International Journal of Current Research in Applied Chemistry & Chemical Engineering
Vol. 4, Issue 2 – 2020
ISSN: 2581-5385

Chemical constituent from the stem bark of *Samanea saman*

Nidhi Srivastava[1]
[1]*Department of Chemistry, P.P.N. College, Kanpur.*

Abstract

New flavonoid glycoside luteolin-7-*O*-[-*β*-D-arabinopyranosyl (1→2)] -*β*-D-arabinopyranoside **1** have been isolated from the stem bark of *Samanea saman*. The structures have been established on the basis of chemical evidences and spectroscopic method.

Keywords: Raintree, medicinal, flavones.

Introduction

Samanea saman (Mimosaecae) commonly called "Raintree" is a useful medicinal plant distributed from Yucatan Peninsula, Guatemala to Peru, Bolivia, Brazil, throughout the West Indies, in old world tropics and also in Southern Florida[1]. It is used as an alcoholic source[2]. It is used for cold, diarrhea, headache, intestine ailments, stomachach[3], stomach cancer[4], sore throat[5]. Earlier alkaloids, lupeol, lupeone, octaconsanolic acid, hexacosanol, flavonoids, kaempferol[6] have been isolated from the different parts of *Samanea saman.*

In continuation of our research on the chemical investigation of medicinal plants, we report herein isolation and structure elucidation of new flavonoid glycosides from *Samanea saman*.

The water insoluble portion of the hot ethanol extract of the air-dried and crushed stem barks of *S. saman* on column chromatography yield compound **1**.

Result and discussion

Compound **1**, $C_{25}H_{26}O_{14}$ $(M^+ 550)$, mp 192°C, was also a non-reducing glycoside. On acid hydrolysis it gave an aglycone **1a** and a sugar moiety. The sugar was identified as D-arabinose by co-chromatography with an authentic sample.

The aglycone **1a**, $C_{15}H_{10}O_6$ $(M^+ 286)$ gave colour reactions characteristic of flavone. The flavone nature of the compound was indicated by its positive Shinoda test[8]. Acetylation of aglycone gave tetraacetate indicated the presence of four hydroxyl groups in the compound. The ^{1}H NMR spectrum of flavone showed the presence of six protons in aromatic region, indicating that compound is tetrasubstituted flavone which was also supported by ^{13}C NMR.

The presence of hydroxy group at 7 and two hydroxy groups at 3' and 4' positions was confirmed by bathochromic shift of 18nm in band II with NaOAc[9] and of 38nm in band I with $AlCl_3$[10] in

© Eureka Journals 2020. All Rights Reserved.

UV spectra, respectively. The compound also gave yellow colour with zirconium oxychloride showing the presence of free hydroxyl group at C-5[11], which was also evidenced by its UV spectrum showing a bathochromic shift of 47nm in band I in the presence of $AlCl_3$ and HCl.[12]

The ^{13}C NMR spectrum of the compound showed singlet at 162.2, 166.5, 147.5 and 151.2 which indicated the presence of hydroxyl group at C-5, C-7, C-3' and C-4' respectively.[13] Thus aglycone is 5,7,3',4'-tetrahydroxy flavone. The site of glycosidation was found to be at C-7 on the basis of UV shift with NaOAc and ^{13}C NMR spectral data of **1** and this location is biogenetically favoured.

Quantitative estimation and molecular weight difference suggested the presence of two moles of sugar per mole of aglycone. ^1H-NMR spectrum of compound showed signals of two anomeric protons signal at δ 4.95 (1H, d, J=5.5 Hz) and 5.75 (1H, d, J=7.5 Hz), 3.25-3.80 (m, 10H, sugar protons). This confirmed that glycoside was dissacharide.[13] The glycoside on permethylation by Hakamori method[14] followed by acid hydrolysis yielded 3,4 di-*O*-methyl-D-arabinose and 2,3,4-tri- *O* -methyl -D-arabinose. This confirmed that interglycosidic linkage was (1→2). From the above evidences, the structure of compound **1** was determined as luteolin-7-*O*-[-*β*-D-arabinopyranosyl (1→2)] -*β*-D-arabinopyranoside.

Experimental Section

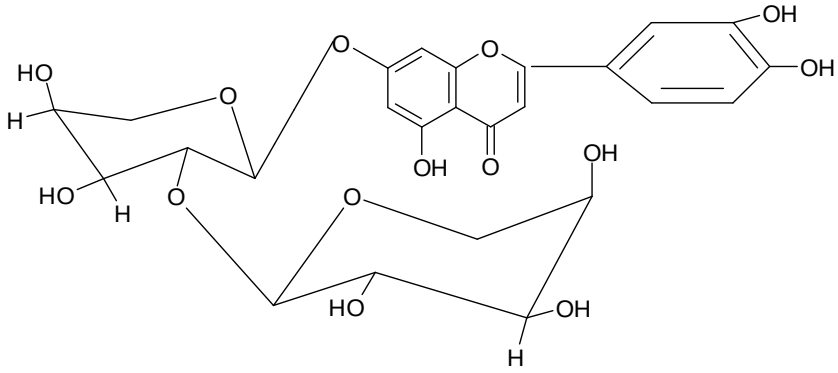
The stem bark of *Samanea saman* was collected in April, 1999 from the Botany Department, University of Allahabad, Allahabad, U.P., India. M.ps measured in open capillary tube and are corrected. TLC was carried out on silica gel G. IR (KBr) and UV spectra were recorded on Perkin-Elmer and Beckman-DK2 spectrophotometer respectively. ^1H NMR spectra of **1** was recorded at 300 MHz in $CDCl_3$ and ^{13}C NMR spectra at 100 MHz in $CDCl_3$ in FT mode. Mass spectra were recorded on a JEOL SX 102/DA-6000 mass spectrometer.

Extraction and Isolation

The air-dried and finely crushed stem bark (5kg) of *Samanea saman* was repeatedly extracted with boiling EtOH (4x10*l*), concentrated under reduce pressure in a rotatory evaporator and poured into an excess of ice-cold water to give water soluble and water insoluble portion. The water insoluble portion was extracted successively with different solvents of increasing polarity over a sintered column. Elution with different solvents of increasing polarity. On elution with solvent system C_6H_6 : ethyl acetate (8:2, v/v) compound **1** was isolated.

© Eureka Journals 2020. All Rights Reserved.

International Journal of Current Research in Applied Chemistry & Chemical Engineering
Vol. 4, Issue 2 – 2020
ISSN: 2581-5385



luteolin-7-*O*-[-*β*-D-arabinopyranosyl (1→2)] -*β*-D-arabinopyranoside.

Compound **1**, mp 192°C, yield 350mg, homogeneous on TLC, R_f 0.66 solvent C_6H_6 : $CHCl_3$ (2 : 8, v/v); Anal. Found: C, 54.53%; H, 4.76%; Calcd. for $C_{25}H_{26}O_{14}$: C, 54.54%; H, 4.72%. UV(MeOH)nm : 275, 374; +$AlCl_3$: 257, 389; +$AlCl_3$/HCl : 265, 409; +NaOAc : 271, 354. ^{1}H NMR ($CDCl_3$, 300MHz): □ 6.72 (s, 1H, H-3), 6.19 (d, 1H, *J*=2.2Hz, H-6), 6.40 (d, 1H, *J*=2.2Hz, H-8), 7.52 (d, 1H, *J*=2.5Hz, H-2'), 6.82 (d, 1H, *J*=7.5Hz, H-5'), 7.68 (dd, 1H, *J*=7.6 and 2.5Hz, H-6'), 12.92 (s, 1H), 4.95(d, 1H, *J*=5.5Hz), 5.75 (d, 1H, *J*=7.5Hz), 3.25-3.80 (m, 10H, sugar protons). MS : m/z 550$[M^+]$ 286, 285, 258, 153, 152, 137, 134; ^{13}C NMR data are given in **Table-1**.

Table 1. ^{13}C NMR spectra of compounds **1, 1a,**

C	**1**	**1a**		
2	155.3(s)	155.3(s)	arabinose 1	98.3(d)
3	133.5(d)	133.4(d)	2	76.5(d)
4	177.4(s)	177.4(s)	3	74.6(d)
5	162.2(s)	162.2(s)	4	67.3(d)
6	99.8(d)	99.8(d)	5	74.7(d)
7	166.5(s)	162.3(s)	6	60.5(t)
8	94.4(d)	94.4(d)	arabinose 1	102.29(d)
9	156.8(s)	156.8(s)	2	70.5(d)
10	104.1(s)	104.2(s)	3	73.6(d)
1'	121.2(s)	121.2(s)	4	68.4(d)
2'	115.5(d)	115.5(d)	5	77.1(d)
3'	147.6(s)	147.3(s)	6	61.8(t)
4'	151.2(s)	150.2(s)		
5'	115.9(d)	115.9(d)		
6'	121.8(d)	121.8(d)		

© Eureka Journals 2020. All Rights Reserved.

References

1. Chopra R N, Nayer S L & Chopra I C, *Glossary of Indian Medicinal Plants* (CSIR, New Delhi), 1956, 201.
2. Kirtikaran K R & Basu B P, *Indian Medicinal Plants*, India, 1, 1993, 830.
3. Roy D, Khanna R N & Sharma N N, *Indian J Chem*, 15B, 1977, 1138-1139.
4. Sharma P & Parthasarathy M R, *Indian J Chem*, 15B, 1977, 866.
5. Pathak V P, Khanna R N & Sani T R, *Phytochemistry*, 22, 1983, 1303-1304.
6. Pathak V P, Khanna R N & Sani T R, *Phytochemistry*, 22, 1983, 308-309.
7. Chauhan D & Chauhan J S, *phytochemistry*, 40, 2002, 171-174.
8. Shinoda J, *J Chem Pharm, Soc Japan*, 48, 1928, 214.
9. Mabry T J, Markham K R & Thomas M B, *The Systematic Identification of Flavonoids*, (Springer, New York) 1970, 48.
10. Purwar C, Rai R, Srivastava N & Singh J, *Indian J Chem*, 42B, 2003, 434.
11. Asahina Y, Inubuse, Ber, 61, 1928, 1646; 64, 1931, 1256.
12. Jurd L & Geissman T A, *J Org Chem*, 21, 1956, 1395.
13. Srivastava N *International journal of basic science and applied computing*, Vol.-2, Issue -11, March 2020, , page (4-7).
14. S.Hakamori, *J.Bio Chem*., 55, 205, 1964.

© Eureka Journals 2020. All Rights Reserved.