Genetic Studies on the Brown Rice Characteristics in the Progenies Derived from the Hybrid and Backcross between *Oryza sativa* L. and *O. nivara* Sharma et Shastry

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Summary

Two *sinica* cultigens, Tainung 67(TNG 67) and Taiken 1(TK 1), and a wild rice, *O. nivara* (Acc.104705) were used as the recurrent parents and donor parent, respectively, to investigate the genetic behaviors for the seed coat(brain) color, grain length, grain width, and grain shape (length-width ratio) of the interspecific hybrid progenies of *Oryza* species. The *F₁*, *F₂*, BC₁*F₁*, BC₁*F₂*, BC₂*F₁*, BC₂*F₂*, BC₃*F₁*, and BC₃*F₂* populations of two cross combinations were simultaneously planted at the experimental farm of Taiwan Agricultural Research Institute in the first crop of 1996. In normal growth conditions, the seed coat color of *O. nivara* is brown, and the shape of grain is slender, on the other hand, two *sinica* cultigens are light brown in seed coat color and bold in grain shape. It is indicated from our data that the seed coat color is conditioned by one major gene, and brown seed coat is dominant. Furthermore, linkage was not found between seed coat color and grain length, width and shape of brown rice. Heterosis was found in grain length in both cross combinations. Few are transgressive in both *F₁* populations, and the frequency distributions of grain length in various backcross populations are peaked and leaned toward the recurrent parents, cultigens. For grain width, heterosis was only found in TK 1 X *O. nivara* combination. However, transgressive segregation was indicated in both *F₂* populations. Variation of grain width in various backcross populations TNG 67 X *O. nivara* combination appeared to be larger than those in TK 1 X *O. nivara*. As for grain shape, bold shape was observed in both *F₁* populations. Transgressive segregation was observed in both *F₂* populations, and frequency distribution was peaked only in various backcross populations of TK 1 X *O. nivara* cross combination. In general, the mean performance for length, width, and shape of brown rice in *F₂* and various backcross populations were lower than those in *F₁* populations, indicating that the genes concerned might be additive. The broad sense heritabilities estimated for the three grain traits were relative high in both *F₂* and BC₁*F₂*, and heritabilities appear to lower along with increase in the number of backcross except grain width in BC₁*F₂* population in TNG 67 X *O. nivara* combination. In *F₂* populations of both cross combinations, it was found that there is a positive correlation between grain shape and length, and a negative correlation between grain shape and width in various populations. Data were also observed that there is no significant relationship between grain length and width in both *F₂* and BC₁*F₂* populations, however, a positive correlation was observed in BC₃*F₂* populations.

Key words: *Oryza sativa*, *O. nivara*, interspecific hybridization, recurrent backcross, brown rice

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