Applicability of Mechanical Drying as a Thermal Pre-treatment for Minimizing Broken Rice Percentage in Rice Milling Industry

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Damaged and cracked grains are abundant in combine harvesting method due to subsequent harvesting and threshing operations at high speeds. Cracks on grains adsorb moisture from the storage environment and impose negative effects on head rice yield due to high moisture contents (over 18%). Milling of same paddy with favourable moisture contents after 2-5 months shows high broken rice percentage. Thermal pre-treatments, prior to milling, is effective in minimizing the broken rice percentages by maintaining the favourable moisture contents in mechanically harvested paddy. It is expected to find out the best thermal treatment condition for mechanically harvested paddy to reduce the broken rice percentage. Paddy samples harvested mechanically using a combine harvester were subjected to thermal pre-treatments at 50 °C, 60 °C and 70 °C using a hot air oven. Thermal exposure time durations of paddy samples were one, two and three hours. The effects of the mechanical drying treatments were evaluated on percentage of brown rice, percentage of polished rice, percentage of broken rice, hardness of brown rice and moisture content. Mechanically harvested paddy samples, subjected to direct milling, were maintained control of the experiment. Control rice samples reported highest significant broken rice percentage of 35.55 and lowest significant hardness value of 2.91. The control samples reported brown rice percentage of 78.92 and polished rice percentage of 90.49. Subjecting mechanically harvested paddy to 60 °C for two hours has shown lowest significant broken rice percentage of 21.9 and highest significant hardness (N) of 5.02±0.01. The same treatment reported the brown rice percentage of 74.28 and polished rice percentage of 90.43. The grain moisture content of the samples after the treatment was 12.01%. The results revealed that the broken rice percentage had been greatly reduced and hardness of milled rice is increased with the introduction of mechanical drying at 60 °C for two hours.

Keywords: Broken rice percentage, Mechanical drying, Milled rice, Thermal pre-treatment