

Arabinogalactan-proteins in Coffee Bean Cell Walls

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Summary

The arabinogalactan polysaccharides in the cell walls of coffee beans exist in part, or in total, as arabinogalactan-proteins (AGPs). The occurrence of AGPs was confirmed in several varieties of both Arabica and Robusta species of coffee. Microscopic studies of the distribution of AGPs in the cell wall was carried out using the β -glucosyl Yariv reagent and two monoclonal antibodies specific for two epitopes which may exist in AGPs. Although the AGPs were distributed across the width of the wall some forms appeared to be concentrated only in the layer adjacent to the cell lumen, indicating possible differences in the location of variant structural forms of the parent polymer. During roasting the Arabinogalactan moiety underwent dramatic changes which included a loss of arabinosyl residues and a 10-20 fold reduction in molecular weight. The carbohydrate-protein linkage, as evidenced by the positive reaction to the Yariv reaction, remained in tact even after a long roast. Chemical analysis demonstrated that coffee AGPs also contained between 8-10% glucuronic acid and therefore had the physical properties of polyelectrolytes. A physicochemical study on the functional properties of coffee AGPs showed that they possessed rheological features which suggested they could be a useful hydrocolloid with properties analogous to surface active polymers such as Acacia gum.