ABSTRACT

Key words: Line x tester, heterosis, combining ability, gene action.

The present investigation was undertaken in sponge gourd in order to estimate heterosis and combining ability for fruit yield and its component characters, viz., days to 50% flowering, days to open first female flower, days to open first male flower, node to first female flower, node to first male flower, days to first picking, length of vine (m), number of primary branches per vine, number of fruits per vine, fruit weight (g), fruit length (cm), fruit girth (cm), fruit yield per vine (kg) and number of seeds per fruit. The crosses were attempted by adopting line x tester analysis involving eight lines and four testers during summer-2016. The resultant 32 hybrids along with their parents and one standard check (GJSG-2) were evaluated in randomized block design with three replications during kharif-2016 at Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh.

Analysis of variance for experimental design revealed that mean square differences among genotypes, parents and hybrids (within group) were significant for all the traits except mean square due to parents for length of main vine (m) and fruit girth (cm) indicating sufficient amount of genetic variability present in the material used. The mean square due to parents vs hybrids was also significant indicating substantial amount of heterotic effects in cross combinations for various traits except for days to first picking indicating sufficient amount of genetic variability for the traits studied. The magnitude of heterotic effects was high for number of fruits per vine and number of seeds per fruit. No heterosis was observed for node number of first male flower and it was low to moderate for rest of the traits.

The highest, positive and significant heterosis for fruit yield per vine and some of its component traits were recorded in the crosses, JSG-14-03 x Pusa Chikni, ASGS-04-23 x GJSG-1, JSG-13-04 x Pusa Chikni and ASGS-11-47 x Pusa Chikni.
The analysis of variance for combining ability revealed that the mean square due to general combining ability (gca) and specific combining ability (sca) were non-significant for all the characters except node number of first female flower, length of main vine, fruit length, fruit girth and number of seeds per fruit were significant for gca. This indicated that both additive and non-additive type of gene action played a vital role in the inheritance of all these traits under present study. The magnitude of gca and sca variances revealed that the sca variances were higher than their respective gca variances for all the characters which confirmed the preponderance of non-additive gene action for all the traits.

The estimate of gca effects exhibited that the parents Pusa Chikni, JSG-14-06, JSG-14-03, ASGS-04-23, JSG-14-04, ASGS-11-47 and JSG-14-02 were good general combiners for fruit yield and some of its contributing traits. For the characters related to earliness viz., days to 50% flowering, days to first picking, the parents JSG-13-04, JSG-14-06 and Pusa Chikni were found to be good combiners, whereas for node number of first female flower, JSG-14-03, JSG-14-06 and GJSG-2 were found good combiners. Similarly, for number of fruits per vine, fruit weight and number of seeds per fruit, parent ASGS-11-47 found good general combiner.

It was observed that per se performance of parents for majority of characters, in general, related to their gca effects. Parents which exhibited significant gca effects for fruit yield per vine also possessed high and significant gca effects for some of the yield components.

The best eight specific cross combinations for fruit yield per vine were ASGS-04-23 x GJSG-1, JSG-14-02 x JSG-13-07, JSG-13-04 x Pusa Chikni, JSG-14-03 x Pusa Chikni, JSG-14-03 x JSG-13-07, JSG-14-05 x GJSG-2, JSG-14-05 x JSG-13-07 and JSG-13-04 x GJSG-1. Crosses showing high sca effects for fruit yield also depicted high sca effects for important yield attributes, accompanied by high to moderate heterotic response. Crosses with high sca effects in fruit yield per vine were combinations of good x good or good x poor or poor x poor general combiners.

On the basis of per se performance, heterotic response, combining ability estimate and gene action involved in the expression of yield and its components, three crosses viz., ASGS-04-23 x GSG-1, JSG-14-02 x JSG-13-07 and JSG-13-04 x Pusa Chikni appeared to be most suitable for exploitation in practical plant breeding programme in sponge gourd. These hybrids recorded 1.17, 1.10 and 0.91 significant sca effects in desirable direction for fruit yield and some of its components traits. Therefore, these three crosses could be exploited for heterosis breeding programme to boost the fruit yield in sponge gourd.