CHARACTERISATION OF THE ULTRASTRUCTURE AND CELL WALL POLYSACCHARIDES OF PORTUGUESE ALMOND SEEDS

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The growing knowledge of the cell wall polysaccharides composition and structure has lead to a better understanding of the physiologic role of polysaccharides in dietary fiber, the agro-industrial applications of seed or fruit meals, the enzymatic degradation of polysaccharides, and the chemistry of texture changes of foodstuffs. Also, in recent years, polysaccharides from plant origin have emerged as an important class of bioactive natural products.

The Portuguese sweet almond (*Prununs dulcis* Miller D. A. Webb) is cultivated in two main regions, Alto Douro and Algarve.

The seed structure and localisation of the embryo's food reserves were determined by light microscopy, applying several differential-staining methods. The mature seed of *P. dulcis* has a very thin and structurally complex seed coat, with cellulosic and lignified tissue. The embryo has two voluminous cotyledons. Cotyledon cells have a high number of protein bodies with protein inclusions. These cells also have a high number of lipid bodies enmeshed with the protein bodies. The cell walls of the embryo and cotyledons consist mainly of cellulose.

The polysaccharides from the almond cell wall material (CWM) were sequentially extracted with imidazole, Na_2CO_3 and a graded series of KOH solutions with increased concentration, and finally twice with KOH 4M + H_3BO_3. The extracted polymers were analysed by GC for neutral sugar and the uronic acids were measured by a colorimetric method [1]. The preparation of the CWM retained about 7% of the initial seed weight. The total percentage of material recovered from the CWM was about 75% (dry weight). The polymers obtained from the imidazole and Na_2CO_3 extracts contained mainly pectic polysaccharides rich in arabinose, but the sugar content of these extracts was very low. The majority of the pectic polysaccharides (also rich in arabinose) was recovered with the KOH extracts. These extracts, with high sugar content, yielded also xyloglucans and acidic xylans.

The KOH 4M + H_3BO_3 extracts (both supernatant and precipitates) accounted for 27% of the CWM and were very rich in arabinose (49 mol%) uronic acids (20 mol%) and xylose (13 mol%). These polysaccharides, when dissolved in water, rendered very viscous solutions.

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[1] M. A. Coimbra, K. W. Waldron, R. R. Selvendran. *Carbohydr. Polym.*, 27 (1995) 285- 294.