日作四国支報（Shikoku J. Crop Sci.）39：26－27（2002）

Analysis of Morphological Hull Characters in Indica, Javanica and Japonica Type Cultivars in Relation to Brown Rice Production

S. Poloma*, Y. Yamamoto, A. Miyazaki and T. Yoshida
(Faculty of Agriculture, Kochi University)

インド型，ジャワ型および日本型水稲品種における籾殻の形態的特性と玄米生産との関係

ポロマ スペンサー・山本由徳・宮崎彰・吉田徹志
（高知大学農学部）

The relationships between hull characters and brown rice development, especially hull weight and brown rice weight were analyzed, using rice cultivars with different grain sizes and shapes belonged to indica, javanica (tropical japonica) and japonica (temperate japonica).

Materials and Methods: Rice seeds of indica (I, 19 CVs), javanica (JV, 8 CVs) and japonica cultivars (JP, 15 CVs) cultivated under the same fertilizer conditions in 2000 and 2001 were selected by 1.06 specific salt water to measure the characters of grains (unhulled grains), hulls, and hulled grain (brown rice).

Results and Discussions: The cultivars used in the experiment varied 18.49～45.81mg in grain weight, 3.47～6.73mg in hull weight and 14.68～39.14mg in brown rice weight. The hull weight was closely correlated with the grain or brown rice weight (or volume), but the coefficient of regression lines were higher in order of JP>JV>I (Fig. 1A). These results implied that the hull weight could be used as an indicator of sink capacity of each spikelet, but brown rice weight or volume at the same hull weight differ among cultivars belonged to different ecospecies. The hull weight was significantly correlated with the length×width of grain or the grain surface area in each cultivar group but was correlated only with the hull width in I or JV and length in JP (Fig. 2), while the contribution of hull thickness measured at the interlocking portion of lemma to its weight was low. The brown rice weight per hull weight ratio, which shows the brown rice production efficiency of hull (BRPEH), was higher in order of JP≧JV>I and weakly correlated with the brown rice weight in each cultivar groups compared with the hull weight (Fig. 1A, B). Moreover, it showed no correlations with hull weight in I and JV, but a significant and negative correlation in JP excluding large grain cultivar, Oochikara (Fig. 3). The BRPEH of Oochhikara (JP) was higher than those of JV at the same hull weight. A significant and negative correlation was observed between the BRPEH and the hull length/width ratio in all cultivars together, and suggested that the BRPEH might be lower in the slender grain cultivars, although such a correlation was not observed in each cultivar group (Fig. 4).

From the above-mentioned results, we concluded that hull weight might be used as an indicator of spikelet sink capacity (brown rice weight or volume), and unit sink capacity per hull weight was higher in order of JP>JV>I due to the difference of grain shape (hull length/width ratio), although the grain shape was not related to unit sink capacity per hull weight in each cultivar group.

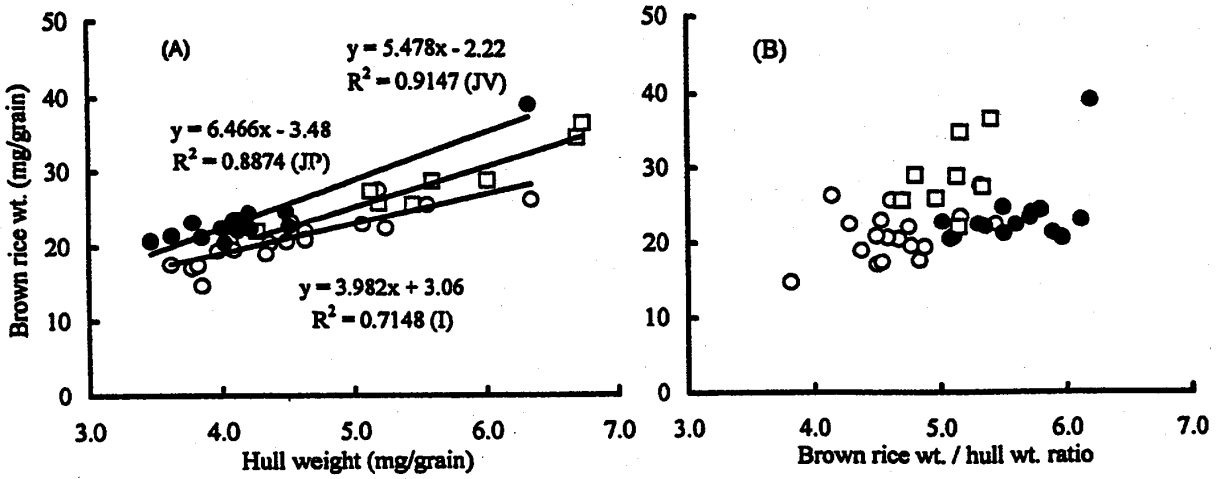

Fig. 1. Relation between hull weight (A) or brown rice weight / hull weight ratio (B) and brown rice weight.
○: Indica, ●: Japonica, □: Javanica

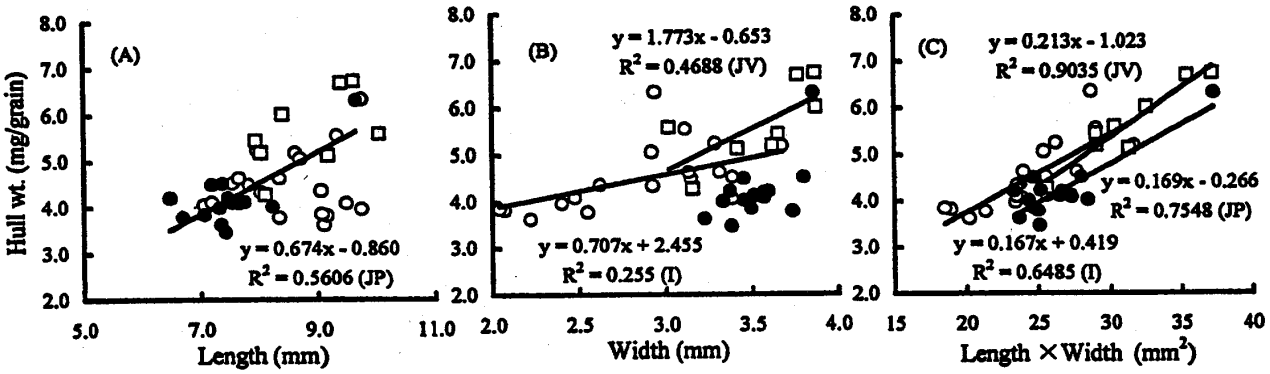

Fig. 2. Relation between grain length (A), width (B) or length×width (C) and hull weight.
○: Indica, ●: Japonica, □: Javanica

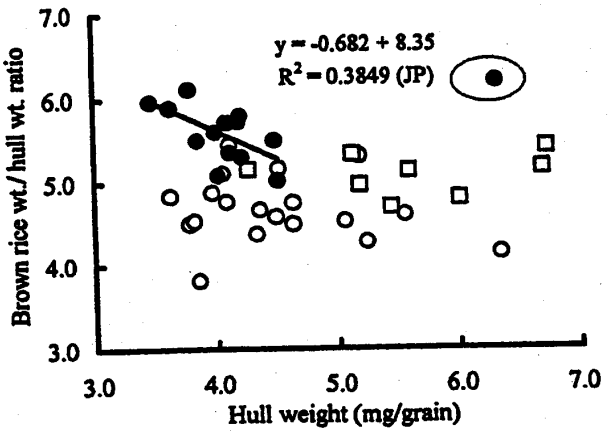

Fig. 3. Relation between hull weight and brown rice weight / hull weight ratio.
○: Indica, ●: Japonica, □: Javanica

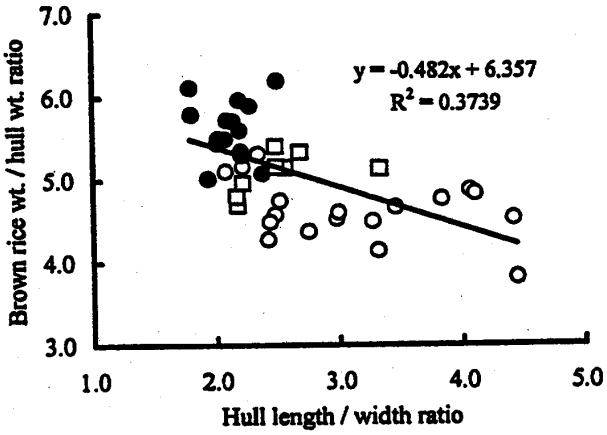

Fig. 4. Relation between hull length/width ratio and brown rice weight / hull weight ratio.
○: Indica, ●: Japonica, □: Javanica