

Thunyaboon Arunyanart 2008: Improving Quality of Frozen Rice Starch Gels with Konjac Glucomannan and Sugars. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Sanguansri Charoenrein, Ph.D. 129 pages.

The objective of this research was to minimize the freezing damage of frozen rice starch gels using and konjac glucomannan (KGM), sucrose and xylitol. This research has two experiments. In the first experiment, rice starch gels containing sugars (0-20%) were frozen and thawed up to 5 cycles. Results showed that sucrose and xylitol were effective in reducing the liquid separation (syneresis) and this effect significantly increased with increasing concentrations ($p \leq 0.05$). However, sucrose was more effective than xylitol. Scanning electron micrographs of freeze-thaw gels showed that smaller pore size and a thicker surrounding matrix corresponded with increasing sugars concentration. Furthermore, the amount of freezable water in starch systems decreased with increasing sugars concentration. For texture values, hardness of freeze-thaw gels containing sucrose was lower than that of the control (rice starch gel). In contrast, xylitol increased the hardness of freeze-thaw gels. In the second experiment, rice starch gel with 0%, 10% and 20% sucrose or xylitol and 0% and 0.5% KGM were frozen at two freezing rates: slow freezing and fast freezing. After storage for 0, 7, 21 and 45 days, samples were thawed and measured syneresis, microstructure and texture. The addition of KGM also decreased %syneresis for both gels with and without added sugars, which also corresponded with gel microstructure. The microstructure of starch gel after freezing and thawing revealed that KGM and combined of KGM with sugars addition changed gel matrix and caused less spongy structure. For texture values, hardness of freeze-thaw gels containing sucrose, KGM and KGM with sucrose were lower than the control (rice starch gel). Moreover, gels frozen at fast freezing rate had lower %syneresis, the smaller ice crystal formation and lower hardness values than those frozen at slow freezing rate.

Student's signature

Thesis Advisor's signature

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