MODIFICATION OF BABASSU STARCH BY PHYSICAL METHODS: APPLICATION IN 3D PRINTING

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ABSTRACT

Babassu (*Attalea speciosa*) is the fruit of a palm tree native to Brazil that has a high starch content in its mesocarp. Starch is a polysaccharide widely used by the food industry as a thickener, gelling agent, stabilizer, emulsifier, cohesion agent, moisture retainer, among others. Starches are modified to meet the specific needs of industries with properties that native starches do not have. 3D printing can be applied to food processing, as it is capable of delivering a product that meets specific consumer taste, texture, cost, convenience and nutrition criteria. Thus, the general objective of this work was to modify babassu starch by physical methods (annealing and dry heating treatment) for 3D printing and to evaluate its physical-chemical and functional characteristics. Starch extracted from babassu mesocarp was modified by dry heating treatment (130 °C/2 h, 130 °C/4 h, 150 °C/2 h, 150 °C/4 h, 170 °C/ 2 h and 170 °C/4 h) and annealing (50 °C/12 h, 50 °C/24 h, 55 °C/12 h, 55 °C/24 h, 60 °C/12 h and 60 °C/ 24h). Samples were evaluated for amylose content, syneresis, transparency, water solubility and absorption index, and 3D printability. Dry heating treatment for 4 hours, regardless of temperature, reduced the amylose content, whereas annealing at 60 °C for 12 and 24 hours increased the amylose content. Gels from all treatments showed decreased transparency with refrigerated storage over 6 days. The dry heating treatment at 170 °C/4 h showed the highest transparency. Increasing the temperature of the dry heating treatment reduced the syneresis of the gels, while the opposite effect was observed in the annealing. The applied treatments practically did not influence the water absorption and water solubility of the starch. Annealing treatments at 50 and 60 °C for 24 h showed better printability and maintained the printed structure for 24 hours. The results demonstrate the potential of babassu starch as a material for 3D printing and the importance of modification processes to obtain starches with different characteristics.

Keywords: *Attalea speciosa*, starch extraction, annealing, dry heating treatment, 3D printing

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