

Quality Evaluation and Standardization Recipes for Apple Pies

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KEY WORDS Apple Pies. Ascorbic Acid. Crude Protein Content.

ABSTRACT Himachal Pradesh is first being labelled as the 'apple state' of India. Due to poor marketing and hazardous transportation system, a major chunk of the apple crop gets destroyed every year. We intend to popularise more purposeful use of this surplus stock for making apple products. One such product is apple pie, a delicious apple product, new to this part of the country which does not require expensive packaging material and could be wrapped in aluminium foils or paper and marketed to distant markets. Carefully planned strategy has popularised this new introduction in a section of society. More data shall be presented on the chemical analysis, nutritional aspects and shelf-life studies.

INTRODUCTION

Himachal ranks first among the apple producing states in the country. In the two neighbouring states of Himachal Pradesh and Jammu and Kashmir, an area of 43,360 and 1,23,600 hectares with an annual production of 3,06,798 and 3,92,000 tonnes, respectively is under apple cultivation (Anonymous, 1982). This figure is showing an upward trend with each passing year.

Oflate, it has been realised that it is rather more important to effectively utilize the total production of all varieties of apple minimising the losses incurred during transit or because of faulty marketing policy or may be because of inadequate facilities for processing the produce. Post-harvest handling of fruits including apples for the manufacture of products like jams, jelly, juice, preserve, sauces, butter, cider, wine and candied apples and recently apple juice concentrates is gaining popularity both with the policy makers and growers alike. The biggest advantage is that the processed products can be stored, till the time all the stocks are disposed off. Himachal has taken a lead in this direction by opening units for processing apple concentrates in the public sector but much remains to be done and these have become popular in many countries. But packaging materials like tin cans, tetrapacks and bottles being very expensive, add to the price of the proc-

essed products and became limiting factor for effective development of the apple industry per se. Therefore, needs of the hour is to make suitable alternative preparations from apple which do not require expensive packaging and can be made available in the domestic market. One such product is apple pie, which can be marketed wrapped in paper and polythene bags. Apple is one of the most important products of the Western world especially United States of America. The proverb "as American as Apple pies" does show its importance where about 13 per cent of total production of apple is consumed in the shape of apple pies (Anonymous, 1968).

Keeping in view the above, an effort has been made to formulate a product similar to apple pies suiting to Indian taste and conditions. In case, it is found acceptable it is proved to be one of the major outlets for the utilization of apples and will not be cost ridden because of expensive containers.

MATERIALS AND METHODS

Royal delicious apples used presently were procured from the Regional Fruit Station, Mashobra, Shimla hills and other ingredients from the local market.

Standardization of the Recipes: Different recipes were tried as a pre-trial exercise and recipes not coming upto the taste of consumers were rejected rightway. The recipe was selected after organoleptic evaluation and promising formulations are given in table 1.

After having received the fruits in the laboratory, these were spread out in a single layer on the table. Overmature, rotton, bruised or unripe fruits were sorted out.

The fruits were washed, peeled and divided into eight segments and cored. The sliced were immediately dipped in a solution of ascorbic acid (1.00%) to check browning. And these slices were then divided into two lots. One lot of the

Table 1: Different treatments of the experiment

Treatments	Fruit slices	Flour (g)	Refined flour (g)	Fats (g)	Yeast g/1000 (g)	Baking powder g/1000 (g)	Salt (g)	Sugar (g)	Cinnamon (g)	Cardamom (g)	Aniseed (g)
T ₁	3	26.66	13.34	12.00	6.00	4.00	2.00	6.00	2.00	1.00	1.50
T ₂	3	26.66	13.34	12.00	6.00	4.00	2.00	6.00	1.50	0.50	1.00
T ₃	3	26.66	13.34	12.00	6.00	4.00	2.00	6.00	1.00	0.50	0.50
T ₄	3	26.66	13.34	12.00	6.00	4.00	2.00	6.00	0.50	0.50	0.50
T ₅	3	26.66	13.34	12.00	6.00	4.00	2.00	6.00	0.00	1.00	1.00

slices packed in polyethene bags containing 20 slices weighing about 300 grams, sealed hermetically, transferred to a freezer and other lot of the slices was used to prepare pies from fresh slices.

Preparation of Dough: To the sieved flour pre-calculated ingredients *i.e.* fats, yeast, baking powder and salt were added according to the recipe, mixed properly and the dough was kneaded till proper consistency by adding approximate 250 ml of luke warm water/1000 grams of mixed flour. The dough was left overnight (6 hours) for effecting the steeping and leavening effects (Table 2).

Table 2: Ingredients used per pie

S. No.	Ingredients	Amount in grams
1.	Flour : Fenined Flour (2:1)	40.00
2.	Fats	12.00
3.	Yeast	0.24
4.	Baking powder	0.16
5.	Salt	2.00
6.	Sugar	6.00
7.	Fruit slices	3.00
8.	Cinnamon	2.00
9.	Aniseed	1.50

Preparation of Crust and Pie: The dough crusts were prepared with the help of a rolling pin on a rolling plate of uniform size and shape. A portion of the sugar ingredients were sprinkled over the crust. The apple slices were arranged on the crust and rest of the sugar alongwith other spices were sprinkled over the slices. The pies were rolled and ends of the crust pressed firmly to effect a strong seal, baked in the electric oven at 218°C.

Chemical Analysis: The pies were analysed for different parameters *viz.*, pH, titratable acidity, ascorbic acid, ash content, moisture content, protein content. The pertinent data is presented in table 3.

pH: The mean values of pH obtained by different treatments is shown in the table 3. A perusal of data showed the highest and lowest pH values of 6.20 and 5.70 for treatments T₂ and T₄ respectively. The mean pH values of the rest of the treatments in descending order were 6.00, 5.80 and 5.80 for T₁, T₃ and T₅, respectively. When the fruits was unbaked, the pH was 4.30 but after baking pH value increased. This variation was due to the use of condiments and spices and sugar etc.

Table 3: Effect of treatments on some chemical parameters of apple pie

Treatments	pH	Acidity	Vit.C mg/100g	Ash %	Protein %	Moisture %
Apple fruit	4.30	0.21	1.89	1.14	0.35	58.39
T ₁	6.00	0.35	1.00	1.07	13.90	37.13
T ₂	6.20	0.21	1.20	1.19	15.40	32.15
T ₃	5.80	0.34	1.21	1.37	14.00	26.26
T ₄	5.70	0.25	1.00	1.05	14.60	40.37
T ₅	5.80	0.22	1.21	1.17	14.70	36.29

Per cent Titratable Acidity: From the data pertaining to the per cent titratable acidity it is seen that highest titratable acidity of 0.35 per cent was found in T₁ and the lowest of 0.21 per cent in T₂. The mean per cent titratable acidity of the rest of the treatments in order of preference was 0.34 for T₃, 0.25 for T₄ and 0.22 for T₅. The unbaked apple was having 0.21 per cent acidity but after baking the acidity ranged from 0.21 to 0.35. It may be because of the ingredients used in pie making.

Ascorbic Acid: The data pertaining to the ascorbic acid content of different treatments revealed that the maximum ascorbic acid of 1.21 mg was found in T₃ and T₅ and minimum as 1.00 mg in T₁ and T₄, respectively.

In unbaked fruit it was 1.89 but after comparing with the apple pie the content was reduced in all treatments.

According to Desrosier (1978) ascorbic acid is destroyed upon heating at low temperature for a long period of time. The destruction of this vitamin is accelerated by oxygen tension. This finding supports the results as reported here.

Crude Protein : From the data, it is clear that highest percentages of protein was found in treatment T₂, (15.40) and lowest in T₁ (13.90). The rest of the mean score lies between these two treatments. The mean value of the rest of the treatments in order of preference was 14.70 for T₃, 14.60 for T₄ and 14.00 for T₅.

There was a high increase in protein when it was compared with unbaked apple. The reason was because in pie baking wheat flour and refined flour in the ratio of 2:1 was used. The protein content of wheat flour was 12.1 per cent and refined flour 11.0 per cent, so both were already high in protein content. Therefore, the protein content has been increased in the pie afterwards.

Ash Content : It is evident from the table that highest ash per cent in treatment T₃ (1.37) whereas, lowest in T₄ (1.05). The rest of the values of mean ash content lie in between these two treatments. The ash content has increased after baking when compared with the unbaked apple. Again the reason for this was the use of different

shelf-life was 5 days for T₁ and T₂ treatments but for T₃, T₄ and T₅ treatments the shelf-life was 6 days.

Shelf-life of the 3rd baking schedule remained upto 5 days for T₁ and 6 days for rest of the treatments.

The shelf-life of the product prepared from 8 weeks storage interval was 6 days for T₃ and 5 days for the rest of the treatments.

The shelf-life of the product prepared from 8 weeks storage interval was 6 days for T₃ and 5 days for rest of the treatments. The life was highest for frozen slices. Shelf-life was observed as 7 days for all treatments except for T₄ which show 6 days life. In case of 8 week frozen slices the life was recorded as 7 days for T₁ and T₂ and 6 days for T₃, T₄ and T₅ treatments.

The reason is only due to different temperatures. In the beginning the temperature was high as compared to the last baking, so the life was cut short in the first baking.

CONCLUSIONS

A product which is better in nutrition, taste and marketability can be manufactured by using apple slices. Production of such products can find yet another outlet for the proper use of apples.

Table 4: Shelf-life of the product (Apple pie)

Treatments	Fresh fruit 1st baking	Baking after 1 week	Baking after 4 week	Baking after 8 week	Baking after 4 week	Baking after 8 week
T ₁	4 days	5	5	5	7	7
T ₂	4 days	5	6	5	7	7
T ₃	4 days	6	6	6	7	6
T ₄	4 days	6	6	5	6	6
T ₅	4 days	6	6	5	7	6

ingredients in the pie-baking.

Moisture Content : The moisture content revealed that highest per cent of moisture was present T₄ (40.37) and lowest in T₃ (26.26). The rest of the mean per cent of moisture was between these two treatments. The moisture when compared with the unbaked apple was decreased because the evaporation of moisture taken place during baking.

Shelf-life: From the table 4, it is evident that shelf-life of the product, T₁ to T₅, on first baking, was 4 days for all treatments when product was prepared from one week stored fruit, the

This will provide a variety to the Indian homes. The product can be packed and marketed in papers or polyethene wrappers which do not involve expensive packing material like cans or glass etc.

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