CHAPTER VI
SUMMARY AND CONCLUSIONS

The present investigation on ridge gourd (*Luffa acutangula* (Roxb.) L.) was undertaken with a view

1. To estimate the general and specific combining ability effects for fruit yield and its component traits.
2. To study the nature and magnitude of heterosis for fruit yield and its component traits.
3. To estimate the nature and magnitude of gene action involved in the inheritance of fruit yield and its component traits.
4. To identify superior cross combinations and parents for future use.

The experimental material comprised of parents and their $F_1$s derived by crossing of seven lines *viz.*, JRG-13-01, JRG-13-02, JRG-13-03, JRG-13-04, JRG-13-05, JRG-13-06, JRG-13-07 and three testers *viz.*, Arka Sujat, Pusa Nasdar, Jaipur Long and one check GJRGH-1 in a line x tester fashion. Ten parental types were collected from the different states of the country on the basis of morphological variability for growth, maturity, fruit size and shaped; fruit yield and fruit yield contributing characters of ridge gourd. The experiment was laid out in a Randomized Block Design with three replications during summer-2016 at the Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh. The observations were recorded on 17 characters *viz.*, days to 50% flowering, days to opening of first female flower, days to opening of first male flower, node number of first female flower, node number of first male flower, days to first picking, length of main vine (m), number of primary branches per vine, number of fruits per vine, fruit weight (g), length of fruit (cm), girth of fruit (cm), rind thickness (mm), flesh thickness (mm), fruit yield per vine (g), number of seeds per fruit, 100-seed weight (g).

The data presented and discussed has facilitated to draw the following conclusions.
**Summary and Conclusions**

1. Analysis of variance showed highly significant differences among the genotypes for all the characters indicating that the genotypes exhibited significant differences for all the characters studied. Differences amongst hybrids were found highly significant for all characters except for length of fruits (cm). Differences amongst parents were found highly significant for all characters except for number of fruits per vine, girth of fruit (cm) and rind thickness (mm). Differences due to parents vs hybrids were found highly significant for all the characters except for rind thickness (mm) and 100-seed weight.

2. A marked degree of useful and significant heterosis over better and standard parent (GJRGH-1) was observed in individual crosses for different traits. The magnitude of heterosis was obtained high for days to 50% flowering, days to open first male flower, node number of first male flower, days to first picking, number of fruits per vine, fruit weight (g), fruit yield per vine (g). Whereas, the magnitude of heterosis was moderate for node number of first female flower, length of main vine (m), number of primary branches per vine, girth of fruit (cm) and flesh thickness (mm) and low for length of fruit (cm), rind thickness (mm), number of seeds per fruit and 100-seed weight.

3. The hybrids exhibited marked heterosis over better parent and standard check for various characters. Significant estimates of positive heterobeltiosis and standard heterosis were observed in 10 and 9 cross combinations, respectively for fruit yield per vine. The range of heterobeltiosis was from -24.22 to 36.69 %, while the standard heterosis ranged from -17.23 to 26.55 % for this trait. The cross JRG-13-04 x Jaipur Long (26.55 %) recorded the highest standard heterosis for fruit yield per vine followed by JRG-13-04 x Arka Sujat (17.23 %), JRG-13-04 x Pusa Nasdar (17.11 %), JRG-13-02 x Jaipur Long (16.43 %) and JRG-13-06 x Jaipur Long (15.93 %). These crosses also recorded significant standard heterosis for node number of first female flower, length of main vine, number of primary branches per vine, length of fruit and girth of fruit. The results thus, showed that the heterosis for fruit yield per vine was associated with heterosis for its component characters.

4. Analysis of variance for combining ability revealed that the mean squares due to lines were significant for all the characters except length of fruit (cm), while
mean squares due testers were significant for all characters except days to opening of first male flower, node number of first female flower, node number of first male flower, number of primary branches per vine, length of fruit (cm), girth of fruit (cm), rind thickness (mm) and number of seeds per fruit. In case of lines x testers interaction, the mean squares were also significant for all the characters except days to opening of first female flower, days to opening of first male flower, length of fruit (cm), rind thickness (mm), number of seeds per fruit and 100-seed weight (g). The results indicated the importance of both additive and non-additive genetic variances in the expression of these characters.

5. The estimated components of genetic variance indicated that the magnitude of variance due to lines ($\sigma^2_l$) was higher than those due to testers ($\sigma^2_t$) and lines x testers ($\sigma^2_{lt}$) for days to opening of first female flower, days to opening of first male flower, days to first picking, number of fruits per vine, fruit weight (g), length of fruit (cm), girth of fruit (cm), rind thickness (mm), fruit yield per vine (g), number of seeds per fruit and 100-seed weight (g). While, the magnitude of $\sigma^2_{lt}$ was higher in case days to 50% flowering, node number of first female flower, node number of first male flower, length of main vine (m), number of primary branches per vine and flesh thickness (mm).

6. Analysis of variance for combining ability revealed that both additive and non-additive genetic variances played an important role in governing most of the characters. However, the additive genetic component was predominant in the genetic control of days to opening of first female flower, days to opening of first male flower, days to first picking, number of fruits per vine, fruit weight (g), girth of fruit (cm), rind thickness (mm), fruit yield per vine (g), number of seeds per fruit and 100-seed weight (g), while non-additive genetic component was more important for days to 50% flowering, node number of first female flower, node number of first male flower, length of main vine (m), number of primary branches per vine and flesh thickness (mm).

7. The greater than unity ratio of $\sigma^2_{gca}:\sigma^2_{sca}$ was for nine characters viz., days to opening of first female flower, days to opening of first male flower, days to first picking, number of fruits per vine, fruit weight (g), length of fruit (cm),
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fruit yield per vine (g), number of seeds per fruit and 100-seed weight (g) indicated that this character was governed by additive type of gene action. Whereas, less than unity ratio of $\sigma^2_{gca}:\sigma^2_{sca}$ were for eight characters viz., suggested that these characters days to 50% flowering, node number of first female flower, node number of first male flower, length of main vine (m), number of primary branches per vine, girth of fruit (cm) and flesh thickness (mm) were predominately under the control of non-additive gene action. This indicated that improvement in fruit yield and its attributes in ridge gourd may be expected through hybridization followed by standard selection procedures and biparental mating, internating of elite segregants and postponding that selection up to later generations should be followed, which meets the requirement of utilizing both types of gene actions.

8. The estimates of gca effect for fruit yield and its components indicated that among the lines, JRG-13-04 was found to be good general combiner simultaneously for eleven characters viz., Days to 50% flowering, days to first opening of female flower, days to first opening of male flower, days to first picking, number of fruits per vine, fruit weight (g), girth of fruit (cm), flesh thickness (mm) and fruit yield per vine (g). Other good general combiners identified for different characters were JRG-13-07 for number of fruits per vine, fruit yield per vine (g) and number of seeds per fruit; JRG-13-06 for number of fruits per vine and fruit yield per vine (g). Among the testers, Jaipur Long was good general combiner simultaneously for two characters viz., fruit weight (g) and fruit yield per vine (g).

9. 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 effect for fruit yield per vine also possessed high and significant gca effects for some of the yield components. The results indicated that the parents (lines and/or testers) showing desirable gca for more number of components possessed high concentration of favourable genes for more number of traits and should be utilized in multiple crossing programmes in order to combine important attributes and to develop high yielding types in ridge gourd.
10. Majority of the parents exhibited good gca effect for different traits also had acceptable per se performance, which suggested that the per se performance can be considered as a reliable criterion for selecting parents for hybridization.

11. The cross combinations viz., JRG-13-07 x Pusa Nasdar, JRG-13-06 x Arka Sujat, JRG-13-05 x Jaipur Long, JRG-13-01 x Pusa Nasdar, JRG-13-02 x Jaipur Long, JRG-13-03 x Pusa Nasdar, JRG-13-04 x Arka Sujat and JRG-13-03 x Arka Sujat were found to be good specific cross combination for fruit yield per vine. Crosses showing high sca effects for fruit yield per vine also depicted high sca effects for important yield attributes, accompanied by high to moderate heterotic response. Crosses with high sca effect in fruit yield per vine were in combinations of good x poor or poor x good or poor x poor general combiners.

12. The crosses showing high heterosis coupled with high sca effect involved at least one parent with good gca effect. Such crosses are expected to give desirable transgressive segregants in the segregating generations if additive genetic system present in good general combiner and the complementary epistatic effect in $F_1$ act in same direction to maximize the desirable plant attribute.

**CONCLUSION**

On the basis of per se performance, heterotic response, combining ability estimate and gene action involved in the expression of yield and its components, the JRG-13-04 x Jaipur Long, JRG-13-04 x Arka Sujat, JRG-13-04 x Pusa Nasdar, JRG-13-02 x Jaipur Long and JRG-13-06 x Jaipur Long appeared to be most superior. These hybrids recorded 26.55, 17.23, 17.11, 16.43 and 15.93 per cent higher yield over standard parent (GJRGH-1) and significant sca effects in desirable direction for fruit yield and some components traits of fruit yield. Therefore, these five crosses could be exploited for heterosis breeding programme to boost the fruit yield in ridge gourd.