Title	Relating rough rice moisture content removal and tempering duration to head rice yield reduction
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Abstract

Previous research has indicated that while drying rough rice using air temperatures above the glass transition temperature (Tg), head rice yield (HRY) reductions are incurred if a state transition occurs when sufficient intra-kernel moisture content (MC) gradients are present. State transitions can occur by extended drying using high-temperature air or by immediate, post-drying cooling of kernels below Tg before sufficient tempering has occurred. The objectives of this experiment were to determine the maximum MC removal per initial drying pass, and the associated tempering durations required, to prevent HRY reduction. Two long-grain cultivars, Francis and Wells, at two harvest moisture contents (HMCs) were used. Samples were dried with air conditions of either 60oC/17% RH or 50oC/28% RH for various durations to create a range of intra-kernel MC gradients and were subsequently tempered at the drying air temperature in sealed bags for durations ranging from 0 to 160 min. After tempering, samples were cooled to cause a state transition, and then slowly dried to 12.2% MC. Samples were then milled to determine HRY. Control samples were dried at 21oC/60% RH. Results showed that the amount of moisture that could be removed in the initial drying pass was directly related to the HMC and the drying air condition. The tempering duration required to prevent HRY reductions increased with the amount of MC removed from the kernel in a drying pass. The HRY reduction patterns concur with a hypothesis that explains fissure formation during the drying process based on rice kernel property changes associated with glass transition.