## ABSTRACT

The present investigation was carried out at the experimental farm of Rice Research and Training Center, Sakha, Kafr El-Sheikh, Egypt during 2005, 2006 and 2007 growing seasons. To study the genetic behavior of yield and its components, and some grain quality traits in rice following triple test cross analysis involving three testers ($P_1$, $P_2$ and $F_1$) and eight pure lines of rice.

The results revealed that epistasis was found to be an integral part of genetic variation for all yield and its components studied characters except 100-grain weight and panicle weight. All grain quality characters exhibited the grate estimates of epistasis except grain shape and hulling (%). The partitioning of total epistasis illustrated that *i* type (additive x additive) were highly significant for plant height, number of panicles/plant, number of filled grains/panicle, sterility (%), grain length, milling (%) and grain yield/plant, while such estimates were non-significant for other remaining traits. in addition, *j* and *l* types (additive x dominance and dominance x dominance) were played remarkable role in the inheritance of plant height, number of panicle/plant, number of filled grains/panicle, sterility (%), grain length, milling (%) and grain yield/plant with predominant effect of *i* type interaction. *J* and *l* types epistasis also played significant role in the inheritance of grain yield, and its components and grain quality traits. The expression of epistasis was influenced differentially by particular genotypes, indicating that a limited number of genotypes may not be sufficient to detect non-allelic interactions for some rice traits.

The magnitude of heterosis over better-parent and superiority were found to be either significant or highly significant in the positive or negative direction for yield and, its components and grain quality traits in most of the studied crosses. The cross GZ 8793-3-3-1-1 x Giza 182 was the highest heterotic for grain yield. The crosses, GZ 9168-2-1-2-1 x Giza 178 and GZ 9168-2-1-2-1//Giza 187/Giza 182 were exhibited highly significant heterosis desirable direction for gel consistency and amylase content traits when it measured as a deviation from better and superiority parent.

Highly significant and positive estimates of phenotypic correlation coefficient was detected between grain yield/plant and each of panicle length, number of panicles/plant, panicle weight, number of filled grains/panicle and 100-grain weight. On the contrary, grain yield/plant was phenotypically and negatively associated with sterility (%) trait. The phenotypic correlation coefficient was found to be highly significant and positive direction between grain length and each of grain shape and gelatinization temperature, moreover, amylase content was highly significantly and negatively correlated with gel consistency. As a result it could be concluded that selection could be practiced in early generations in order to improve these characters in any conventional breeding program aiming high yielding ability and superior grain quality.

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