

Wattinee Katekhong 2013: Effect of Rice Aging and Freeze-Thaw Cycle on Textural Properties of Cooked Rice (*Oryza sativa* L.) cv. Khao Dawk Mali 105. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Sanguansri Charoenrein, Ph.D. 116 pages.

The objective of this study was to study the effect of rice aging and freeze-thaw cycle on textural properties of cooked rice. This research was divided into three parts. Milled rice cultivar Khao Dawk Mali 105 which was aged for three different time periods, ranging from 0-12 months were used in this study. The first part, the chemical and physicochemical properties of rice flour we studied. The results showed no significant effect of aging rice on apparent amylose content of rice flour. The pasting properties of the milled rice flour showed a significant decrease in peak viscosity and breakdown after being aged. Moreover, the gelatinization temperature and gelatinization enthalpy of rice flour were increased with longer rice aging time. The second part of this study investigated the effect of rice aging on textural properties of frozen cooked rice. The frozen cooked rice was freeze-thawed up to 5 cycles. For the textural properties and sensory evaluation, the fresh cooked rice from rice aged for 12 months had higher hardness and lower stickiness than rice aged for 3 and 0.7 months, respectively. In addition, the freeze-thawed cooked rice had a tendency to increase hardness and decrease stickiness with subsequent freeze-thaw cycles. From a scanning electron micrograph, the surface of the cooked rice before freezing exhibited a smooth surface; however, after 5 freeze-thaw cycles the surface of the cooked rice became rough, in particular cooked rice from rice aged for 12 months. Moreover, an enthalpy of melting retrograded amylopectin increased with progressive aging time and a number of freeze-thaw cycles. The third part of this study investigated the effect of rice aging on freeze-thaw stability of rice flour gels. The result showed that aging of the milled rice and repeated freeze-thaw cycles affected the percent syneresis and hardness of the rice flour gels, in particular after the fifth freeze-thaw cycle. Furthermore, all samples showed an increase in enthalpy of a melting amylose-lipid complex after 5 freeze-thaw cycles. From the scanning electron micrograph, flour gels from rice aged for 12 months had large pores and the matrix surrounding the pores were thicker than flour gels made from rice aged for 3 and 0.7 months. These results demonstrate that aging of milled rice causes an increase in hardness of cooked rice. Moreover, repeated freeze-thaw cycles influence the textural properties of frozen cooked rice and frozen rice flour gels.

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