

Combining ability analysis in restorer lines of sunflower (*Helianthus annuus* L.)

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ABSTRACT

Combining ability studies in sunflower were undertaken with a set of 8 x 8 half diallel excluding reciprocals for the characters days to 50% flowering, days to maturity, plant height, head diameter, pollen productivity, seed yield per plant, 100 seeds weight, filled seeds per head, husk content and oil content. The variance due to general and specific combining ability was highly significant for all the characters with the higher magnitude of the former. The parents were classified for their genetic worth in respect of different traits and prospects for use in hybridization programme. The majority of the hybrids showing positive sca effects mainly involved with positive better combining parents for seed yield per plant besides associated with desirable sca effects for component traits especially head diameter, number of filled seeds per head, plant height, pollen production crosses, 100 seeds weight, oil content. For husk content ten crosses recorded significant negative sca effect.

Key words : Combining ability, Sunflower, Restorer lines.

INTRODUCTION

Combining ability studies are frequently used by the plant breeder to evaluate parents and crosses for number of objectives. Sunflower (*Helianthus annuus* L.) is an important oilseed crop in India as well as in world. It is the fourth largest oil crop, after soybean, oil palm and rape seed (Fernandez-Martinez *et al.*, 2004). Evolution of high yielding hybrids requires identification of good combining restorer lines. The combining ability analysis like diallel studies provides a useful tool to the breeder in this direction. Therefore, the present study was undertaken to estimate the general and specific combining ability effects for the selection of potential of parents and crosses.

MATERIALS AND METHODS

The experimental material comprised of one set of half diallel crosses in sunflower, comprising eight diverse parents *viz.*, J/6, DMLT-1Y, MR-1, 6D-1R, NDR-1, LR-451, NDR-856, LR-3322 and their 28F₁s excluding reciprocals was grown at Oilseed Research Station, Latur in a Randomized Block Design with three replications. The plant to plant distance was kept at 30 cm. The per plant data obtained as the average of five randomly selected competitive plants of each genotype for days to 50% flowering, days to maturity, plant height, head diameter, pollen productivity, seed yield per plant, 100 seed weight, filled seeds per head, husk content and oil content (%) and were analyzed for combining ability as per method 2, Model I of Griffing (1956).

RESULTS AND DISCUSSION

The knowledge of combining ability helps in identifying superior parents and specific cross combinations, which can be exploited for different breeding purposes. In the present study 8 restorer lines were used for synthesis of 28 restorer hybrids. The results on analysis of variance for combining ability for ten characters are described (Table 1). The mean sum of squares due to general and specific combining ability were highly significant for all the characters studied, indicating the importance of both additive and non-additive gene effects in expression of these characters. The magnitude of general combining ability variances was larger than specific combining ability variances for all characters indicating predominance of additive gene action. The results on general and specific combining ability effects for parents and hybrids, respectively are presented in Table 2 and 3.

The estimates of gca effects of parents:

Four parents out of 8 parents exhibited negative significant gca effect for plant height. Parent 6D-1R exhibited highest negative gca effect (-7.37) followed by NDR-856 (-4.40). Three parents exhibited significant gca effects for head diameter. J/6 exhibited high positive gca effect (1.82) followed by NDR-1 (0.65) and DMLT-1Y (0.55), respectively. Hence, J/6, NDR-1 and DMLT-1Y were considered to be good general combiners for head diameter. Four parents exhibited positive significant gca effect for pollen productivity. The parent J/6 exhibited high positive gca effect (0.09) followed by 6D-1R (0.07), MR-1 (0.04) and NDR-1 (0.03). Hence, J/6, 6D-1R,

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