

Grading of Milled Rice (*Oryza sativa*) Using Machine Vision

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ABSTRACT

This study involved the development and testing of a machine vision system (MVS) for automated grading of milled rice. The MVS was composed of a flatbed scanner, computer, and developed image analysis software (IAS).

The red-green-blue (RGB) color ranges of milled rice, paddy rice, and stones were initially determined for the development of the IAS. For the MVS grading process, rice samples from three milled rice varieties (Fancy, R-18 and Sinandomeng) were scanned without manually separating touching grains. Scanned images were uploaded to the IAS which determined the grain dimension (width and length), grain size distribution (percent head rice and broken), and presence of foreign material (paddy kernel, stones, and other non-milled rice objects). The results were compared to manual methods: by measuring the length and width of rice kernels using a micrometer; by obtaining the mass of stones, paddy rice and other foreign materials after being sorted through visual inspection; and by obtaining the mass of whole and broken grains after being sorted using a 4-mm indented tray.

The tests showed that the MVS was 97.63% and 96.67% accurate in grain length and width measurements, respectively, while it was 100% accurate in counting the number of paddy rice. On the other hand, the MVS was 96.84%, 93.05% and 86.96% accurate in evaluating the head rice, broken grains and foreign material percentages, respectively, at an average speed of 55.2 seconds. Analysis of Variance (ANOVA) at 5% level of significance showed that measurement using MVS and manual method had no significant variation on each grading parameter. Thus, at 14.7 times faster than the manual grading, this study showed that MVS can be used for grading milled rice.

*Keywords: milled rice, machine vision system, grading, rice (*Oryza sativa*)*

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