CHAPTER-VI
SUMMARY AND CONCLUSION

The experiment entitled “Effect of pre and post harvest treatments of chemicals on shelf life of different cultivars of mango (Mangifera indica L.)” was carried out at Fruit Research Station, Sakkarbaugh Farm and Post Graduate Laboratory, Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during 2017. The experiment was laid out in Factorial Completely Randomized Design (FCRD) with twenty treatment combinations arising from four mango varieties (V₁ – Kesar, V₂ – Alphonso, V₃ – Langra and V₄ – Ratna) and five chemical treatments (C₁ - Putrescine 2 mM, C₂ - Spermine 1 mM, C₃ - GA₃ 200 ppm, C₄ - CaCl₂ 1.5 % and C₅ - Control) with two replications. The results discussed in preceding chapters are summarized as follows.

6.1 Physical Parameters

- Fruit characters are showed variation among different varieties. Among the varieties studied, the variety Langra recorded the maximum weight of fruit, volume of fruit, pulp weight, highest fruit length, pulp to stone ratio, pulp to peel ratio and Ratna recorded maximum stone weight, peel weight and maximum girth of the fruit. At the same time effect of chemicals and interaction effect was found non-significant in fruit characters.

- Physiological loss in weight increased with increase in storage period. Loss in weight gradually increased with respect to the increment of storage duration irrespective of varieties. Among the varieties studied, the variety Kesar recorded the minimum loss in weight and Langra recorded maximum. Treatment with putrescine 2 mM reduced loss in weight over the control. Among different treatment combinations, V₁C₁ (Kesar + Putrescine 2 mM) recorded minimum weight loss during study period.

- Marketable fruits were decreased with the increment in storage time. Among the different varieties evaluated, Kesar gave maximum marketable fruits. However, minimum marketable fruits obtained in Langra variety. Among the chemicals treatment with putrescine 2 mM showed maximum marketable fruits compared to control. Among different treatment combinations, V₁C₁
(Kesar + Putrescine 2 mM) gave promising results with respect to maximum marketable fruits.

- Among the varieties studied, Kesar variety showed minimum spoilage loss where as Langra variety showed maximum spoilage loss. Fruits treated with putrescine 2 mM showed minimum spoilage loss compared to control. Coming to the interaction effect of varieties and chemicals, Kesar variety treated with putrescine 2 mM (V1C1 - Kesar + Putrescine 2 mM) recorded minimum spoilage loss compared to other treatment combinations.

- Ripening was significantly influenced by different varieties. Among the different varieties, Langra took minimum days (9.90) for ripening and gave maximum percentage of ripe fruits. Whereas, Kesar taken maximum days (13.30) for ripening and minimum ripened fruits percentage compared to other varieties. Delayed ripening percentage and maximum days (13.75) to ripening was recorded in putrescine 2 mM treated fruits compared to control. Among the different treatment combinations, fruits of V1C1 (Kesar + Putrescine 2 mM) showed slow ripening and took maximum days (15.00) for ripening.

- Shelf life of mango fruits was significantly influenced by varieties, chemicals as well their interaction. Out of four varieties studied, Kesar had long shelf life of 17.10 days and shelf life of Langra was short (13.80 days). Among the different chemicals treated, putrescine 2 mM increased shelf life upto 17.75 days i.e 5.12 days extended over control. Within the different treatment combinations V1C1 (Kesar + Putrescine 2 mM) enhanced shelf life upto 19 days.

- Even though fruit firmness was reduced with the progress in storage period, Kesar maintained higher firmness among all the varieties at the end of storage, whereas Langra variety recorded lowest firmness. The decrease in firmness was comparatively slower in putrescine 2 mM treated fruits than control. Among the different treatment combinations, V1C1 (Kesar + Putrescine 2 mM) maintained the highest fruit firmness throughout the period of storage.

6.2 Biochemical parameters

- The total soluble solids increased with advancement of storage period. The rate of increase in TSS was comparatively slower in Kesar variety and was highest in Langra variety. On the last day of storage Kesar variety recorded maximum TSS among the different varieties. Putrescine 2 mM treated fruits
showed slow and gradual increase in TSS compared to control. Treatment combinations V1C1 (Kesar + Putrescine 2 mM) maintained the highest TSS on the last day of storage and slower increase in total soluble solids.

- Acidity was gradually decreased with increment in storage days. But the rate of reduction in acidity was varied among the varieties and highest acidity was maintained by the Kesar variety throughout the storage period. However, variety Langra showed lower level of acidity and faster depletion in acid content. Among the different chemicals treated, the rate of decrease in acidity was slower in putrescine 2 mM treated fruits. Higher acidity and slower reduction rates of acidity was showed by treatment combination of V1C1 (Kesar + Putrescine 2 mM).

- Ascorbic acid content of the fruits decreased continuously during storage. Langra variety initially recorded higher levels of ascorbic acid but later reduction rate was comparatively faster. But slower reduction in ascorbic acid throughout the storage period and higher levels of acid content on terminal day of storage was recorded in Kesar variety. Among the different chemicals, putrescine 2 mM treated fruits maintained higher levels of ascorbic acid and slower reduction rates compared to control. Interaction effect was found non-significant.

- Total Sugar, reducing sugar and non-reducing sugar content was increased with the increment of storage period. Among the varieties studied, Kesar recorded slower accumulation of sugars and recorded highest sugar content on last day of storage. Langra variety recorded fastest accumulation of sugars compared to the other varieties. Among different chemical treatments, fruits treated with putrescine 2 mM showed slower accumulation rates and maintained higher sugars during the last period of storage. Coming to the interaction effect of varieties and chemicals, treatment combination of V1C1 (Kesar + Putrescine 2 mM) maintained slower accumulation of sugars and highest sugar content with progress in storage period.

- Total carotenoids content was increased with increase in storage duration. Kesar recorded higher amounts of carotenoids with the progress in storage, while Langra showed low carotenoids content. Carotenoids content was significantly increased by the chemical treatment with putrescine 2 mM over
control. In the case of treatment combinations, V1C1 (Kesar + Putrescine 2 mM) gave highest total carotenoid content.

6.3 Organoleptic test score

- Among the different varieties, Kesar recorded highest scores of fruit colour, pulp colour, taste and overall acceptability. But lowest organoleptic scores were recorded in Langra. Fruits treated with putrescine 2 mM improved organoleptic scores. Among the different treatment combinations V1C1 (Kesar + Putrescine 2 mM) gave higher organoleptic scores.

CONCLUSION:

From the present investigation, it can be concluded that among different varieties studied, Langra is better in fruit characters but inferior in shelf life compared to other mango varieties. Among four varieties Kesar showed superior keeping quality and longer shelf life. Kesar showed lower weight loss, lower spoilage losses, more number of days for ripening, higher firmness and marketable fruits percentage contributing to longer shelf life. Similarly biochemical parameters like highest values of TSS, acidity, ascorbic acid, sugars and total carotenoids contents as well as organoleptic scores were superior in Kesar with prolonged storage period compared to other varieties. Varieties like Alphonso and Ratna also have better shelf life than Langra.

The pre-harvest application (15 days before harvest) and post harvest dipping of putrescine 2 mM improved the shelf life and quality of mango fruits. The treated fruits exhibited less weight loss, spoilage losses, more number of days for ripening, higher firmness and maximum marketable fruits. Putrescine 2 mM treated fruits improved TSS, acidity, ascorbic acid, sugars and total carotenoids compared to other treatments. This shows the beneficial effect of putrescine to improve the quality and shelf life of mango fruits.

Among the different varieties treated with various chemicals, variety Kesar treated with putrescine 2 mM enhanced the shelf life and quality. Therefore we can conclude that Kesar variety treated with putrescine 2 mM is very effective in extending the shelf life and quality which can attribute to the long shelf life during transport and higher keeping quality for export purpose.