

## SUMMARY AND CONCLUSIONS

In the present investigation entitled “Line x Tester analysis of combining ability in okra (*Abelmoschus esculentus* (L.) Moench” an attempt was made to study the heterosis, combining ability, nature of gene action and stability in respect of eight characters namely, days to first flowering, days to 50% flowering, number of branches per plant, plant height, tender fruit length, number of seeds per fruit, number of fruits per plant and weight of fruits per plant. In present study, twelve lines of okra namely, BO-2, 35, 447, EC-316053, Vaibhav, VRO-4, IIVR-11, HRB-55, 162, 315, 364 and 410 were selected as parental lines and five lines were crossed with seven testers in line x tester design. The resultant 35 F<sub>1</sub> hybrids were assessed in randomised block design with three replications over a period of three *kharif* and two summer season. The experimental findings are summarised and concluded here under.

Analysis of variances revealed significant differences among parents and crosses for most of characters except number of branches per plant, tender fruit length and plant height that indicates presence of good variations for various traits in selected parents and their hybrids. In okra, even though there are minimum morphological variations. However, it could be concluded that there is good quantum of genetic variations. Therefore, present parental lines could be fairly used for exploitation of heterosis and selecting the transgressive segregants.

In present study, five, sixteen and eight hybrids were significantly superior over better parent during *kharif*-2010, *kharif*-2011 and *khairf*-2012. However, BO-2 x 315 and 35 x 315 were significant over two *kharif* seasons for days to first flowering. Seven and five hybrids were shown negative significance for days to first flowering. Hybrid BO-2 x VRO-4 was consistent over summer seasons. None of the hybrid was found consistent over standard check. However, eighteen, two and seven hybrids were significant over standard check during *kharif*-2012, summer-2011 and summer-2012 respectively for days to first flowering.

Nineteen, sixteen and eight hybrids were significant over better parent for days to 50% flowering in *kharif*-2010, *kharif*-2011 and *kharif*-2012 respectively. BO-2 x 315 and BO-2 x VRO-4 were consistent over two *kharif* seasons. Out of seven significant hybrids, 447 x 315 was consistent over summer seasons. None of the hybrids was shown consistent standard heterois over both the *kharif* and summer seasons. However, six hybrids *viz.*, BO-2 x IIVR-11, BO-2 x 162, BO-2 x 315, BO-2 x 364, 35 x 162 and Vaibhav x 162 were found with significant standard heterosis for days to 50% flowering during summer-2012.

None of the hybrid was significant over better parent for number of branches per plant during *kharif* and summer seasons. However, nine, fourteen, twentyfive, nineteen and fifteen hybrids were positive but non-significant

heterobeltiosis over the three *kharif* and two summer seasons respectively. None of the hybrid was shown significant standard heterosis over both the *kharif* and summer seasons.

Hybrid EC-316053 x 162, two hybrids EC-316053 x 364 and Vaibhav x VRO-4 and hybrid BO-2 x VRO-4 were shown significant heterobeltiosis in *kharif*-2010, *kharif*-2012 and summer-2012 respectively for plant height. None of the hybrid was consistent over both the *kharif* and summer seasons. None of the hybrids was shown consistent standard heterois over both the *kharif* and summer seasons. Whereas, hybrid BO-2 x VRO-4 was significant over standard check during summer-2012.

Fruit length is an economical character in okra, for this trait fifteen, fifteen and seventeen hybrids were exhibited non-significant positive heterobeltiosis over *kharif* seasons. Whereas, hybrid BO- 2 x 364 was significant during summer-2011 and four hybrids were non-significant positive heterobeltiosis during summer-2012. None of the hybrid was shown significant standard heterosis over both the *kharif* and summer seasons. However, seven, one, six, six and one hybrid was found with marginal standard heterosis over *kharif* and summer seasons.

Hybrids BO-2 x 315 and Vaibhav x 315 were significant over better parent in *kharif*-2011 and sixteen and seventeen hybrids were marginal superior in *kharif*-2010 and *kharif*-2012. Hybrid EC-316053 x 315 was

consistently superior over better parent for number of seeds per fruit over summer seasons. Hybrid 447 x 315 was significantly superior over better parent during summer-2012. Hybrids BO-2 x 315 and Vaibhav x 315 were shown significant standard heterosis during *kharif*-2011; BO-2 x IIVR-11 during *kharif*-2012. However, hybrid EC-316053 x 315 was shown consistent significant standard heterosis over summer seasons.

Number of fruits per plant is directly related with fruit yield. In present study, none of the hybrid was consistent over both the *kharif* and summer seasons. However, hybrid Vaibhav x 315 was significant over better parent during *kharif*-2010; Vaibhav x 364 during *kharif*-2012; Vaibhav x 410 during summer-2011 and Vaibhav x 162 during summer-2012. Whereas, four hybrids *viz.*, 447 x VRO-4, EC-316053 x VRO-4, Vaibhav x 315 and Vaibhav x 410 were found significant standard heterosis during *kharif*-2011.

Parental line HRB-55 was good general combiner for days to first flowering over the *kharif* and summer seasons. Four parental lines *viz.*, 447, VRO-4, IIVR-11 and 364 was significant negative general combining ability effects over *kharif* seasons. Two parental lines, 35 and 162 were good combiner over summer seasons. None of the cross combination was shown consistent significant specific combining ability effects over the *kharif* and summer seasons. However, two hybrids 35 x 315 and 447 x 315 during *kharif*-

2011 and one hybrid BO-2 x VRO-4 during summer-2011 was exhibited significant specific combining ability effects.

Significant negative *gca* effects for days to 50% flowering over the *kharif* and summer seasons were expressed by BO-2 and HRB-55. Two parental lines 447 and 364 over *kharif* seasons and one parent 162 over summer seasons were good general combiner for days to 50% flowering. Hybrids 35 x 315 and Vaibhav x IIVR-11 were found with significant *sca* effects during *kharif*-2011.

Parent, Vaibhav over the *kharif* seasons and parents 162 and 364 over summer seasons was good general combiner for number of branches per plant. None of the hybrid was found with significant specific combining ability effects over the *kharif* and summer seasons. However, eighteen, thirteen, twentytwo, seventeen and eighteen cross combinations were exhibited non-significant positive *sca* effects during *kharif*-2010, *kharif*-2011, *kharif*-2012, summer-2011 and summer-2012.

None of the parental line was shown significant positive general combining ability effects over the *kharif* and summer seasons for plant height. However, hybrid BO-2 x VRO-4 was found significant specific combining ability effects during summer-2012.

Parent, Vaibhav was found significant positive consistent general combining ability effects over summer seasons for tender fruit length. None of

the parents was shown significant consistency over *kharif* season. Whereas, hybrid Vaibhav x HRB-55 was expressed significant positive *sca* effects during summer-2012.

None of the parental lines was shown significant positive *gca* effects for number of seeds per fruit over the *kharif* and summer seasons. Hybrid EC-316053 x 315 was found significant positive *sca* effects during summer-2012.

Three parent *viz.*, Vaibhav, VRO-4 and 410 was good general combiner for number of fruits per plant during *kharif*-2011. None of the parent shows significant consistent over the *kharif* and summer season. Hybrid Vaibhav x 315 and EC-316053 x VRO-4 during *kharif*-2011 and hybrid EC316053 x 364 during summer-2012 were exhibited significant positive *sca* effects.

None of the parents was found with significant positive *gca* effects over the *kharif* and summer season for weight of fruits per plant. However parent 35, Vaibhav and 315 were exhibited non-significant positive *gca* effects over the two and three *kharif* seasons. However hybrid, Vaibhav x 315 expressed significant positive *sca* effects over the *kharif* seasons.

Combining ability variances and gene action study revealed higher estimates of GCA variance than SCA variance for all the characters except days to 50% flowering, number of branches and number of seeds per fruit during *kharif* 2010 (KE<sub>1</sub>); Plant height and number of fruits per plant during *kharif* 2011 (KE<sub>2</sub>); number of seeds per fruit and number of fruits per plant

during *kharif* 2012 (KE<sub>3</sub>); days to first flowering during summer 2011 (SE<sub>1</sub>); whereas plant height, number of seeds per fruit and number of fruits per plant. The additive variance was higher than dominance for all the characters except days to 50% flowering, number of branches per plant, tender fruit length and number of seeds per fruit during *kharif* 2010 (KE<sub>1</sub>); days to 50% flowering and number of fruits per plant during *kharif* 2011 (KE<sub>2</sub>); number of seeds per fruit and number of fruits per plant during *kharif* 2012 (KE<sub>3</sub>); days to first flowering during summer 2011 (SE<sub>1</sub>); whereas plant height, number of seeds per fruit and number of fruits per plant during summer 2012 (SE<sub>2</sub>). The ratio of GCA variance to SCA variance was less than unity for all the characters except days to first flowering, plant height and weight of fruits per plant during *kharif* 2010 (KE<sub>1</sub>) and *kharif* 2011 (KE<sub>2</sub>); days to first flowering and number of seeds per fruit during *kharif* 2012 (KE<sub>3</sub>) and weight of fruits per plant during summer 2012 (SE<sub>2</sub>), indicates that characters were predominantly governed by additive gene action.

It was observed that the dominance as well as additive components of variation were important for expression of fruit yield. The additive component of variation was found to be involved in most of the characters. An improvement, therefore, in all such characters will be possible and effective by adopting a proper selection method, crossing genetically diverse parents for yield and its component characters with high GCA effects and selecting the

desirable transgressive segregants. The resultant segregating population would also provide scope to generate variability to achieve the goal.

Both linear (predictable) and non-linear (unpredictable) components significantly contributed to genotype x environmental interactions for yield and yield contributing components and part of variation in these characters was unpredictable. In present investigation, 35 x 162, 447x 315, Vaibhav x 315 and Vaibhav x 364 were found stable for *kharif* season and BO-2 x 315, 35x 162, 447x 315 and vaibhav x 364 were stable over *kharif* season. Among top five heterotic hybrids, two hybrids Bo-2 x 315 and Vaibhav x 315 were found stable over the environments and could be commercially exploited after intensive testing.

Thus, it could be concluded that in okra, there is great scope for exploitation of heterosis even though limited genetic diversity in germplasm. Further, there is wide scope to develop parental lines and straight varieties by selecting transgressive segregants from elite crosses.