

Nutsuda Preechathamwong 2009: Improving Quality of Frozen Rice Starch Gels Using Tapioca Starch and Waxy Rice Flour. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Sanguansri Charoenrein, Ph.D. 102 pages.

Retrogradation of starch during frozen storage is one of the major reasons for the deterioration of frozen starch based products. Starch retrogradation can be retarded by adding hydrocolloids or modified starch. However, the cost of hydrocolloids is very expensive and most of consumers do not like to consume modified starches due to the safety aspect. Therefore, we attempted to use native tapioca starch (TS) and native waxy rice flour (WF) to retard retrogradation of frozen rice starch gel. In the first experiment, the effect of TS or WF addition on freeze-thaw stability was investigated. The result showed that in the first freeze-thaw cycle, TS or WF addition had effectively reduced syneresis of frozen rice starch gel. The percentage of syneresis gradually decreased with increasing TS or WF addition. WF addition showed more effective in reduction of syneresis in first freeze-thaw cycle than TS addition. On the contrary, in the second to fifth cycles, TS addition improved freeze-thaw stability of frozen rice starch gel better than WF addition. The results of % syneresis corresponded to gel microstructure. In the second experiment, frozen rice starch gels with and without TS and WF addition were stored for 0, 10, 20, 40 and 60 days at -18°C. We found that starch gels with TS or WF addition, which were frozen with slow and fast freezing rate, showed effectively reduce syneresis at all storage time. The percentage of syneresis decreased with increasing TS or WF addition. However, fast freezing rate was more effective in reducing syneresis than slow freezing rate. In addition, WF was a more effective ingredient for the reduction of syneresis than TS. We also found that the final viscosity of starch systems as determined by rapid visco analyzer increased with increasing TS or WF addition. There was a good linear relationship between final viscosity and % syneresis, which also corresponded to gel microstructure. Hardness of mixed starch gels after storage 0, 10 and 20 days was also investigated. The results showed that the hardness of mixed gels decreased with increasing addition of WF. On the contrary, the hardness of mixed gel increased with increasing addition of TS. Hardness of rice starch gels with 2%WF and fast freezing was similar to that of fresh rice starch gel. It is concluded that the best condition to most effectively stabilize rice starch gels was adding 2%WF with fast freezing.

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Thesis Advisor's signature

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