

Kanokkan Panchan 2011: Effect of Pre-Germinated Paddy Rice Production on Parboiled Brown Rice and Expanded Rice Product Qualities. Master of Science (Food Science), Major Field: Food Science, Department of Food Science and Technology. Thesis Advisor: Professor Onanong Naivikul, Ph.D. 181 pages.

This research was aimed to investigate effects of pre-germinated paddy rice process conditions on properties of parboiled pre-germinated brown rice in 3 rice cultivars, Suphan Buri 1 (SB 1), Sinlek (SL) and Rice Division6 (RD6). Paddy rice samples were soaked in water at 30 °C for 14 hours, and then incubated at 30 °C with 85% relative humidity until all three cultivars of paddy rice had three stages of embryonic growth lengths, 0.5-1, 1-2 and 2-3 mm. Pre-germination time of SB 1 and RD6 to achieve 3 stages of embryonic growth lengths were 28, 32, and 38 hours, respectively, while those of SL were 30, 38 and 42 hours, respectively. All pre-germinated paddy rice was parboiled at 121 °C, 15 psi for 10 minutes and analyzed for chemical compositions. The results showed that pre-germinated brown rice (PGBR) of 3 cultivars had significantly higher reducing sugar (37.81-80.68 mg/100 g) and gamma-amino butyric acid (GABA) (4.13-19.08 mg/100 g) contents than white rice (WR), brown rice (BR) and parboiled brown rice (PBR) when embryonic growth lengths increased. However, reducing sugar and GABA contents in parboiled pre-germinated brown rice (PPBGR) were less than before parboiling process. Amount of protein (6.64-8.66 %) and iron (0.54-1.98 mg/100 g) in all three stages of PGBR were significantly higher than in WR, BR and PBR and were further increased in PPBGR. Pasting behaviors of 3 rice cultivars were observed, especially peak viscosity value, pre-germination and parboiling processes in SB 1 and SL reduced peak viscosity (1,480-1,718 cP) comparing to WR, BR and PBR. Pre-germination process in RD6 also decreased peak viscosity (95-343 cP), interestingly, parboiling process increased viscosity in PPBGR. However, viscosity of PPBGR was still lower than WR, BR and PBR. To evaluate expanding ability, WR, BR, PBR, PGBR and PPBGR were produced expanded-rice product and investigated properties. Results showed that PGBR (1.51-2.68 time) provided higher expansion ratio than BR and expansion ratio increased with increasing embryonic growth length, moreover, parboiling process also enhanced expansion ratio. When comparing among 3 rice cultivars, SB 1 gave the lowest expansion ratio because its amylose content is higher than the others. The expansion ratio was inverse amylose content and hardness of expanded rice. The hardness of expanded rice which was made from PGBR (22.18-27.55 N) was lower than BR. According to effect of parboiling process, expanded rice made from PPBGR would have low hardness. Sensory evaluation by using 1-5 points score (1 = extremely dislike and 5 = extremely like) displayed that expanded rice from PPBGR gained sensory scores from moderately to good (3.63-4.25 points) for flavor, from fair to good (3.00-4.50 points) for crispiness and from moderately to mostly (3.25-4.13 points) for overall liking. All these 3 attributes scores of expanded rice from PPBGR were more than others. Moreover, total plate counts, yeast and mold counts were less than 10 CFU/g in all samples which were in the safe range for consumption.

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Student's signature

Thesis Advisor's signature