

**Rice Research and Promotion Board  
Research Report December 2004**

**Title: The Effect of Harvest Conditions on Kernel Damage Effects and Milled Rice Free Fatty Acid Quality**

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Status: New, Year 2

The effect of harvesting conditions on rough rice damage and subsequent milled rice free fatty acid (FFA) levels after rough rice storage is being investigated. Milled rice FFA levels are a critical in determining milled rice acceptability for brewers, as off flavors derived from rice FFA reduces beer quality. Oxidation of FFA and rice bran oil is a rapid autocatalytic process which rapidly accelerates off-flavor production once the process is underway.

*Cocodrie* harvested in 2003 with fixed concave settings (0-1) and fixed harvester speed (1.8mph) and cylinder speeds of 550, 850 and 1000rpm produced damaged kernels at 1.2%, 4% and 9% levels, respectively. The damage had a significant effect on the development of FFA during 6 months rough rice storage at ~20° C. After 6 months storage, rice with 1.2% (550rpm), 4% (850rpm) and 9% (1000rpm) damage rice produced milled rice with 0.06% FFA, 0.075% FFA and 0.095% FFA, respectively. In contrast, control rough rice samples, without rice damage, produced milled rice with only 0.05% FFA after 6 months. These results are significant as 0.1% FFA in milled rice has been used as the threshold level to identify rice that is unsatisfactory for brewing.

Rice was harvested in September 2004 to investigate the effect of rice type (*Cocodrie*, *Bengal*), harvest moisture (20%, 16%, 13%) and harvester type (John Deere and Case 1688) on harvest rough rice damage and milled rice FFA levels during 6 months rough rice storage. The amount of damaged rice produced under each harvesting condition is being determined. Preliminary findings suggest that **harvest moisture content may be a more important factor than cylinder speed** and that the **harvester type used is a significant factor** in determining to brewing quality. However, this will have to be confirmed by further data collection and statistical analysis. All the rough rice has now been dried to 12% moisture. The 6 months storage study began in December 2004 and will continue until June 2005, with samples being taken at monthly intervals and milled to determine milled rice FFA analysis.

Findings so far suggest that harvesting conditions significantly influence milled rice brewing quality and may be a greater factor than milling conditions, since off-flavor development can begin in damaged rough rice long before milling occurs. However, milling provides bran disruption and milled rice surface bran may accelerate the rancidity process. Nevertheless, consideration of harvesting conditions is probably key to maintaining rice brewing quality.

Publication: D. J. Feliz-Perez. 2004. The Effects of kernel damage caused by combine harvester settings on rice free fatty acid levels. M.S. Thesis. (Advisor: A. Proctor)