

Reciprocal cross differences and combining ability studies for some quantitative traits in tomato (*Lycopersicon esculentum* Mill.) under mid hill conditions of western Himalayas

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ABSTRACT

Six horticulturally superior lines viz., Solan Vajr, AI-11, AI-14, FT-5, UHF-571 and UHF-566 were crossed in full diallel fashion including reciprocals to obtain 30 hybrids. The investigation was undertaken with the view to explore the possibility of developing high yielding tomato hybrids coupled with desirable horticultural traits. The mean sum of squares between F_1 's and reciprocal F_1 's were significant for all the traits including fruit yield per plant suggesting the influence of maternal effects or cytoplasmic interaction for the inheritance of these characters. For fruit yield, the range of reciprocal differences varied from -220.95 (AI-11 x UHF-566) to 279.1 g (AI-11 x FT-5). Considerable non-additive gene action was observed for this character. The parents AI-11 (130.90), UHF-571 (109.91), UHF-566 (88.05) and FT-5 (26.99) were good general combiners for fruit yield per plant. The highest positive SCA was exhibited by AI-14 x UHF-566 (512.20), followed by AI-11 x UHF-571 (425.01) and Solan Vajr x FT-5 (335.38). All the characters including fruit yield per plant showed preponderance of V_{SCA} suggesting heterosis breeding as the best approach for developing vigorous hybrids with the desirable characters.

Key words : Tomato, *Lycopersicon esculentum*, Reciprocal differences, Combining ability, Quantitative traits

Tomato (*Lycopersicon esculentum* Mill.) a solanaceous vegetable, originated in Peruvian and Mexican region (Tigchelaar, 1986) is an important vegetable crop grown in mid hills of the western Himalayas. The hybrid cultivars in tomato have generated increased interest among the breeders for the last few years due to possibility of combining complex of valuable attributes in the genotype viz., earliness, uniformity, high yield and strong adaptability to different environments. Differences depending on the direction of crossing in tomato have been reported by many workers. For the development of F_1 hybrids, the selection of the parents is of paramount importance. Parents are generally selected on the basis of their combining ability. The diallel cross analysis serves as a useful progeny testing technique (Christie and Shattuck, 1991). Therefore, the present investigation was undertaken with the view to explore the possibility of developing high yielding tomato hybrids coupled with desirable horticultural traits.

MATERIALS AND METHODS

The present investigation was carried out during March, 2004 to August, 2005 at the experimental farm of the Department of Vegetable Science, Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, Solan. The experimental site is situated at an altitude of 1270 m above

the mean sea level with an average annual rainfall of 1100-1300 mm. During March, 2004, six horticulturally superior genotypes viz., Solan Vajr, AI-11, AI-14, FT-5, UHF-571 and UHF-566 were crossed in full diallel fashion including reciprocals to obtain 30 hybrids. All the genotypes and their F_1 crosses were planted during March, 2005 along with the standard check Naveen in the randomized complete block design (RCBD) with three replications. Eighteen plants per replication were transplanted at a recommended spacing of 90 cm x 30 cm. The standard cultural practices were followed to raise the crop. The observations on number of seeds per fruit, harvest duration (days), number of fruits per plant, average fruit weight and fruit yield per plant were recorded on ten randomly selected plants in parents as well as their crosses. The reciprocal differences and combining ability were worked out according to Griffing (1956) model-I and method-I.

RESULTS AND DISCUSSION

The analysis of variance revealed significant genotypic differences for all the characters under study suggesting the presence of sufficient genetic diversity. Like wise, the mean sum of squares between F_1 's and reciprocal F_1 's were also significant for all the characters suggesting importance of cytoplasmic inheritance for these