



## Combining ability and gene action in experimental hybrids of Sweet Corn (*Zea mays* var. *saccharata*)

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### ABSTRACT

Combining ability effect was estimated for sixty crosses produced in Line × Tester design using twenty sweet corn parents as female with three sweet corn cultivars as testers. General and specific combining ability for all the traits were found to be significant, suggesting both additive and dominance variance were operating for these traits. Proportionately, the additive variance component was higher in magnitude than dominance component. Based on *per se* and GCA effects the best combiners for more than one trait are IPSA-2710, IPSA-2713 and IPSA-2703. IPSA-2710 was good general combiner for days to tasseling, silking and maturity. For ear weight with husk, without husk and grain yield, the parent IPSA-2713 was found superior, and IPSA-2703 for TSS and cob length. While IPSA-2707 had good GCA for ear weight with husk, without husk, TSS and grain yield. Among the crosses, based on superior *per se* performance and SCA effect, IPSA-2696 × T2 and IPSA-2698 × T1 were superior for 100 kernel weight and grain yield. IPSA-2714 × T3, IPSA-2698 × T1 and IPSA-2700 × T2 were found superior for ear weight with and without husk and grain yield.

**Key words:** Sweet corn, additive variance, GCA, SCA, dominance variance.

### INTRODUCTION

Among cereal crops, maize is uniquely amenable to many diverse uses as different plant parts are used for a various usages. Such uses attract considerable attention in Indian context due to current emphasis on diversification of agriculture and even diversification within each crop. Specialty corns represent important component of diverse uses of maize and constitute majority of the types suitable for direct human consumption. Sweet corn (*Zea mays* var. *saccharata*) is the type of corn with a thin pericarp layer and it is consumed at immature grain stages of endosperm at 18 to 22 days after fertilization. These genotypes accumulate higher amounts of sugars due to gene/genes operating in different stages of starch biosynthesis pathway. Such changes make sweet corn amenable for using as vegetable in many ways (Dagla *et al.*, 4). Single cross hybrids in maize are gaining prominence in field corn, the same strategy would be applicable in other specialty corns, including sweet corn improvement (Gadag *et al.*, 7). It is widely used in many countries in different forms and, India is emerging as one of the potential sweet corn producing country due to low cost of production and high demand within the country. There is a great potential to earn foreign exchange through export of

fresh/canned sweet corn and its processed products. Some efforts towards sweet corn improvement were initiated during couple of years using different approaches (Meena *et al.*, 12).

However, further studies with wider and better choice of source material are warranted. Moreover, it is important to study the traits related to green ears, which are more relevant for the marketable product. A better understanding of the magnitude and nature of gene action of such character could help the breeder in identifying and using an appropriate breeding strategy (Kumari *et al.*, 11). Therefore, the present investigation was undertaken to determine combining ability and gene action for yield, its component and quality traits. A technique that helps to choose the best parents based on their performance, as well as for selection of promising hybrids, is the line × tester mating design. It also provides information on variances that govern the character in the study (Kempthorne, 8). The combining ability analysis is an important method to know gene actions and it is frequently used by crop breeders to choose the parents with a high general combining ability (GCA) and hybrids with high specific combining ability (SCA) effects. Large genotype × environment effects tend to be viewed as problematic in breeding because of lack of a predictable response which hinders progress through selection. The aim of this study was to evaluate twenty sweet corn inbreds for performance *per se* and combining ability for yield and yield components in specific hybrid combinations.

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