

## **Studies on value added product of blended apple and pineapple cheese**

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### **Abstract**

The present experiment was carried out during October 2020 in the Post Harvest Laboratory of the Department of Horticulture, SHUATS, Prayagraj (India). The experiment was conducted in Completely Randomized Design (CRD), with ten treatments and three replications. The treatments were T<sub>0</sub> Apple + Pineapple 100% (Control), T<sub>1</sub> Apple + Pineapple + Cashew nut (2.5%), T<sub>2</sub> Apple + Pineapple + Cashew nut (5%), T<sub>3</sub> Apple + Pineapple + Cashew nut (10%), T<sub>4</sub> Apple + Pineapple + Almond (2.5%), T<sub>5</sub> Apple + Pineapple + Almond (5%), T<sub>6</sub> Apple + Pineapple + Almond (10%), T<sub>7</sub> Apple + Pineapple + Pistachio nut (2.5%), T<sub>8</sub> Apple + Pineapple + Pistachio nut (5%) and T<sub>9</sub> Apple + Pineapple + Pistachio nut (10%). The main objectives of the research is to standardize the proportion of apple and pineapple pulp for Apple-Pineapple blended cheese, in order to improve physico-chemical properties, organoleptic characteristics and shelf-life of the product, within an affordable economics. From the present investigation it is found that treatment T<sub>6</sub> Apple + Pineapple + Almond (10%) was superior in respect of the parameters Total Soluble Solids (9.98<sup>o</sup>Brix), Total Sugar (10.49%), Reducing Sugar (4.14%), Non-Reducing Sugar (6.35%), Ascorbic acid (115.69 mg/100g), Acidity (0.62%), pH (4.69%), Ascorbic acid (115.69mg/100g). In terms of organoleptic properties like Flavour and Taste (8.00), Colour and Appearance (8.00), Texture (8.33) and Overall Acceptability (8.11) T<sub>6</sub> was found best. In terms of cost benefit ratio, the highest net return (294.5/-) and Cost Benefit Ratio (1.65) were found in T<sub>4</sub> Apple + Pineapple + Almond (2.5%). Hence, T<sub>6</sub> was found superior based on above parameters and T<sub>4</sub> was best based on cost benefit ratio.

**Keywords:** *Apple-Pineapple and value addition Cheese*

### **Introduction**

Apple (*Malus x domestica* Borkh.) is the most important temperate fruit crop of the North Western Himalayan region of the country. In India, the area under apple is 313.00 thousand hectares with approximate production of 2497.70 thousand metric tonnes having a productivity of 8.00 metric tonnes/hectare. Apple is highly nutritive food. It contains minerals and vitamins in abundance. The food value of the Apple is chiefly constituted by its contents of sugar which ranges from 9 to 115 per 100g of fruit contains moisture 84%, protein 0.5% fat 0.5%, minerals 1.15% Fibre 6% and carbohydrates 11%. Among mineral and vitamins it contains 6 mg of Ca, 11 mg of phosphorus and 0.12 mg iron per 100 g of fruit. 100g of Apple gives calorific values of 50 Calories (USDA: National Nutrient database). Thus fruit are an important supplement of the human diet as they possess almost all the nutritive components required for the growth and development of the human body leading to a healthy physique and mind also these are ready source of energy with a unique

capacity to guard against many deficiency diseases Reddy *et al.* (2019), Bhardwaj & Pandey (2018).

Pineapple (*Ananas comosus* L.) belongs to the Family: Bromeliaceae is one of the most important commercial fruit crops in the world. Pineapple is the third most important tropical fruit in the world after Banana and Citrus Pineapples are consumed or served fresh, cooked, juiced and can be preserved. This fruit is highly perishable and seasonal. Mature fruit contains 14% of sugar; a protein digesting enzyme, bromelin, and good amount of citric acid, malic acid, vitamin A and B. Pineapple juice's composition varies depending on geography, season, process and time of harvest. Its balance of sugar and acid contributes to the fruit's refreshing flavour. Thailand, Philippines, Brazil and China are the main pineapple producers in the world supplying nearly 50 % of the total output. Other important producers include India, Nigeria, Kenya, Indonesia, Mexico, Costa Rica and these countries provide most of the remaining fruit (FAO 2004). Green pineapple is also used for making pickles. After extraction of its juice, the left over is

used as livestock feed and also the tender leaves are used for the same purpose. Various food items like squash, syrup, jelly are produced from pineapple. Vinegar, alcohol, citric acid, calcium citrate etc. are also produced from pineapple. Pineapple is also recommended as medical diet for certain diseased persons. The U.S. National Library of Medicine lists bromelain as a proteolytic digestive enzyme. When taken with meals, bromelain aids in the digestion of proteins, working to break proteins down into amino acids.

Fruit cheeses have a long shelf life (Srivastava & Kumar 2007). In India very less work is carried out in Apple preservation especially in case of cheese. It is highly nutritive, having good keeping quality, remunerative and has good export potential. Cheese is only one product which can be preserved for long duration and available through out the year. Therefore it is very important to conduct the researches develop the new recipes and for value addition from different cultivars of Apple *Kalam et al.* (2018), *Awar et al.* (2003), *Sinha et al.* (2017) and *Nidhi et al.* (2011).

## Materials and methods

### 2.1 Design and Site of Experiment

The Experimental was conducted in Completely Randomized Design (CRD) with 10 treatments of Apple and Pineapple with three replications in the Post Harvest Laboratory of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during October 2020.

#### 2.1.1 Treatment Combinations

- T<sub>0</sub> - Apple + Pineapple 100%
- T<sub>1</sub> - Apple + Pineapple + Cashew nut(2.5%)
- T<sub>2</sub> - Apple + Pineapple + Cashew nut (5%)
- T<sub>3</sub> - Apple + Pineapple + Cashew nut (10%)
- T<sub>4</sub> - Apple + Pineapple + Almond (2.5%)
- T<sub>5</sub> - Apple + Pineapple + Almond (5%)
- T<sub>6</sub> - Apple + Pineapple + Almond (10%)
- T<sub>7</sub> - Apple + Pineapple + Pistachio nut (2.5%)

T<sub>8</sub> - Apple + Pineapple + Pistachio nut (5%)

T<sub>9</sub> -Apple + Pineapple + Pistachio nut (10%)

### Parameters studied

TSS (<sup>0</sup>Brix), Total sugar (%), Reducing sugars (%), Non-reducing sugars (%) and Ascorbic acid (mg/100g), Acidity (%), pH of apple-pineapple cheese content were determined following the methods suggested by Association of Analytical chemists. Sensory evaluation was done by point hedonic scale in which 1 means dislike extremely, 2 means dislike very much, 3 means dislike moderately, 4 means dislike slightly, 5 means neither like nor dislike, 6 means like slightly, 7 means like moderately, 8 means like very much and 9 means like extremely (Ranganna S.). The total cost of production (INR) was recorded along with the selling price. The gross income is actually the selling price. The Net Income (INR) is determined by subtracting the selling price (INR) with the total cost of production.

### Preparation of apple-pineapple Cheese

Select firmly riped apple fruits wash with clean water and then cut into pieces. After that boil it with 300ml of water/kg of apple, till the pieces becomes soft then, either sieve in a muslin cloth or in a pulping machine to remove seeds and skin to make a fine pulp. Select fully riped pineapple fruits, peel it and cut into pieces and then grind the pieces to make the fine pulp. Mix the different proportions of apple and pineapple pulp based on treatments and cook it for 10-15min after that add sugar (400 g/kg of pulp), butter (45 g/ kg of pulp) and citric acid (2 g/ kg of pulp) to the pulp cooked till, until mixture become sufficiently thick, and then after removed from fire when mixture starts leaving side of the pan evenly distributed over butter coated tray and left for 3 hours to set cut into pieces, with a sharp knife pre packed with butter paper and then packed in polythene. Stored at ambient temperature.

### Result and discussion

The treatment shows significant differences in Total soluble solids (0Brix) of value added blended apple and pineapple cheese. The highest for total soluble solids (9.98) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub>Apple + Pineapple + Almond (5%) (9.92) and T<sub>4</sub>Apple + Pineapple + Almond (2.5%) (9.84) and the minimum

total soluble solids (8.16) was with T<sub>0</sub> Apple + Pineapple 100%. The similar findings reported by Chen & Zhang (2001) and Shabi *et al.*, (2017).

The treatment shows significant differences in Total sugar (%) of value added blended apple and pineapple cheese. The highest for Total sugar (%) (10.49) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (10.26) and T<sub>4</sub> Apple + Pineapple + Almond (2.5%) (10.09) and the minimum Total sugar (%) (7.60) was with T<sub>0</sub> Apple + Pineapple 100%. The similar findings reported by Ahmad *et al.* (2004) and Deka *et al.* (2004) for lime-aonla blended RTS and (Bons *et al.*, 2013), Shabi *et al.*, (2018).

The treatment shows significant differences in reducing sugar (%) of value added blended apple and pineapple cheese. The highest for reducing sugar (%) (4.14) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (4.00) and T<sub>4</sub>Apple + Pineapple + Almond (2.5%) (3.89) and the minimum Reducing sugar(%) (2.84) was with T<sub>0</sub> Apple + Pineapple 100%. Similar results were reported by Riaz *et al.* (2013), Kinker *et al.* (2017) and Shabi *et al.* (2018).

The treatment shows significant differences in non reducing sugar (%) of value added blended apple and pineapple cheese. The highest for non reducing sugar (%) (6.35) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (6.26) and T<sub>4</sub> Apple + Pineapple + Almond (2.5%) (6.20) and the minimum Non reducing sugar (%) (4.76) was with T<sub>0</sub> Apple + Pineapple 100%. Similar results were reported by Riaz *et al.* (2013), Kinker *et al.*, (2017) and Shabi *et al.*, (2018).

The treatment shows significant differences in Ascorbic acid /Vit. C (mg/100g) of value added blended apple and pineapple cheese. The highest for Ascorbic acid /Vit. C (mg/100g) (115.69) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (117.77) and T<sub>4</sub> Apple + Pineapple + Almond (2.5%) (120.79) and the minimum Ascorbic acid /Vit.C (mg/100g) (149.01) was with T<sub>0</sub> Apple + Pineapple 100%. Similar results were reported by Riaz *et al.* (1999), Kinker *et al.*, (2017) and Shabi *et al.*, (2018).

The treatment shows significant differences in Acidity (%) of value added blended apple and pineapple cheese. The highest for Acidity (%) (0.62) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (0.58) and T<sub>4</sub>Apple + Pineapple + Almond (2.5%) (0.56) and the minimum Acidity (%) (0.44) was with T<sub>0</sub> Apple + Pineapple 100%. Similar results were reported by Riaz *et al.* (2013), Kinker *et al.* (2017) and Shabi *et al.*, (2018).

The treatment shows significant differences in pH of value added blended apple and pineapple cheese. The highest for pH (4.69) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (4.65) and T<sub>4</sub>Apple + Pineapple + Almond (2.5%) (4.54) and the minimum pH (3.49) was with T<sub>0</sub> Apple + Pineapple 100%. Similar results were reported by Riaz *et al.* (2013), Kinker *et al.* (2017) and Shabi *et al.* (2018).

The treatment shows significant differences in flavor and taste score of value added blended apple and pineapple cheese. The highest for flavor and taste score (8.00) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (7.67) and T<sub>4</sub> Apple + Pineapple + Almond (2.5%) (7.67) and the minimum flavor and taste score (5.00) was with T<sub>0</sub> Apple + Pineapple 100%.

The treatment shows significant differences in Colour and Appearance score of value added blended apple and pineapple cheese. The highest for Colour and Appearance score (8.00) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub>Apple + Pineapple + Almond (5%) (7.67) and T<sub>4</sub>Apple + Pineapple + Almond (2.5%) (7.33) and the minimum Colour and Appearance score (3.67) was with T<sub>0</sub> Apple + Pineapple 100%.

The treatment shows significant differences in Texture score of value added blended apple and pineapple cheese. The highest for Texture score (8.33) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (8.00) and T<sub>4</sub> Apple + Pineapple + Almond (2.5%) (7.33) and the minimum Texture score (3.33) was with Apple + Pineapple 100%.

The treatment shows significant differences in overall acceptability score of value added blended

apple and pineapple cheese. The highest for overall acceptability score (8.11) was recorded with T<sub>6</sub> Apple + Pineapple + Almond (10%) followed by T<sub>5</sub> Apple + Pineapple + Almond (5%) (7.78) and T<sub>4</sub> Apple +

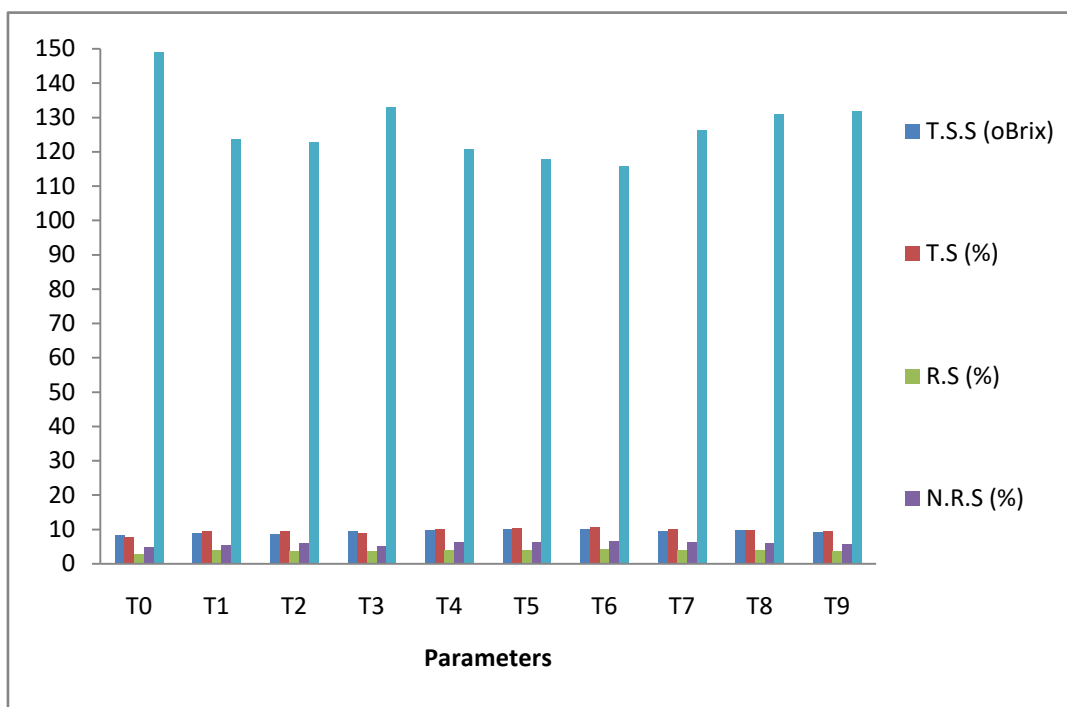
Pineapple + Almond (2.5%) (7.22) and the minimum Overall acceptability score (4.00) was with T<sub>0</sub> Apple + Pineapple 100%

**Table 1. Physico-chemical properties of value added Apple -Pineapple blended cheese**

Treatment No.	Treatment	T.S.S (°Brix)	T.S (%)	R.S (%)	N.R.S (%)	Ascorbic acid /Vit.C(mg/100g)
T <sub>0</sub>	Apple + Pineapple 100%	8.16	7.6	2.84	4.76	149.01
T <sub>1</sub>	Apple + Pineapple + Cashew nut (2.5%)	8.79	9.26	3.83	5.43	123.59
T <sub>2</sub>	Apple + Pineapple + Cashew nut (5%)	8.57	9.47	3.60	5.87	122.84
T <sub>3</sub>	Apple + Pineapple + Cashew nut (10%)	9.59	8.82	3.62	5.20	132.85
T <sub>4</sub>	Apple + Pineapple + Almond (2.5%)	9.84	10.09	3.89	6.20	120.79
T <sub>5</sub>	Apple + Pineapple + Almond (5%)	9.92	10.26	4.00	6.26	117.77
T <sub>6</sub>	Apple + Pineapple + Almond (10%)	9.98	10.49	4.14	6.35	115.69
T <sub>7</sub>	Apple + Pineapple + Pistachio nut (2.5%)	9.58	10.04	3.90	6.14	126.20
T <sub>8</sub>	Apple + Pineapple + Pistachio nut (5%)	9.83	9.73	3.79	5.94	130.89
T <sub>9</sub>	Apple + Pineapple + Pistachio nut (10%)	9.11	9.27	3.53	5.74	131.76
F- test		S	S	S	S	S
S.Ed. (±)		0.871	0.609	0.298	0.518	4.134
C.D. (P = 0.05)		0.415	0.290	0.142	0.247	1.968

**Keywords:** T.S.S=Total Soluble solids (°Brix), T.S = Total Sugar (%), R.S= Reducing Sugar(%), N.R.S = Non Reducing Sugar (%)

**Fig. 1. Physico-chemical properties of value added Apple -Pineapple blended cheese**



**Table 2. Physico-chemical properties and Organoleptic score of value added Apple-Pineapple blended cheese**

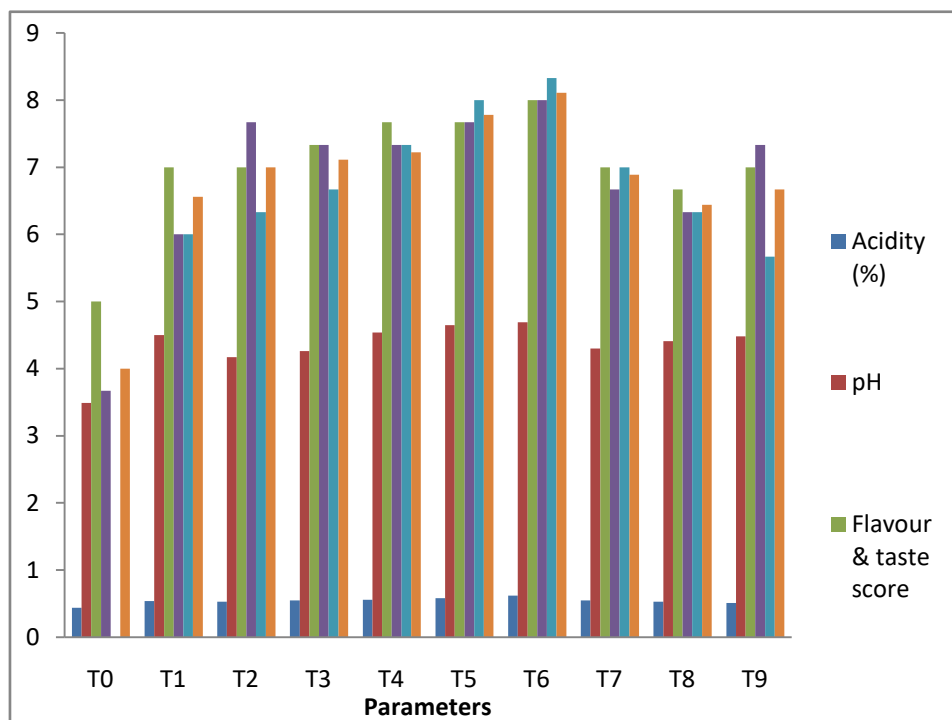
Treatment No.	Treatment	Acidity (%)	pH	Flavour & taste score	Colour and Appearance	Texture	Overall acceptability
T <sub>0</sub>	Apple + Pineapple 100%	0.44	3.49	5.00	3.67	3.33	4.00
T <sub>1</sub>	Apple + Pineapple + Cashew nut (2.5%)	0.54	4.50	7.00	6.00	6.00	6.56
T <sub>2</sub>	Apple + Pineapple + Cashew nut (5%)	0.53	4.17	7.00	7.67	6.33	7.00
T <sub>3</sub>	Apple + Pineapple + Cashew nut (10%)	0.55	4.26	7.33	7.33	6.67	7.11
T <sub>4</sub>	Apple + Pineapple + Almond (2.5%)	0.56	4.54	7.67	7.33	7.33	7.22
T <sub>5</sub>	Apple + Pineapple + Almond (5%)	0.58	4.65	7.67	7.67	8.00	7.78
T <sub>6</sub>	Apple + Pineapple + Almond (10%)	0.62	4.69	8.00	8.00	8.33	8.11
T <sub>7</sub>	Apple + Pineapple + Pistachio nut (2.5%)	0.55	4.30	7.00	6.67	7.00	6.89
T <sub>8</sub>	Apple + Pineapple + Pistachio nut (5%)	0.53	4.41	6.67	6.33	6.33	6.44
T <sub>9</sub>	Apple + Pineapple + Pistachio nut (10%)	0.51	4.48	7.00	7.33	5.67	6.67
F- test		S	S	S	S	S	S
S.Ed. (±)		0.039	0.325	2.031	1.936	1.559	1.065
C.D. (P = 0.05)		0.019	0.155	0.967	0.922	0.742	0.507

### Conclusion

Based on findings of the present experiment it may be concluded that treatment T<sub>6</sub> Apple + Pineapple + Almond (10%) was superior in respect of total soluble solids (9.98), Total sugar (%) (10.49), reducing sugar (%) (4.14), Non reducing sugar (%) (6.35), Ascorbic acid /Vit.C (mg/100g) (115.69), Acidity (%) (0.62), pH (4.69), flavor and taste score

(8.00), Colour and Appearance score (8.00), Texture score (8.33) and overall acceptability score (8.11).. Where highest net returns was found in T<sub>1</sub> Apple + Pineapple + Cashew nut (2.5%) (Rs. 299.5) and T<sub>4</sub> Apple + Pineapple + Almond (2.5%) (Rs. 294.5) and cost benefit ratio (1.65). Treatment T<sub>4</sub> Apple + Pineapple + Almond (2.5%) is recommended due to its overall acceptability.

**Fig. 2. Physico-chemical properties and Organoleptic score of value added Apple-Pineapple blended cheese**



## References

- Ahmad, M.A., D.B. Singh, J.A. Rather, S.H. Malik & M.N. Iqbal 2004. Study of cheese prepared from five different varieties of apple. International seminar on recent trends in Hi-tech Hort. and post-harvest technology, Organized by C.S.A. Univ. Agric. & Tech., Kanpur, S9048: 284.
- Alirai M.N. 2007. Studies on the preparation & composition of guava (*Psidium guajava* L.) toffee and slab bars. *Pk. J. Sci. & ind. Res.*, **50(4)**: 288-29.
- Awad, R.A., S.A. El-Shabrawy, S.G Osman & S.A. Saad 2003. Study on chemical composition of flavoured processed cheese spreads with different fruit flavours. *Egyptian J. Dairy Sci.*, **31 (2)**: 335-344.
- Bhardwaj, R.L. & S. Pandey 2018. Juice blends-A Way of utilization of underutilized fruits, vegetables and spices. *Critical Reviews in Food Sci. Nutrition*, **51(6)**: 563-570.
- Kalam, S.R., K.N. Dahatonde, P.B. Kardile & Rajwade 2018. Studies on physico-chemical properties of apple value added products. *Journal of Pharmacognosy and Phytochemistry*; **SP1**: 1439-1441.
- Reddy, S.K., V. Bahadur, D. Wilson & S. E. Topno 2019. Studies on physico-chemical, organoleptic properties and economic analysis of custard apple blended apple cheese. *Journal of Pharmacognosy and Phytochemistry* 2019; **8(4)**: 1368-1372.
- Sinha, M., A. Mani & P. Sinha 2017. Value addition of guava cheese cv. Allahabad safeda by medicinal herbs. *Journal of Pharmacognosy and Phytochemistry* 2017; **6(6)**: 856-859.
- Nidhi, R. Prasad, V.M. Prasad & S. Sheikh 2011. Development of carrot cheese through value addition with guava, *The Allahabad Farmer Vol. 1.XVI.No. 2*.
- Riaz, M.N., G. Mohyuddin, M.I. Al Haq 2013. Physical, chemical and sensory characteristics of jams made from fresh and frozen strawberries. *Pakistan J. Arid Agri.* 1999; **2(1)**:51- 60.
- Srivastava, R.P. & S. Kumar 2007. Fruit and vegetable preservation of principals and practices 3rd Revised & Enlarged Edition. International book distributing co. Lucknow, 2007.