

Valorization of rejected plantain fruit as an isomalto–oligosaccharides syrup

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Introduction. The generation of agricultural waste, in particular from plantain fruit, have been increasing. Its accumulation and poor valorization limits the environmental, economic and social development of communities. The main goal of this work was to characterize physicochemically and functionally the flour obtained from rejected Dominico–Hartón pulp (*Musa* AAB Simmonds). As well as to evaluate the production of a prebiotic isomalto–oligosaccharides syrup from this waste feedstock. **Methodology.** Moisture, total protein, ethereal extract and ash contents of the raw flour were determined applying AOAC methods. Thermal properties of the raw flour were determined through rheometry, differential scanning calorimetry and thermogravimetric analysis. The functionality and kinetics hydrolysis of the raw and cooked flour was evaluated by *in vitro* gastrointestinal digestion using the INFOGEST protocol. The production of isomalto–oligosaccharides was made from plantain flour solution 18% (p/p) that was treated with thermostable α -amylase at 95 °C for 3 h. Starch dextrin's were then treated with β -amylase (barley) and pullulanase at 50 °C for 24 h. Finally, the syrup was treated with α -glucosidase (transglucosidase) at 50 °C for 24 h. Saccharides were analyzed by HPLC. **Results.** Moisture, total protein, ethereal extract and ash contents determined for the flour were 9.8±0.5%, 2.83±0.01%, 0.46±0.03% and 2.15±0.02%, respectively. Starch and amylose content was 87±2% and 31.2 ± 0.8%, respectively. The pasting temperature, gelatinization temperature, gelatinization enthalpy, mass loss at the first decomposition stage and mass loss at the second decomposition stage were 79.26±0.02 °C, 69.9±0.24 °C, 2.48±0.04 J×g⁻¹, 10.79±0.04% and 59.3 ± 0.1%, respectively. When cooked, the starch content changed for rapid (0.5±0.1 to 2.4±0.3), slow (15.6±1.2 to 32±1) and resistant digestion (59±1 to 48±2). The glycemic index predicted for raw and cooked flour was 47.7±2.2 and 84.2±1.8, respectively. The greatest amount of production of isomalto–oligosaccharides was of degree of polymerization (DP) 3 (isomaltotriose) at 6 h of transglycosylation step, in a content of 25.75 g/L. **Conclusions.** The rejected plantain fruit showed potential as a prebiotic source, which may be a good strategy for the valorization of this waste.

Keywords: agro–industrial waste, Dominico–Hartón clone, glycemic index, INFOGEST protocol, thermal analysis.

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