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CHEMICAL CONSTITUTENTS OF FLOWERS OF BOMBAX - MALABARICUM

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The flowers of Bombax-malabaricum are highly reputed for curing various ailments[1]. No work seems to have been done on this plant, except the recent report of a rhamno-arabinogalactan from the stamens of its flowers[2].

To the present communication we record the isolation and characterisation of two flavones and a phytosterolin from the flowers of Bombax-malabaricnm.

The 1% hydrochloric acid and cold methanolic extracts of petals of the flowers on concentration deposited a solid mass which was defatted with petrol and then extracted with ethyl acetate yielding two flavones. They were separated by thin layer chromatography and finally crystallised from acetone having m.p. 280° and 294° respectively. The structural studies of these flavones were performed by various colour reactions[3-10], degradative and spectral studies [11-17]. Finally the structure of these two flavones were confirmed by the preparation of their acetylated derivatives, m.p. 118° and 216° respectively, superimposition of IR and cochromatography with authentic samples as 3,5,7,4′ tetra hydroxy flavone (Kaempferol) and 3,5,3′,4′ tetra hydroxy quercetin 7-methyl other (rhamnetin).

Similarly the ethanolic extract of the stamens of Bombax-malabaricum flowers on concentration deposited a solid substance which was defatted with light petrol and then extracted with Ethylacetate yielding a white compound. It was crystallised from methanol-pyridine as shinning needles, m.p. 286-288°. The structure of the compound was established on the basis of colour reactions and degradative studies as β-D-glucopyranoside of β-sitosterol.

Experimental

ISOLATION AND PURIFICATION OF COMPOUNDS

The 1% hydrochloric acid and cold methanolic extracts of fresh petals of the flowers on concentration deposited a solid mass which was defatted with petroleum ether (40-60°) and then extracted with ethylacetate yielding to flavones designated as A & B. They were separated by thin layer chromatography using silicagel-G and ethyl-acetate saturated with water as a solvent system system and finally crystallised from dry acetone having, m.p. 280° and 294° respectively.

Similarly the ethanolic extract of the stamens of Bombax-malabaricum flowers on concentration deposited a solid mass which was defatted with petroleum ether (40-60°) and then extracted with ethyl acetate yielding a white mass. It was found to be single entity which was crystallised from methanol-pyridine as shinning needles, m.p. 286-88°, $\left[\alpha\right]_D^{30}$ −128° in pyridine.

STUDY OF COMPOUND A :

$C_{15}H_{10}O_6$, m.p. 280°, crystallised from acetone as yellow crystalline substance, was found to belong to flavone group of colouring matters as it gave positive Shinoda test[3] and other colour reactions [4-10]. It yielded a tetra acetyl derivative, m.p. 118° and tetra methyl derivative, m.p. 216°. On oxidation it gave p-hydroxy benzoic acid, m.p. 21°, which showed that side phenyl ring contains only one hydroxyl group. The λ max (shift [11-17] and Rf values given in table 1 established the structure as 3,5,7,4′ tetra-hydroxy flavone (Kaempferol). Finally, it was confirmed by superimposition of IR and cochromatography with authentic sample.

STUDY OF COMPOUND B :

$C_{16}H_{12}P_7$, m.p. 294°, crystallised from dry acetone as golden yellow substance, was, also found to belong flavone group of colouring matters, it yielded a tetracetyl derivative, m.p. 182°. On demethylation it gave a compound which was found to be identical with quercetin, m.p. 315° on the basis of m.m.p. and co-chromatography with authentic sample. On oxidation it gave protocatechuic acid, m.p. 190° which showed that the phenyl ring contains two hydroxyl groups. The λ max (shift) [11-17] and Rf values given in table 1 established the structure as 3,5,3′, 4′ tetrahydroxy flavone 7-methyl ether (Rhamnetin). Finally, it was confirmed by IR and cochromatography with authentic sample.

TABLE 1

S. N.	COM-POUND	Rf in Solvent		λ max in									
		(a)	(b)	Et-OH	Et-OH/ $AlCl_3$		Et-OH/ NaOEt		Et-OH/ NaOAc		Et-OH/ H_3BO_3/ NaOAc		Et-OH/ Mg_+Hcl	
					λ max	Shift	λ max	Shift	λ max	Shift	λ max	Shift	λ max	Shift
1.	A	0.81	0.61	267, 369	428	59	343	16	332	13	385	16	520	140
2.	B	0.71	0.38	257, 380	430	50	—	—	380	No	395	15	540	160
3.	Demethy-lated (B)	0.75	0.41	372	432	60	—	—	386	14	393	21	536	156

(a) Butanol : Acetic acid : water (4:1:5 v/v) system.

(b) Acetic acid : Hydrochloric acid : water (30:3:10 v/v) system.

Table 1

STUDY OF PHYTOSTEROLIN :

$C_{35}H_{60}O_6$' m.p. 286-288°, $[\alpha]_D^{30}$-in pyridine. It was crystallised from Me-OH-Pyridine as shinning needles. It formed a tetra-acetate, m.p. 138-140° (Me-OH-$CHCl_3$), $[\alpha]_D^{30}$-120° ($CHCl_3$) Hydrolysis of the phytosterolin with boiling 8% hydrochloric acid in methanol for 10 hr. give glucose (1 mole) which was characterised by PC in BAW (4:1:5 v/v) with an authentic sample and through osazone formation m.p. 202-204°. The aglycone was crystallised as shinning flakes m.p. 124-125°, $[\alpha]_D^{30}$-37° ($CHCl_3$). It was finally identified as β-sitosterol by direct comparision (m.m.p.,T.L.C.,IR.) with an tuthentic sample. Hydrolysis of the methyl ether of phytosterolin yielded β-sitosterol and 2,3,4,6 tetra-O-methyl-D-glucose (1 mole). Periodate oxidation studies also indicated the presence of 1 mole of glucose in the phytosterolin. The glycoside was hydrolysed with emulsin, thereby indicating a β-glucosidic linkage between glucose and sterol which is further supported by negative optical rotations of the phytosterolin and its derivatives.

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