

# STUDIES ON SOME PLANT

## POLYSACCHARIDES

A THESIS SUBMITTED BY

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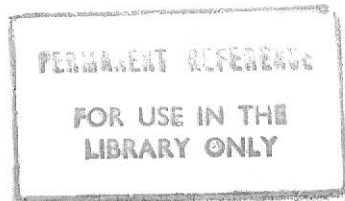
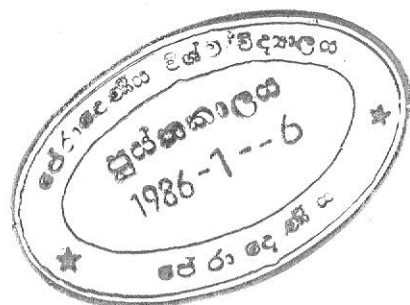
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## ABSTRACT

The thesis consists of four parts. The first part describes the isolation and structural investigations of a water-soluble arabinoxylan from Neolitsea cassia (Lauraceae). The glycosyl composition and glycosyl linkage composition analyses were carried out using g.l.c., g.l.c.-m.s., high resolution  $^1\text{H-n.m.r.}$  and  $^{13}\text{C-n.m.r.}$  spectroscopy. The arabinoxylan was shown to be composed of a  $\beta$ -1,4-linked xylopyranosyl backbone which is fully substituted with  $\underline{\text{I}}$ -arabinofuranosyl side-chains. Terminal  $\alpha$ - $\underline{\text{I}}$ -arabinofuranosyl residues were found to be predominantly attached to 0-3 of the xylopyranosyl backbone whereas short side-chains of 3-linked  $\alpha$ - $\underline{\text{I}}$ -arabinofuranosyl residues, terminated with  $\beta$ - $\underline{\text{I}}$ -arabinofuranosyl residues were found to be predominantly attached to 0-2 of the xylopyranosyl backbone.

The second part of the thesis deals with the isolation of some polysaccharides from Cyclea burmanni (Menispermaceae). The water-soluble polysaccharide was found to be a pectin by the neutral sugar composition and uronic acid content which were determined by g.l.c. and the decarboxylation procedure respectively. Ion-exchange chromatography of the pectin gave four fractions having different uronic acid and neutral sugar contents. Glycosyl composition analysis of the fractions obtained by gel-permeation chromatography of a partially degraded pectin showed the distribution of each

neutral sugar. The polysaccharide fraction isolated from C. burmanni by EDTA was composed of more neutral sugars and less uronic acids than the water-soluble pectin. The polysaccharide fraction obtained from the alkali extract was composed mainly of xylose and glucose while uronic acids were completely absent.

The investigation on the effect of water and  $\beta$ -glucanase treatment on low and high viscous barley - Hordeum sp. (Gramineae) is described in the third part of this thesis. The barley  $\beta$ -glucans and pentosans which contribute to the high viscosity of water extracts of barley were found to have degraded after (i) water treatment and (ii)  $\beta$ -glucanase treatment.

The final part of the thesis describes the separation of some polysaccharide fractions from a brown seaweed, Turbinaria conoides (Phaeophyceae) by sequential extraction. The sugar composition of each fraction was analysed by g.l.c. Alginic acid was isolated with sodium carbonate by sequential extraction as well as direct extraction.

The composition and sequence of  $\alpha$ -I-guluronate and  $\beta$ -D-mannuronate residues in the isolated alginate were determined by high resolution  $^1\text{H-n.m.r.}$  and  $^{13}\text{C-n.m.r.}$  These alginates were compared with those isolated by sequential and direct extraction from three other species

of brown seaweeds, namely Cystoseira trinodis and two unidentified species of Sargassum viz. Sargassum sp.(linear) and Sargassum sp.(oval) . Three of the sequentially extracted alginates had more of  $\alpha$ -I-guluronate residues when analysed by  $^1\text{H-n.m.r.}$  and  $^{13}\text{C-n.m.r.}$  spectroscopy. Two of the direct extracted samples also had more of  $\alpha$ -I-guluronate residues when analysed by  $^1\text{H-n.m.r.}$  spectroscopy. The alginate isolated by direct extraction from Sargassum sp. (oval) was found to contain more  $\beta$ -D-mannuronate residues.