

Teerarat Likitwattanasade 2009: Effect of Accelerated Aging on Functional Properties of Rice Grain and Flour. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Associate Professor Parichat Hongsprabhas, Ph.D. 104 pages.

The influences of aging process on functional properties of polished Jasmine rice grain and paddy of three cultivars of different amylose content were investigated. For polished Jasmine rice, the accelerated aging was carried out at 60°C, 75% relative humidity for 5 days, in the absence and presence of 25 mM cysteine, a known GRAS reducing agent for food proteins. The aged polished Jasmine rice grains were more opaque and yellowish than the new one ($p < 0.05$). The sensory hardness of the cooked aged grains were higher than that of the cooked new ones ($N=30$, $p < 0.05$). Confocal Laser Scanning Microscopy revealed the protein network, orderly encased the starch fraction within its honeycomb structure in the cooked grains. The rapid visco analyser (RVA) showed that the aging of rice grain lowered peak viscosity but increased the holding strength, final viscosity and setback of rice flour slurries compared with the new one ($p < 0.05$). The presence of cysteine during aging process did not have significant effect on the RVA pasting profile of the aged polished rice ($p < 0.05$). Nevertheless, further addition of 25 mM cysteine during cooking in the RVA lowered the holding strength, final viscosity and setback of aged rice flour ($p < 0.05$). For paddy, the accelerated aging was carried out at 60°C, 70% relative humidity for 5 days. Aging process decreased peak viscosity for non-waxy rice flours but increased that of waxy rice flour ($p < 0.05$). However, holding strength, final viscosity and setback of all rice flours were increased after aging ($p < 0.05$). The lowering of protein content by alkali de-protenization showed that when protein was removed, accelerated aging did not have significant effect on pasting properties ($p < 0.05$). Nevertheless, removal of protein caused markedly increase of peak viscosity and breakdown viscosity ($p < 0.05$). The presence of 25 mM cysteine slightly lowered holding strength, final viscosity and setback of both new rice flour and aged rice flour, regardless of cultivar. SDS-PAGE of glutelin fraction, the main rice storage protein, with β -mercaptoethanol indicated the protein existed in subunits linked by disulfide bond in both new and aged paddy. This study suggested the possibility in the manipulation of rice grain and flour properties by accelerated aging through protein modification to have desirable characteristics in food formulations and processing.

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