ICC DF22 Seminar Abstract

A. Yi-Yuan Shao (邵貽沅教授)

Maximize Resistant Starch from Waxy Maize Starch: An Integration of Debranching, Ultrasonication and Storage Temperature

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The physiologic behavior of resistant starch (RS) is similar to soluble and fermentable fiber, which generates short-chain fatty acids and lowers postprandial glycemia. The aim of the study is to maximize the resistant starch and modify physicochemical properties of starch crystals through an integration method of debranching, ultrasonication and storage temperature. Waxy maize starch at 10% was debranched using Pullulanase for 24 h, ultrasonicated with 40 kHz at 50 ºC for 30 min, and then crystallized at 4, 25 and 50 ºC for 48 h, respectively. The starch recrystallized at 4 and 25 ºC were recovered at 80-84 % yield whereas those at 50 ºC induced a lower yield of ~30%. As storage temperature increased from 4 to 50 ºC, resistant starch in starch crystals increased from 42 to 68%; however, slowly digested starch decreased from 24 to 13%. Starch crystals produced by storage at 50 ºC were more stable, showing T_o (onset temperature measured in DSC) higher by 8-16 ºC than those produced at 4 or 25 ºC, and one more peak at higher temperature (i.e., 98-143 ºC) with high enthalpy change (ΔH). Starch crystals produced at 50 ºC also revealed lower solubility and swelling power than those at 4 or 25 ºC. Ultrasonic effect significantly increased ΔH at Peak 2 of crystals stored at 50 ºC, and reduced solubility detected at 60 and 90 ºC. The values on parameters for starch crystals produced at 4 and 25 ºC were quite similar. The combination of debranching, ultrasonication and crystallization were effective for crystal formation with thermal stability and high resistant starch, and modification of swelling and solubility.

Keywords: Debranching, Ultrasonication, Crystallization, Resistant starch, DSC

B. Chang-Wei Hsieh (謝昌衛教授)

Elevating Garlic Fructans by Thermal Processing to Promote Gastrointestinal Motility and Hepatoprotective Effect

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Black garlic is a traditional Asian food made by thermal processing of garlic. The inulin-type fructans in black garlic has been confirmed to be a functional water-soluble dietary fiber (DF). This study further confirmed that black garlic extract can promote the expression of 5-HT4 receptors to promote gastrointestinal motility and defecation. In addition, the SOD and DPPH of black garlic extract are also better than those of garlic extract. Further studies have shown that black garlic extract can reduce the expression of liver inflammatory factors TNF-α and IL-1β induced by CCl4, and increase the activities of antioxidant factors such as GSH, SOD, GSH-Px and GSH-RdT so that the expression of AST and ALT in liver cells increased by reducing CCl4. It is shown that the function of DF fructans can be effectively changed by thermal processing technology. In the future, related technologies can also apply to medicinal plants or crops with similar properties.

Keywords: Garlic, 5-HT4, Maillard reaction, Gastrointestinal tract function, Hepatoprotective effect.