



## Heterosis Study in Sunflower (*Helianthus annuus* L.) Hybrids for Yield Attributing Traits in High Salinity Condition for Identification of Superior Sunflower Hybrids for Coastal Saline Belts

Lakshman SS

AICRP-Sunflower, Nimpith, 24 Parganas, (South), West Bengal, India

### Abstract

Heterosis is the increase or decrease in the vigor of F1 over its mid or better parental value. One of the objectives of the present study was to estimate the extent of heterosis for various characters and to isolate promising hybrids over standard check hybrids for seed yield and oil content for commercial exploitation. The development of new high yielding and stable sunflower hybrids were based on hybridization which requires information on the heterotic effects for agronomically important traits in the F1 generation. Heterotic effects for seed yield and its attributing traits viz., plant height and head diameter, number of seeds per head, seed filling%, 100 seed weight (g), 100 seed kernel weight (g), volume weight (g/100cc), hull content (%), oil content (%) and oil yield (kg/ha) were studied in the sunflower hybrids developed by the line x tester method. There are significant differences among the sunflower genotypes (inbred lines and F1 hybrids) we tested with regard to the mean values of all the traits involved indicating a considerable amount of heterosis for most of the traits except hull content (%), oil content and seed filling percent. Most of the crosses exhibited high heterosis especially for the number of seeds per head seed yield (kg/ha) and oil yield (kg/ha). However, mean heterosis was comparatively low for hull and oil contents. The study on heterosis in sunflower showed that the crosses with favorable characteristics such as oil and seed yields, oil and hull contents could be bred from correctly selected parents. The cross CMS-853A X EC-

623027 reached the breeding aim mentioned above, especially for high vigor in seed and oil yields. Under present study, the genotypes, EC-601878 and EC-601751 with regard to all measured traits, CMS-852A, CMS-103A and P-89-1A for seed yield, oil content and low hull rate could be used for increasing hybrid vigor in future sunflower breeding programs as well as the sunflower genotypes, viz., CMS-852A, CMS-853A, and EC-623027, EC-623023 appeared to possess high concentration of additive genes for seed yield and component traits and, therefore, these parents can be considered as the good combiners for heterosis breeding program for seed and oil yield improvement in sunflower.

### Introduction

National sunflower hybrid (development of new hybrid) breeding program is a continuous program that started in our country in the early 1980s. Sunflower hybrid breeding was started economically in discovering by Leclercq [1] and restorer genes by Kinman [2], Miller and Fick [3]. Heterosis of these crops has been exploited only over the past few decades. Hybrid sunflower became a reality with the discovery of cytoplasmic male sterility and an effective male fertility restoration system during 1970. Hybrid vigor has been the main driving force for the acceptance of this oilseed crop. Utilization of heterosis has allowed sunflowers to become one of the major oilseed in many countries of Eastern and



Western Europe, Russia and South America and is an important crop in the USA, Australia, South Africa, China, India and Turkey. Sunflower hybrid breeding has thus played a vital role in the improvement of this crop. Increasing seed and oil yields is the top priority of most sunflower breeding programs.

#### Keywords

Sunflower; Heterosis; Seed yield; Oil yield; Yield components

#### Results and Discussion

Significant genotypic differences existed for all the agronomic traits among the lines, testers and hybrids. The analysis of variance shows significant differences among the genotypes for all the above said characters studied. Hybridization helps to augment the desirable genes of various parents in one combination. Irrespective of general combining ability of the parents, certain combinations of parents can give superior hybrids (Table 3). Among the sunflower hybrids, for days to 50% flowering the heterosis was observed from -7.33% (CMS-207A X EC-623027 (M)) to 20.37% (CMS-10A X EC-601751), for plant height the heterosis was ranged from 13.10 per cent (CMS-207A X EC-601978) to 123.2% (CMS-853 A X EC-623027 (Mono)).

#### References

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E-mail: [lakshmanshyam\\_ss@yahoo.co.in](mailto:lakshmanshyam_ss@yahoo.co.in)