ABSTRACT

Structural And Physicochemical Properties And *In Vitro* Digestibility of Recrystallized Linear *A*-D-(1 → 4) Glucans Derived from Mild-Acid-Modified Cassava Starch

C. Mutungi, C. Onyango, F. Rost, T. Doert, D. Jaros, H. Rohm

T. Doert, D. Jaros, H. Rohm

Molecular structure and recrystallization method influence the techno-functional behaviour of recrystallized starch as a functional ingredient in foods. The physicochemical properties of debranched and recrystallized mild-acid-modified cassava starch were studied. Cassava starch was treated with 0.14 mol/L hydrochloric acid for 24, 96 and 216 h at 40 °C prior to debranching with pullulanase. The debranched starches (DS) were recrystallized by annealing (ANN-DS), temperature-cycling (TC-DS) or heat-moisture treatment (HMT-DS) and the particle distribution, crystallinity, thermal properties, solubility, water binding and in vitro digestibility were analyzed. Acid treatment increased the fraction of linear α-d-(1 → 4) glucans comprising 13–30 monomers. Particles comprised loosely to firmly coalesced primary elements forming aggregates of mono- or bi-modal size distribution at ⩽5 μm and ⩾20 μm. The relative crystallinities ranged between 31.1–56.1%. Water binding decreased significantly with acid treatment whereas both solubility and water binding were influenced by the recrystallization method and decreased in the order: DS > ANN-DS > TC-DS > HMT-DS. Major thermal transitions occurred at 80–130 °C and 130–160 °C, and the in vitro digestibility rates of 6.8–62.8% correlated significantly ($p < 0.001$) with relative crystallinity and melting enthalpy.

Keywords: a-D-(1? 4) glucans, Crystallinity, Thermal properties, Solubility, Water binding, Particle size, In, vitro digestibility