

# Physical Properties of Japonica, Indica and Nerica Types of Rice

Laboratory of Agricultural and Food Process Engineering  
Edenio Olivares Díaz

**Keywords:** kernel thickness, moisture content level, dimension, mass, friction, grain hardness.

## 1. Introduction

Information on physical properties of rice is essential to the design of equipment required for harvesting and post-harvesting process. Previous researchers have indicated that kernel thickness and moisture content influence the physical properties of rice. Thus, the objectives of the research are to analyze both the effect of kernel thickness and moisture content on the physical properties of Japonica, Indica and NERICA types.

## 2. Materials and methods

Rough rice of seven varieties of Japonica (3 varieties), Indica (3 varieties) and NERICA (1 variety) types produced in 2013 were used to analyze the effect of kernel thickness. Meanwhile, fresh-harvested of five varieties of Japonica (1 variety), Indica (2 varieties) and NERICA (2 varieties) produced in 2014 were utilized in the analysis of the effect of moisture content. Physical properties such as dimensional characteristics, mass characteristics, and frictional characteristics, as well as composition analysis, moisture content and grain hardness were determined.

## 3. Results and discussion

In general, one way analysis of variance (ANOVA) indicated that the mean of physical properties of rough, brown and milled rice were significantly different among the thickness fractions within each variety. Lower thickness fractions, in contrast to higher thickness fractions, indicated higher percentage of undesirable kernels (chalky, immature, and broken), as well as shorter, narrower and thinner kernels, and hence had lower kernel volume and lighter kernels.

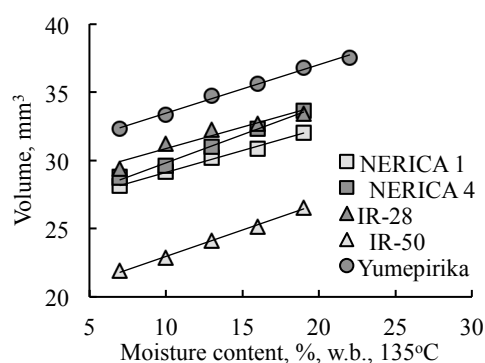


Figure 1 Relationship between moisture content and volume of rough rice kernel.

Furthermore, most of the physical properties analyzed increased as moisture content increased. One way ANOVA reported that significant differences were mostly found between lower and higher moisture content levels of rough rice within each variety. In contrast to higher moisture content levels, lower moisture content levels contained shorter, narrower and thinner kernels, and hence lower kernel volume and lighter kernels (Figure 1). Other results showed that

rice kernel shrank in volume but didn't shrink uniformly length during the drying process.

## 4. Conclusion

Kernel thickness had an effect on physical properties of rough, brown and milled rice. Thickness fractions of the NERICA type were found to have a closer relationship with the Indica type. Additionally, moisture content was found to have an effect on physical properties of rough rice, with the NERICA type having a varied relationship with other types.