 2916, 1680, 1600, 1280, 1114, 810 $cm^{-1}$, $^1$HNMR spectrum of hexa-acetyl derivative of the aglycone showed signals at δ = 6.48 (d, J = 2, $C_6$—1H), δ = 7.53 (d, J = 2.5, $C_2$, —$^1$H), δ = 6.88 (d, J = 8.5, $C_5$, —$^1$H), δ = 7.63 (d, d, J = 2.5, 9, $C_6$, —$^1$H), δ = 2.34 (S, 3H, $C_3$, —OAC), δ = 2.36 (S, 3H, $C_4$, —OAC), δ = 2.48 (S, 3H, $C_3$—OAC), δ = 2.45 (S, 3H, $C_5$—OAC), δ = 2.41 (S, 3H, $C_7$—OAC), δ = 2.39 (S, 3H, $C_8$—OAC).

A peak at 3388 $cm^{-1}$ in the IR spectrum of the [2] showed the presence of OH groups in it. The number of OH groups were estimated by the acetylation with $AC_2O$/pyridine yielded hexa acetyl derivative, thereby confirming the presence of six hydroxyl groups in it.

Formation of 4 : 5 dihydroxy-benzoic acid (protocate cheuic acid) on alkaline degradation of the [2] confirmed the presence of OH groups at C–3′ and C–4′ in the [2].

A bathochromic shift of 38 nm in the band I and hypsochromic shift of

34 nm upon addition of $AlCl_3$ and $H_3BO_3$ in the UV Spectrum of [2] further confirmed the presence of OH groups at $C_3$, and C–4′ respectively[4].

Formation of phloroglucinol on alkaline degradation of the [2] showed the presence of two —OH groups at C–5 and C–7 respectively.

Spectral shift[5] with $AlCl_3$ (bathochromic shift 24 nm) and $CH_3COOH$ (bathochromic shift 34 nm) indicated the presence of —OH groups at C–5 and C–7 respectively.

Yellow fluorescence of the [2] in UV light[6] and the spectral shift with $AlCl_3$ in presence of HCl relative to band (I) in MeOH indicating a free 3-OH group in the aglycone.

A characteristic colour reaction with Zn/Hg and zirconium oxychloride in citric acid[7] further suggested the presence of —OH group at C–3.

The [2] gave a red complex with zirconium nitrate solution soluble in HCl showing the presence of a hydroxyl group at position $C_8$[8], which was further confirmed by a signal at $\delta = 2.39$ in the $^1H$ NMR spectrum of acetylated aglycone.

Formation of above degradation products established the identity of the [2] as 3 : 5 : 7 : 8 : 3′ : 4′—hexahydroxy flavone (Gossypetin).

The aqueous hydrolysate on chromatographic study revealed the presence of only D-glucose (by CO–PC and CO–TLC). The sodium metaperiodate oxidation[9] of the [1] consumed 2.01 mole of periodate and liberated 1.07 mole of formic acid indicating the presence of a monosaccharide and also that it was in the pyranose form.

[1] on permethylation[10] followed by hydrolysis yielded 2 : 3 : 4 : 6-tetra-O-methyl-D-glucose (by CO-PC and CO-TLC) confirmed that the sugar was attached via its $C_1$–OH to the $C_7$–OH of the aglycone.

[1] on hydrolysis with emulsion[11] indicated $\beta$-linkage between the sugar and the aglycone thereby confirming that the glycoside was Gossypetin-7-O-$\beta$-D-glucopyranoside which was further supported by its spectral analysis, UV $\lambda_{max}^{MeOH}$ 254, 272, 363 nm, $\lambda_{max}^{AlCl_3}$ 295, 364 nm, $\lambda_{max}^{H_3BO_3}$ 224, 270, 362 nm, IR $\nu_{max}^{KBr}$ 3400, 2910, 1675, 1598, 1112, 1275, 815 $cm^{-1}$, $^1H$ NMR $\delta = 6.46$ (d, J = 2, $C_6$–1H).

$\delta = 7.54$ (d, J = 2.5, $C_2$, –1H), $\delta = 6.86$ (d, J = 8.5, $C_5$, –1H), $\delta = 7.61$ (d, d, J = 2.5, 9, $C_6$, –1H), $\delta = 2.31$ (s, 3H, $C_3$, –OAC), $\delta = 2.35$ (S, 3H, $C_4$, –OAC), $\delta = 2.47$ (s, 3H, $C_3$–OAC), $\delta = 2.44$ (s, 3H, $C_5$–OAC), $\delta = 2.40$ (S, 3H, $C_8$–OAC), $\delta = 5{\cdot}7$ (d, J = 7, $C_{1''}$–anomericproton), $\delta = 5.46$ (m, 6–protons of sugar residue), $\delta = 2.06$ (S, 3H, $C_{2''}$–OAC), $\delta = 2.10$ (S, 3H, $C_{3''}$–OAC), $\delta = 2.02$ (S, 3H, $C_{4''}$–OAC), $\delta = 3.92$ (S, 3H, $C_{6''}$–OAC), $M^+$480, m/e = 318, 290, 288, 169, 168, 140, 134, 132.

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