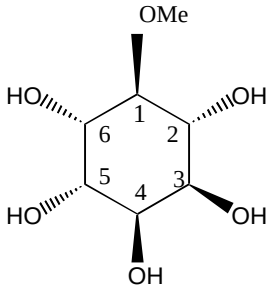
Dhaincha (*Sesbania bispinosa*) leaves: A good source of antidiabetic (+)-pinitol

Dhaincha (*Sesbania bispinosa* wt. Syn. *S. aculeata* Poir. Syn. *Coronilla aculeata* Willd.) is a crop generally cultivated for its nutritive value to soil. It is cultivated in monsoon season almost throughout India and grows well in loamy, clayey, black and sandy soils. It is an ideal green manure crop as it is quick-growing, succulent, easily decomposable with low moisture requirements and produces maximum amount of organic matter and nitrogen in the soil[1]. Its seeds and fibre have been studied to yield galactomannans, lignins and cellulose[2–5]. *S. bispinosa* is not considered as a crop of medicinal value. However, in continuation of our work on the unconventional plants to find out medicinally useful substances[6–11], we investigated the leaves of *S. bispinosa* which have now yielded good concentration of (+)-pinitol. A process for the extraction of pinitol from this source has been developed by us and the method has recently been patented[12].



Pinitol or *O*-methyl inositol (1-methoxy-2,3,4,5,6-penta hydroxy cyclohexane) is a natural product of cyclitol group occurring mainly in its (+) form in certain leguminous plants. It has earlier been isolated from the leaves of *Bougainvillea spectabilis* and was found to be responsible for antidiabetic and hypoglycaemic activities of its leaf extract[13,14]. Pinitol has also been isolated from *Lespedeza cuneata* leaves in 0.2% yield to show feeding stimulant activity for the larvae of the yellow butterfly *Eurema hecabe mandarina*[15]. Pinitol from soybean (*Glycine max* [L.] Merr) leaves is reported to be effective in the inhibition of *larval* growth of *Heliothis zea*[16]. It was also tried to be prepared synthetically by microbial oxidation of benzene into 1,2-dihydroxybenzene and further chemical reactions with the formation of its several possible stereoisomers[17].

As the IR, MS, ^{1}H NMR and particularly ^{13}C NMR spectral data on pinitol, together, are scarcely available, we report here its complete spectral data. The methanol extract also contains uncommon poriferasterol along with its glucoside and *b*-sitosterol glucoside whose identification was confirmed by spectral data and also with the authentic samples.

S. bispinosa leaves were collected from CIMAP's experimental farm in October 1998 where the crop is routinely cultivated for manuring the soil. The shade-dried leaves (0.5 kg), after defatting with *n*-hexane, were extracted with MeOH (3×7.0 l) at room temperature overnight. The solvent was distilled off under reduced pressure. The extract, thus obtained, was charged on a silica gel column for the separation of pinitol by using *n*-hexane as mobile phase. The polarity was increased by sequentially adding 25%, 50%, 75% ethyl acetate in *n*-hexane, then pure ethyl acetate and finally 2%, 5%, 10% and 25% methanol was added in ethyl acetate. Out of 80 fractions collected, fractions from 35 to 42 after further column chromatography gave poriferasterol (28 mg); fractions from 45 to 50 gave *b*-sitosterol glucoside (40 mg); fractions from 55 to 65 afforded poriferasterol glucoside (90 mg) and fractions from 70 to 76 gave a viscous mass which on recrystallization yielded (+)-pinitol (Rf 0.60, TLC, EtOAc-MeOH, 3 : 2, 90 mg). Although the physical data of (+)-pinitol matched well with those reported in the literature, the spectral data are given below.

Pinitol (*1-methoxy inositol*): **IR** n_{max}^{KBr} cm^{-1}: 3600–3200, 2950, 1420, 1175; **MS** m/z (rel. int.): 194 $[M]^+$ (3), 176 $[M\text{-}H_2O]^+$ (4), 162 $[M\text{-}CH_3OH]^+$ (4), 158 $[M\text{-}2H_2O]^+$ (6), 150 (50), 144 $[176\text{-}CH_3OH]^+$ (8), 133 (22), 88 (65), 73 (75), 58 (50), 45 (100); **^{1}H NMR**, *d*, Pyd$_5$: 3.59, 3H, s, OMe, 3.82, 1H, m, H-1, 4.30, 1H, m, H-4, 4.42, 4H, overlapping m, H-2, H-3, H-5, H-6; **^{13}C NMR**, *d*, Pyd$_5$: 85.85 (C-1), 73.08 (C-2), 74.19 (C-3), 72.28 (C-4), 74.69 (C-5), 73.76 (C-6), 60.75 (OMe).

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