Title Influence of Harvest Time and Storage Temperature on Characteristics of Inulin from Jerusalem Artichoke and Physicochemical Properties of Inulin-Starch Mixed Gel.

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Abstract

Jerusalem artichoke (*Helianthus tuberosus* L.) tubers (JAT) were harvested 16, 18 and 20 weeks after planting at Kanchanaburi Research Station, Kasetsart University, Thailand. Tuber maturity contributed to changes in inulin characteristics. A decrease in the more polymerized fractions (degree of polymerization, DP> 10) with an increase in fructose and sucrose composition was observed for late-harvested (20 weeks) tubers. The inulin DP distribution profile from JAT stored at 2 °C and 5 °C significantly changed with increased storage time and temperature. Sucrose and DP 3-10 fractions increased while DP> 10 decreased, particularly after 4-6 weeks of storage. Changes in inulin composition were reflected by formation of a second fructan series, as revealed by HPAEC-PAD chromatograms. These peaks corresponded to inulo-*n*-ose fructan where inulo-*tri*-ose (3') and inulo-*tetra*-ose (4') were predominantly found after 2 weeks of tuber storage at 2 °C and 5 °C. Inulo-*n*-ose (5') up to DP 17' increased in percentage with longer storage time. Frozen storage of tubers at —18 °C maintained their DP distribution profiles. Ethanol (70% and higher) extraction of inulin from JAT gave high content of sugar and low DP fraction as compared to water extraction. Ethanol precipitation of inulin extract therefore obtained high yield and high DP content.

Solubility of inulin increased with elevated temperature. The extracted JAT inulin did not gel even at 25% w/w concentration. In mixture of inulin-starch system, inulin did not affect pasting temperature but caused a decrease in gel viscosity. Light microscope and SEM of inulin-starch mixed gel showed that inulin exhibited a particle gel system that might interfere and disrupt the starch gel network. Texture analyzer and dynamic rheometer indicated that inulin decreased gel strength, firmness, yield point and modulus, and increased gel brittleness of inulin-starch mixed gel. Thermal properties of inulin-starch mixed gel by MDSC suggested an inulin-amylopectin complex but not inulin-amylose complex.