

# Luteolin-7-o- $\beta$ -d-Glucopyranoside from the Roots of Cordia Dichotoma

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## Abstract

*Cordia dichotoma* is locally known as bhokar, lasura, gonda, Indian cherry and shelesmataka. This plant belongs to natural order boragenaceae. Its fruits having wound healing, gastro protective and antiulcer activity. Its seeds are good source of antioxidant agents. Fruit pulps are used in the treatment of diabetes. Its leaves showed to possess antimicrobial activity and roots have antibacterial activity. In the present study, we describe the isolation and structural elucidation of the flavones-o-glycoside, luteolin-7-o- $\beta$ -glucopyranoside isolated from the roots of *Cordia dichotoma*.

**Key words** : luteolin-7-o- $\beta$ -glycopyranoside, *Cordia dichotoma*, antimicrobial, antibacterial

## Introduction

*Cordia dichotoma*<sup>1</sup> belongs to family boragenaceae and known as lasura in hindi. In view of its very important medicinal values, its roots were subjected to systematic phytochemical investigation.

## EXPERIMENTAL

### The plant material

The roots of the plant were collected and authenticated by the reputed taxonomist.

### Extraction and isolation

About 2.5 Kg roots of *Cordia dichotoma* were dried and crushed into powder and extracted with 95% ethanol in round bottom flask over an electric water bath and filtered while hot. There after the filtrate was concentrated and concentrate was partitioned between diethylether and water. The aqueous layer on extraction with ethyl acetate gave brown viscous mass, which on TLC examination showed it to be mixture of two compounds using solvent system  $\text{CHCl}_3:\text{MeOH}$  and 5%  $\text{H}_2\text{SO}_4$  as visualizing agent. Subsequently it was subjected to column chromatography using an eluants as  $\text{CHCl}_3:\text{MeOH}$  (1:1) in varying proportion and solvent removed to get an amorphous light brown mass, which was crystallized from methanol cream coloured crystals.

### Study of the glycoside BT-1

The BT-1 was obtained as light cream colour crystals, which analysed for m.f.  $\text{C}_{21}\text{H}_{20}\text{O}_{11}$ , m.p. 260-261°C,  $[\text{M}^+]$ 448 (CIMS).

IR  $\nu$ ( $\text{cm}^{-1}$ ) 3425 ( $-\text{OH}$  groups), 2931 ( $-\text{C}-\text{H}$  stretching vibration), 1638 ( $\alpha, \beta$  unsaturated  $\text{C}=\text{O}$  vibration), 1612, 1561, 1459 ( $\text{C}=\text{C}$  stretching vibration), 1218 ( $\text{C}-\text{O}-\text{C}$  bending vibration), 1036 ( $\text{C}-\text{O}-\text{C}$  stretching vibration), 770, 669 ( $\text{C}-\text{H}$  out of plane bending vibration) (Monosubstituted benzene ring).

CIMS  $m/z$ ,  $[\text{M}^+]$  448, 286, 258, 154, 153, 134, 124.

$^1\text{H}$  NMR 6.25, s, (1 protons H-3),  $\delta$  6.27, d,  $J=2.5$ , (1 protons H-6),  $\delta$  6.51, s, (1 protons H-8),  $\delta$  7.75, d,  $J=7.5$ , (1 protons H-2'),  $\delta$  6.93, dd,  $J=7.5$ , (1 protons H-5'),  $\delta$  7.57, dd,  $J=7.6$ , 1.8 (1 protons H-6'),  $\delta$  5.61, d,  $J=9.5$  (1 protons H-1' anomeric proton),  $\delta$  2.25, s, (3 protons OAc-3'),  $\delta$  2.29, s, (3 protons OAc-4'),  $\delta$  2.31, s, (3 protons OAc-5'),  $\delta$  3.40-4.15, m, (3 protons sugar protons).

#### Acid hydrolysis of the glycoside BT-1

The glycoside BT-1 on acid hydrolysis with 6% concentrated  $\text{H}_2\text{SO}_4$  gave an aglycone BT-1(A) which was identified as 5,7,3',4'-tetrahydroxyflavone (by m.m.p. and super-imposable spectral studies) m.p. 320-321°C,  $[\text{M}^+]$  286 (CIMS). The aqueous layer was found to contain the sugar which was identified as D-glucose (TLC and Co TLC)<sup>25</sup>.

#### The periodate oxidation of the glycoside BT-1

About 50 mg of the glycoside BT-1 on periodate oxidation with  $\text{NaIO}_4$ <sup>6</sup> consumed 2.0 mole of periodate and in turn gave 1.05 mole of formic acid, thereby suggesting that the D-glucose and aglycone (BT-1A) were present in the form of pyranose in the glycoside<sup>7</sup> BT-1.

#### Result and Discussion

The alcoholic extract from the roots of plant *Cordia dichotoma* was concentrated and partitioned between diethyl ether and water. The aqueous layer was then extracted with ethyl acetate. The ethyl acetate extract when worked up by column chromatography gave a glycoside BT-1 which was crystallized from methanol. The glycoside BT-1 responded to positive Molisch's test, which is specific for the glycoside as well as various characteristic colour reactions for flavonoids. The glycoside BT-1 analysed for molecular formula  $\text{C}_{21}\text{H}_{20}\text{O}_{11}$ , m.p. 260-261°C,  $[\text{M}^+]$  448 (CIMS).

On hydrolysis with 7% aqueous sulphuric acid the glycoside BT-1 gave an aglycone BT-1(A) and the sugar which was identified as D-sugar (by Co-PC and Co TLC). The aglycone crystallized as yellow crystals m.f.  $\text{C}_{15}\text{H}_{10}\text{O}_6$ , m.p. 320-321°C,  $[\text{M}^+]$  35 (CIMS).

The glycoside BT-1 exhibited in the IR spectrum at 3425  $\text{cm}^{-1}$ , which indicated the presence of  $-\text{OH}$  group(s) in it. The compound was found to form an acetyl derivative,  $\text{C}_{23}\text{H}_{18}\text{O}_{10}$ , m.p. 221-222°C,  $[\text{M}^+]$  454 (CIMS).

The percentage of acetyl group was determined by the method as described in Balcher and Godbert and was found to be 37.16%, which indicated the presence of seven (OH) groups in the glycoside BT-1. The aglycone BT-1(A) on degradation with 50% ethanolic KOH gave phloroglucinol m.f.  $\text{C}_6\text{H}_6\text{O}_3$ , m.p. 113-114°C,  $[\text{M}^+]$  154, which were identified with authentic samples.

As such the formation of protocathechuic acid showed the presence of two -OH groups at C-3' and C-4' in the ring B in the aglycone BT-1(A). The UV spectrum of the aglycone with NaAc/H<sub>3</sub>BO<sub>3</sub> relative to MeOH confirmed the presence of OH groups at C-3' and C-4' in aglycone.

The formation of phoroglucinol showed the presence of two -OH groups at C-5 and C-7, respectively. The  $\lambda_{max}$  in AlCl<sub>3</sub>/HCl relative to MeOH confirmed the presence of -OH groups at position C-7 in the aglycone BT-1(A). Thus considering all the facts together, the structure of the aglycone BT-1(A) was assigned as 5,7,3',4'-tetrahydroxy flavone and also the glycoside BT-1, on hydrolysis with almond emulsion yielded D-glucose.

Therefore, on the basis of all the above facts, the glycoside BT-1 was identified as luteolin-7-o- $\beta$ -D-glucopyranoside.

#### References

1. R.N. Chpora, S.L. Nayar and I.C. Chopra, Glossary of Indian Medicinal plants, 8<sup>th</sup> edition, Page no.77(2009)
2. E. Weisenberger, Mikrochemie Ver., Mikrochim Acta, Page no.33(1947)
3. Egon Stahl, Longman Green, Thin Layer Chromatography, Academic press, New York, London(1972)
4. R. Belcher and A.L. Godbert, Semimicro Quantitative Organic Chemistry, Longmans green, New York(1956)
5. E.L. Hirst and J.K.N. Jones, Chem Soc, Page 1659(1949)
6. F.G. Mann and B.C. Soondars, Practical Organic Chemistry, Longmann Green, New York, Page 365(1936)
7. S. Ramaswamy and H. Hariharan, Phytochemistry, 9 Page no. 409(1970)