

A new insight into the physicochemical, functional, and macromolecular properties of banana starch

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The thermal, functional and macromolecular characteristics of 16 unripe varieties of banana starches were investigated, while including the world most cultivated dessert (*dessert*) and cooking genotypes (*cooking*) and some FHIA hybrids. Average granule size diameter of *dessert* and *cooking* varied in the 20.1 to 42.7 μm range with an average size of 33.6 and 31.5 μm , respectively. Some significant differences were observed in the onset temperature, in the gelatinization variation of enthalpy, and in the amylose content of the groups (64.5 vs 66.5°C, 13.8 vs 15.6 J g⁻¹, and 17.7% vs 23.5%) with a variation in the 59.7 to 70.2°C range, in the 8.1 to 18.4 J g⁻¹ range and in the 14.8 to 26.6% range, respectively. Pasting temperatures assessed by RVA on 8% (dry w/v) suspensions also highlighted some significant differences between groups with 71.2 and 74.9°C, respectively. *Dessert* genotypes exhibited higher peak viscosity than those of *cooking* ones (1872 vs 1608 cP), whereas an antagonistic trend was observed on the starch solubility at 90°C (7.6% vs 9.4%). Starches showed a mixture of A-type and B-type crystallites, with a higher proportion of B-type allomorph (from 50 to 100%). *Dessert* showed a higher proportion of B-type crystallites (74%) than *cooking* (67%) and *FHIA* ones (62%). Crystallinity degrees varied from 20 to 40%. Molar mass and size distributions of the constitutive macromolecules were determined using size-exclusion (SEC) and field flow fractionation (A4F) techniques coupled with multi-angle laser light scattering. No significant difference was observed between banana clusters. A4F and SEC results followed the same tendency with molar masses ranging from 9.7×10^7 to 1.9×10^8 g.mol⁻¹ and from 8.3×10^7 to 2.3×10^8 g.mol⁻¹, respectively. Branching parameters and molecular conformation of corresponding amylopectins were evaluated as well. A close relation between cultivar genotypes uses and consumer preferences with the thermal and pasting properties were revealed.