CHAPTER-V
SUMMARY AND CONCLUSIONS

Peanut is a pod of the Leguminosae family and the second most harvested legume in the world behind soybeans and provides an important nutrient source to human. Peanut seeds make an important contribution to the diet in many countries. They are a good source of proteins, lipids and have a desirable fatty acid profile for which it is used for weight management diets and is rich in vitamins, minerals and several bioactive compounds. It also contains nutrients beneficial for heart including mono unsaturated fatty acids and poly unsaturated fatty acid.

Peanut oil is also considered superior than other vegetable oils during frying as fewer flavour defects are formed with long-term use. It is considered to be more desirable dietary ingredient than saturated animal fats because they helps to improve blood vessel elasticity, keeps the heart rhythm beating normally, thin the blood, which makes it less sticky and less likely to clot and support the immune system.

Roasted peanuts is one of the most popular snack foods, in which roasting is a key step in the process that directly impacts its quality especially crispness, taste and flavour as well as shelf-life of the final product. Roasting is critical to the development of colour, flavour and texture through chemical reactions, heat transfer and drying which occur during the roasting. Understanding of the roasting process is important because the critical roasting parameters (roasting time and temperature) greatly influence the roasted product characteristics.

Hence, the present investigation was undertaken to determine roasting characteristics of three different varieties namely GJG9, GG11 and GG20. The three varieties were selected on the basis of bunch, spreading and semi-spreading type and are distinctive in size, flavour and nutritional composition.

Based on the research work carried out on various methods employed for roasting and on the basis of earlier studies, it was concluded that roasting will be carried out by two different methods viz., hot air oven method and microwave oven method. Both methods have their own benefits and the quality of roasted peanuts
obtained from both the methods was evaluated in terms of biochemical, functional and sensory characteristics.

By considering the above facts, the present research was conducted to determine the various characteristics of three different varieties of peanut kernels roasted by two different methods with the following objectives:

1) To determine the effect of different roasting method and process parameters on organoleptic quality of roasted peanut kernels.
2) To optimize process parameters for quality roasting for different roasting methods.
3) To analyse the physico-chemical, biochemical and functional properties of peanut kernels before and after roasting.

The pods of the selected peanut cultivars were procured in the required quantity from the Main Oilseeds Research Station of Junagadh Agricultural University, Junagadh. The pods were decorticated manually to obtain whole kernels with minimum damage. The immature, rotten and scorched kernels were removed manually to obtain sound and healthy kernels for various investigations.

The different properties of raw peanuts viz., pod weight, kernel weight and shelling percentage were determined and biochemical analysis of raw peanut kernels which included moisture content, total carbohydrate, amino acids, true protein, oil content and GC-MS were carried out.

The roasting of peanut kernels was carried out by two methods. The critical roasting parameters which include roasting temperature and roasting time were decided on the basis of previous studies carried out by various researchers.

For hot air oven roasting, temperature was kept 160 ºC and the roasting durations were varied as 15 minutes, 30 minutes and 45 minutes. Microwave oven roasting was carried out at 2450 MHz frequency with three different roasting durations i.e., 3 minutes, 4 minutes and 5 minutes. Hence, the combination of three different varieties, two different methods and three different roasting durations resulted in total 18 treatments.
The roasted peanut kernels obtained from all the treatments were analysed for their biochemical, functional and sensory characteristics. Completely Randomized Design was used for statistical analysis of data obtained from treatments of both the methods employed for roasting.

Based on the results and its analysis, the following conclusions could be drawn from the various investigations.

1. The mean value for 100-pod weight, kernel weight and shelling percentage for variety GJG9 were 124.60±6.47 g, 88.59±7.42 g and 71.01±3.06 per cent, respectively.

2. The mean value for 100-pod weight, kernel weight and shelling percentage for variety GG11 were 105.88±7.20 g, 70.83±6.10 g and 66.03±1.70 per cent, respectively.

3. The mean value for 100-pod weight, kernel weight and shelling percentage for variety GG20 were 162.50±8.75 g, 116.77±6.40 g and 71.86±1.00 per cent, respectively.

4. The mean value for moisture content, total carbohydrate, amino acids, true protein and oil content for raw kernels of peanut variety GJG9 were 4.43, 17.91, 0.99, 25.90 and 46.29 per cent, respectively.

5. The mean value for moisture content, total carbohydrate, amino acids, true protein and oil content for raw kernels of peanut variety GG11 were 3.89, 18.76, 0.88, 26.80 and 48.17 per cent, respectively.

6. The mean value for moisture content, total carbohydrate, amino acids, true protein and oil content for raw kernels of peanut variety GG20 were 4.10, 16.25, 1.08, 27.89 and 50.10 per cent, respectively.

7. The moisture content for hot air oven roasted peanut kernels decreased in the range of 2.9 to 0.4 per cent whereas as that of microwave oven roasted peanut kernels was reduced in the range of 3.5 to 2.0 per cent. The decrease in moisture content for hot air oven roasting method was higher than microwave oven roasting.
8. The total carbohydrate content for all the treatments was higher than raw samples. However, in comparison between two methods, the carbohydrate content was found higher in the microwave oven roasted peanut kernels.

9. The total free amino acids for all the treatments were lower than raw samples. Microwave oven roasting proved to be less detrimental to the decrease in amino acids. However, the effect of roasting duration on roasted peanut kernels was found to be non significant. Whereas, hot air oven roasting showed a significant decrease in amino acids with increase in roasting time.

10. There was a significant effect of hot air oven roasting on protein content of roasted peanut kernels. The protein content decreased with increase in roasting time. All the varieties yielded higher protein content at lowest roasting duration (15 minutes).

11. Microwave oven roasting showed a non significant effect on protein content of roasted peanut kernels i.e., there was no particular trend with increase in roasting time. For peanut variety GJG9 and GG11, higher values were obtained at roasting time of 5 minutes. Variety GG20 showed highest value at 3 minutes roasting time.

12. The effect of roasting on oil content concluded that regardless of method employed for roasting, oil content decreased with increase in roasting time. The treatments from both the methods showed highest value at lower roasting time.

13. The oil content in hot air oven roasted peanut kernels was higher for treatments at 15 minutes roasting time. For microwave oven roasting, it was higher for 3 minutes roasting time. Also treatments of microwave oven roasting yielded higher oil content than that of hot air oven roasting.

14. GCMS analysis for comparison of oil obtained from raw and roasted peanut kernels detected presence of various saturated as well as unsaturated fatty acids.

15. The effect of hot air oven roasting on free fatty acid content (as % oleic acid) showed that initially free fatty acid content increased with increase in roasting duration up to 30 minutes and then decreased for roasting duration of 45 minutes.
16. Microwave oven roasting showed a significant increase in free fatty acid (FFA) content with time. This behaviour was observed in variety GG11 and GG20. But variety GJG9 differed, in that the FFA content was similar at 4 minutes and 5 minutes of roasting duration.

17. The peroxide value of roasted peanut kernels increased with increase in roasting time. The lowest peroxides were conquered at lower roasting time. There was a significant effect of both the methods on peroxide value. In comparison between two methods, lower values were obtained for treatments of microwave roasting method.

18. The iodine number for all the treatments increased significantly with increase in time. The lowest preferable iodine number were found at lower roasting time i.e., for hot air oven roasting, roasting duration of 15 minutes gave lowest value. Microwave oven roasting produced lower values at 3 minutes roasting time.

19. Regarding functional characteristics, water absorption index (WAI) of roasted peanut kernels increased with increase in roasting time. The water absorption index was higher for hot air oven roasted peanut kernels and the reason was that moisture content was less in these samples. Hence, microwave oven roasted peanut kernels showed lower WAI.

20. The hot air oven roasting had no significant effect on water solubility index (WSI) except for peanut variety GG11 which showed an increase in water solubility index (WSI) with time. Also, microwave oven roasting had no significant effect on WSI.

21. The sensory characteristics of roasted peanut kernels revealed that for hot air oven roasting, colour index was higher at 30 minutes duration in variety GJG9 and GG11. For variety GG20, it was higher at 45 minutes duration. Odour attribute was highest for variety GG20 at 45 minutes roasting time. For variety GJG9, it was higher at 30 minutes roasting time. The taste attribute was dominant in variety GG20 at 45 minutes roasting time followed by variety GG11 at 30 minutes roasting time. The appearance attribute was higher for variety GJG9 at 30 minutes; however the data were not significantly different from each other.
The overall acceptability was higher in GG20 at 45 minutes roasting time while for GJG9 and GG11 it was higher for 30 minutes roasting time.

22. From the results of sensory analysis, it could be concluded that peanut variety GJG9 and GG11 had superior sensory attributes at 30 minutes roasting time. The sensory attributes for peanut variety GG20 were highest for 45 minutes roasting time.

23. The colour attribute in microwave oven roasted peanut kernels was found higher at 3 minutes roasting time for all the three varieties. The odour index was higher in variety GJG9 at 5 minutes roasting time and no significant effect was observed in variety GG11. For variety GG20, it was higher at 3 minutes roasting time. Results similar to odour index were found for taste attribute. Regarding appearance, it was higher at 5 minutes roasting time for GJG9 and 3 minutes roasting time for GG20. The highest score for overall acceptability was found in variety GJG9 at 5 minutes. For GG11, it was higher at 4 minutes roasting time and for GG20 it was higher at 3 minutes roasting time.

24. The results for sensory characteristics of microwave oven roasted peanut kernels revealed that roasting duration of 5 minutes was beneficial to peanut variety GJG9. For variety GG11, 4 minutes duration gave higher sensory values and for variety GG20, it was higher at 3 minutes roasting time.

Considering the overall aspects of the study, it may be concluded that irrespective of method employed for roasting, biochemical parameters of roasted peanut kernels were better retained at lower roasting times. Microwave oven method showed superior attributes as compared to hot air oven method in roasting the peanut kernels.