

Title            Critical Moisture Gradient for Rice Endosperm Fissuring  
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### **Abstract**

In the field, rice kernels can fissure from re-adsorption of moisture into the endosperm when exposed to high humidity or rain conditions. During milling, fissured kernels are more susceptible to breaking which reduces whole head rice yield. A model predicting the moisture gradient within the endosperm of rice kernels by measuring properties of 500 grams of kernels was previously developed and successfully predicted relative fissuring resistance for four rice varieties by matching field observations. However, the critical relationship between predicted moisture gradient or time of formation of moisture gradient and actual fissure observations has not been established. The objective of this study was to determine the critical moisture gradient (CMG) or critical time of formation of moisture gradient (CTMG) before fissuring occurs for absorption conditions. CMG represents elastic structural failure of endosperm and CTMG represents visco-elastic failure. Four rice cultivars with known relative fissuring resistance were used for this study. Absorption experiments were conducted at 25 degree C temperature and 92% relative humidity conditions on rice with initial moisture content of 12% wb. Experiments correlated observed incidence of fissuring (percent of fissured kernels) under controlled adsorption of moisture with modeled CMG and CTMG for the same kernels under simulated conditions occurring during experiments. Correlations were made for each of the four varieties.