J. Natn. Sci. Coun. Sri Lanka 1981 9(2): 251—253

Chemical Constituents of *Myristica dactyloides*

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(*Date of receipt*: 12 *June* 1981)
(*Date of acceptance*: 25 *September* 1981)

Abstract : Chemical investigation of the methanol extract of the endemic plant *Myristica dactyloides* resulted in the isolation of myoinositol, a hexitol of some biological importance.

1. Introduction

Myristica dactyloides Gaertn[5] (Sinhala, Malaboda), a plant endemic to Sri Lanka, is a member of the nutmeg family (Myristicaceae). The chemical constituents of nutmeg have been studied extensively due to its pharmacological properties[2] and due to its economic importance. However, no work on the chemical constituents of *M. dactyloides* has thus far been reported. This paper deals with an investigation of a major chemical constituent of the bark extract of this plant.

2. Results and Discussion

A hot methanol extract of the bark gave a precipitate of a light brown amorphous solid. It was found to be insoluble in common organic solvents like petroleum ether, diethyl ether, chloroform, and ethyl acetate and sparingly soluble in methanol and in water. However it was found to be moderately soluble in a mixture of methanol and water, from which it was recrystallised to obtain colourless needles m.p. 227-228.5°C. The IR spectrum of the compound indicated very strong hydroxyl absorption.

The hexaacetate of the compound was soluble in common organic solvents and the IR spectrum indicated that all hydroxy groups were acetylated. The ^{1}H-NMR spectrum showed the presence of six acetate groups and six hydrogens attached to carbon atoms carrying oxygen. In the mass spectrum, the peak of highest mass at m/e 372 corresponded to $M^+ - CH_3COOH$. On the basis of spectral characteristics, the compound was identified as a stereoisomeric form of inositol.

There are nine theoretically possible inositols.[3] Seven of them are meso forms and the other two constitute an enantiomorphic pair. The compound isolated as well as its hexaacetate was found to be optically inactive. The ^{1}H-NMR spectrum of the hexaacetate showed two acetate signals in the ratio 5:1 at δ 2.02 and δ 2.2 respectively. Of the nine possible inositols, only the hexaacetate of myoinositol which has five equatorial acetate groups and one axial acetate group could be expected to lead to such an NMR pattern.[4] Hence the compound was identified as myoinositol (Figure 1).

Myoinositol is a compound of some biological interest.[1]

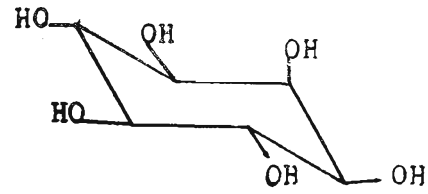

Figure 1. Myoinositol

3. Experimental

3.1 General Procedures

Melting points were determined on a Gallenkamp melting point apparatus and are uncorrected. IR spectra were recorded on a Perkin-Elmer 577 Spectrophotometer. NMR spectra were recorded in $CDCl_3$ at 60 MHz on a Varian T 60A Spectrometer with TMS as the internal standard.

3.2 Extraction and isolation

Air dried bark (700 g) of *M. dactyloides*, collected at Kanneliya, Sri Lanka, in August 1978 was ground to a coarse powder and extracted with hot methanol for 40 hrs. The light brown amorphous solid (14.5 g), which precipitated from the hot methanol extract was collected by filtration. The filtrate on concentration gave a reddish brown gum (163 g), which was extracted with diethyl ether. The ether extract was extracted successively with aqueous sodium carbonate and aqueous sodium hydroxide solutions. The sodium carbonate and sodium hydroxide extracts were acidified with hydrochloric acid and extracted with diethyl ether. The ether extracts, when purified by column and preparative TLC, failed to give any compounds in pure form.

The light brown amorphous solid isolated was recrystallised twice from water-methanol to obtain myoinositol as colourless needles, m.p. 227-228.5°. lit[6] 227-228.5°; IR ν_{max} (KBr) cm^{-1}, 3480-3050, 2910, 1435, 1410, 1360, 1240, 1190, 1140, 1110, 1045, (Found: C, 40.13; H, 6.77%. $C_6H_{12}O_6$ requires: C, 40.00; H, 6.67%).

3.3 Hexaacetate of myoinositol

The light brown amorphous solid (2 g) was heated on a water bath with pyridine (15 ml) and acetic anhydride (15 ml) for 2 hrs. The mixture was cooled and treated with water. The solid which separated was collected by filtration and recrystallised from chloroform-methanol to obtain colourless needles, m.p. 220.5-222°,

lit[6] 220.5-222°; IR ν_{max} (KBr) cm^{-1}, 2960, 1740, 1430, 1370, 1210, 1040; NMR δ 2.02(15H, s, equatorial -O-C(=O)-CH_3), 2.2 (3H, s, axial -O-C(=O)-CH_3), 4.93-5.73 (6H, m, -CH-O-); MS: m/e (relative intensity) 372(3), 271(5), 270(6), 242(3), 241(6), 210(46), 169(17), 168(81), 157(46), 127(10), 126(43), 115(49), 43(100).

Acknowledgements

The authors express their gratitude to Professor S. Balasubramanium of the Department of Botany, Peradeniya University, Sri Lanka, for identification of plant material, the University of Colombo and the National Science Council of Sri Lanka for financial assistance.

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