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Physicochemical and Thermal Characterization of Starch from Three Different Plantain Cultivars in Puerto Rico

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Abstract : Plantain contains starch as the majority component and represents a relevant source of this carbohydrate. Starches from different cultivars of plantain and bananas have been studied for industrialization purposes due to their morphological and thermal characteristics and their influence on food products. This study aimed to characterize the physical, chemical, and thermal properties of starch from three different plantains cultivated in Puerto Rico: Maricongo, Maiden, and FHIA 20. Amylose and amylopectin content, color, granular size, morphology, and thermal properties were determined. According to the content of amylose in starches, FHIA 20 starch presented minor content of the three cultivars studied. In terms of color, Maiden and FHIA 20 starch exhibited a significantly higher whiteness index comparing their values with Maricongo starch. The starches of the three cultivars had an elongated-ovoid morphology, with a smooth surface and a non-porous appearance. Regardless of similarities in their morphology, FHIA 20 showed a lower aspect ratio, which meant that their granules tended to be more elongated granules. Comparing the thermal properties of starches, it was found that the initial gelatinization temperature of the starch of the cultivars was similar. However, the final gelatinization temperatures of the starches belonging to the cultivars Maricongo (79.69°C) and Maiden (77.40°C) were similar, whereas FHIA 20 starch presented a noticeably higher final gelatinization temperature (87.95°C) and transition enthalpy. Despite source similarities, starches from plantain cultivars showed differences in their composition and thermal behavior. Therefore, this represents an opportunity to diversify their use in food-related applications.

Keywords : aspect ratio, morphology, Musa spp., starch, thermal properties
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