

Production of Kudzu Starch Gels With Superior Mechanical and Rheological Properties Through Submerged Ethanol Exposure and Implications for in Vitro Digestion

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Abstract : Producing starch gels with superior mechanical attributes remains a challenging pursuit. This research sought to develop a simple method using ethanol exposure to produce robust starch gels. The gels' mechanical properties, rheology, structural characteristics, and digestion were assessed through textural, rheological, structural, and in vitro digestion analyses. It investigation revealed an improvement in gel's strength from 62.22 to 178.82 g. The thermal transitions were accelerated when ethanol was elevated. The exposure to ethanol resulted in a reduction in syneresis from 11% to 9.5% over a period of 6 hours with noticeable change in size and color. Rheologically, the dominating storage modulus and tan delta (<0.55) emphasized the gel's improved elasticity. X-ray analysis showed a stable B + V-type pattern after ethanol exposure, with increasing relative crystallinity to 7.9%. Digestibility revealed an ethanol induced resistance, through increased resistant starch from 1.87 to 8.73%. In general, the exposure to ethanol played a crucial role in enhancing the mechanical characteristics of kudzu starch gels, while simultaneously preserving higher levels of resistant starch fractions. These findings have wide-ranging implications in the fields of food and pharmaceuticals, underscoring the extensive academic and industrial importance of this study.

Keywords : kudzu starch gels, mechanical properties, rheological properties, submerged ethanol exposure, In vitro digestion

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