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DEVELOPMENT OF FLAVORED PRESERVED PRODUCTS USING BAEL

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ABSTRACT

The present study was carried out with the objective to prepare candy, jam, murabba and chutney by incorporation of various herbs (ginger, cardamom and rose extract in wood apple) and to assess the acceptability and nutritive value of the products prepared. The experiment was replicated five times for all the four products and data obtained during investigation were statistically analyzed by using analysis of variance (ANOVA) and critical difference (C.D) techniques. Organoleptic properties were analyzed by 9 point hedonic scale. On the basis of finding, candy, jam and murabba prepared with ginger was found to best in the case of colour and appearance, body and texture, taste and flavor and overall acceptability. But in case of chutney the best treatment was found in colour and appearances T_1 (ginger). The nutritive values of all the products were comparatively each other. The low cost of all products was found T_1 (ginger) as compared to T_2 (cardamom) and T_3 (rose extract).

Keywords: Ginger, Cardamom and Rose.

INTRODUCTION

The perishable fruits and vegetables are available as seasonal surpluses during certain parts of the year in different regions and are wasted in large quantities due to absence of facilities and know-how for proper handling, distribution, marketing and storage. Furthermore, massive amounts of the perishable fruits and vegetables produced during a particular season results in a glut in the market and become scarce during other seasons. Quality of fruits in pre and post harvest influences the consumer acceptance. The changes that occur in various physical and chemical characters determine the quality and in turn the economic returns to the producers and processors (Agarwal and Mangaraj, 2005). Fruits and vegetables needed simple technologies for processing, preservation and transport to various places of need, have suffered post-harvest losses, estimated to nearly 35percent. Only 1percent of the total fruits and vegetables produced are processed in the 3000 food industries in the country. India accounts for 10.1percent of the total world population of fruit crops and ranks second with the production of 45.47 million tons in 2002. In India, fruits and vegetables are wasted to the tune of rupees 30,000 million tons due to poor post harvest management (Das, 1991).

The Beal (*Aegle Marmelos*) is the only species of its genus, in the family Rutaceae. Beal is used in the preparation of chutneys and for making jelly and jam (Morton, 1987). Beal has got high medicinal value. Every part of the fruit has got its medicinal property. The fruit is much used in India as a liver and cardiac tonic and when unripe, as a means of haltingdiarrhoea and dysentery and for effective treatment for hiccough, sore throat and disease of the gums (Anonymous, 1996).

A hundred gram of bael fruit pulp contains137 g energy, 31.8 g of carbohydrate, 1.8 g of protein, 0.3 g fat, 1.7 g minerals, 85mg calcium, 50 mg, 0.6 mg iron, beta-carotene 55µg and 8 mg vitamine C (Gopalan *et al* 2004).
The bael fruit is more popular as medicine than as food. Bael fruit is mildly astringent and used to cure dysentery, diarrhoea, hepatitis, tuberculosis, dyspepsia and good for heart and brain. Roots have antidiarrhoetic, antidote to snake venom, anti-inflammatory and wound healing properties. The Bael fruit is one of the most nutritious fruits, rich in riboflavin and used for the preparation of a number of products like candy, squash toffee, slab, pulp powder and nectar. The leaves and seed oil have pesticidal properties.
The bael fruit has a smooth, woody shell with a green, gray, or yellow peel. It can reach the size of a large grapefruit or pomelo. The shell is so hard it must be cracked with a hammer or machete. The fibrous yellow pulp is very aromatic. Numerous hairy seeds are encapsulated in slimy mucilage. The fruit is eaten fresh or dried. If fresh, the juice is strained or sweetened to make a drink. It can be made into sharbat (Hindi) or *bel pana* (Bengali/Oriya language), a refreshing drink made of the pulp with water, sugar, and lime juice, mixed, left to stand a few hours, strained, and put on ice. One large bael fruit may yield five or six liters of sharbat (Jauhari *et al* 1999)

Ginger is the root of the plant Ziniber Officinale Goscoe. The volatile oil present is "gingerol". The flavouring compound has sharp burning sensory stimulation. Ginger is reported to reduce inflammation and pain in joints. It is also has potential prophylactic use in treating migraine. It may also be effective in alleviating nausea (Srilakshmi 2007).

Young ginger rhizomes are juicy and fleshy with ovary mild taste. They are after pickled in vinegar or sherry as a snack or just cooked as an ingredient in many dishes. They can also be stewed in boiling water to make ginger tea, to which honey is after added, sliced orange or lemon fruits may also be added. Mature ginger root are fibrous and nearly dry. The juices from old ginger roots is extremely potent and is often used as a spice in india recipes and Chinese cuisine to flavor dishes such as seafood or goat meat. In vegetarian cuisine, ginger act as useful food preservatives and has been proven to kill the harmful bacteria salmonella. Fresh ginger can be substituted for ground ginger ata ratio of 6:1, although the flavours of fresh and dried ginger are somewhat different, ginger is also made into candy. Ginger is know, to posses anti-oxidants properties; it reduces intestinal contractions, neutralizes digestive acids and inhibits the "vomiting centre" in the brain.

Ginger gives 67Kcal from per 100gm of edible portion. It gives 2.39gm of protein, 0.9gm of fat, 12.3gm of carbohydrates, 80.9percent of moisture, 2.4gm of crude fiber, 20mg of calcium, 60mg of phosphorus, 3.5mg of iron. In vitamins 40ug of carotene,0.06mg of thiamine,0.03mg of riboflavin, 0.6mg niacin, 6mg of vitamin c. In minerals 405mg of manganese, 1.93mg of zinc, 0.057mg of chromium (Gopalan, 2004).

Fresh ginger is one of the main spices used for making pulse and lentils curries and other vegetables preparation. It is used fresh to spice tea especially in winter. Ginger powder is also used in certain food preparations particularly for pregnant or nursing women, the most popular one being "Katlu" which is a mixture of gum resin, ghee, nuts and sugars (Srilakhmi, 2008)

It is the comman name for Ellettaria cardamom a spice belonging to the ginger family, green cardamom in south Asia is broadly used to treat infection in teeth and gums, to prevent and treat throat, congestion of the lungs and pulmonary tuberculosis, inflammation of eyelids as well as for digestive disorders. It is used to break up kidney stones and gall stones and was reportedly used as an antidote for both snake and scorpion venom. Cardamom helps in reliving flatulence or feeling of over fullness of stomach and promotes digestion (Srilakhmi 2008).

Cardamom (Amomum) is used as a spice and as an ingredient in traditional medicine. Such as in systems of the traditional Chinese medicine in china, in Ayurveda in India, Japan, Korea and Vietnam. Green cardamom powder is used as a spice for sweet dishes as well astraditional flavouring in coffee and tea. Cardamom pods are ground together with coffee beans to produce a powdered mixture of the two which is boiled with water to make coffee. Cardamom is also used to some extent in savoury dishes.

Cardamom, the fruit contains brownish black seeds which have about 2-10 percent volatile oil with the characteristic pleasant odour. The active principles present in the oil cineole, terpinyl acetate, pinene, sabinene and porneol. Cardamom is used for flavouring coffee in Arebia. It is mainly used for flavouring sweet preparation, cookies, breads, cakes and preserves. Cardamom sometime may be sold in the market cheaply after the extraction of essential oils (Srilakhmi, 2007).

MATERIALS AND METHODS

The details of materials and experimental procedures during the course of the present investigation have been elaborated in this chapter under the following heads:-

1. **COLLECTION OF MATERIALS**
   Beal, sugar, salt, onion, ginger, cardamom, rose extract and preservative were collect from the local market of Allahabad.
2. **DEVELOPMENT OF PRODUCTS**
   Beal was used for the preparation of beal - candy, jam murabba and chutney.

DETAILS OF TREATMENTS WERE AS FOLLOW

Treatments	T_1 (2 percent)	T_2 (2 percent)	T_3 (2 percent)
Jam	Ginger	Cardamom	Rose extract
Candy	Ginger	Cardamom	Rose extract
Murabbas	Ginger	Cardamom	Rose extract
Chutney	Ginger	Cardamom	Rose extract

ORGANOLEPTIC ANALYSIS OF PRODUCTS

The products beal candy, jam, murabbas and chutney were freshly prepared and organoleptically evaluated by a panel of judges selected from Department of Foods and Nutrition, Halina School of Home Science, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed-to-be University) Allahabad. The products were judged for the qualities such as colour and appearance, texture, taste and overall acceptability with the help of 9 points Hedonic Scale **(Srilakshmi 2007)**

CALCULATION OF NUTRITIVE VALUE OF DEVELOPED PRODUCTS

The nutritive value of the products with flavours added experimental beal candy, murabba, jam and chutney was calculated following I.C.M.R., pattern of calculation using the value per hundred gram of each raw ingredient from the book of nutritive value of Indian Foods by Gopalan *et al* (2007).

COST OF THE PRODUCTS

The cost of the product was calculated of the prevailing price of raw materials purchased from the local market of Allahabad.

STATISTICAL ANALYSIS

The data obtained from the sensory evaluation was statistically analyzed by using analysis of variance techniques and CD (critical difference) technique (Chandel, 2006).

PREPARATION OF CANDY

Raw fruits
↓
Removed shell
↓
Slice peeled fruit crosswise into 2.5cm thick pieces
↓
Wash with water
↓
Prick on both side
↓
Steep in cold water for 24hours
↓
Blanching
↓
Draining
↓
Keeping fruit in alternate layer (1kg fruit: 1kg sugar) or steeping fruit in syrup of 40percent TSS for a day
↓
Remove of fruit
↓
Increasing consistency of syrup to 60percent TSS by boiling
↓
Steeping of fruit (for a day)
↓
Repeating the process and raising strength of syrup by 65 to 70 percent TSS (PRESERVE) or 75percent TSS (candy) for a week
↓
Addition of flavours
↓
Preserve
↓
Draining
↓
Filling jar
↓
Sealing (airtight)
↓
Storage

Source:- Srivastava and Kumar (2009)
Fig 1:-Flow diagram of prepared candy

PREPARATION OF JAM

Ripe fruit
↓
Washing
↓
Peeling
↓
Pulping (remove seed and core)
↓
Addition of sugar (add water if necessary)
↓
Boiling (with continuous stirring)
↓
Addition of flavors (ginger, cardamom and rose extract)
↓
Judging of end-point by further cooking up to 105^0C or 68-70percent TSS
↓
Filling hot into sterilized bottle
↓
Cooling
↓
Waxing
↓
Capping
↓
Storage (at ambient temperature)

Source:- Srivastava and Kumar (2009)
Fig 2:- Flow diagram of prepared jam

PREPARATION OF MURABBA

Raw beal
↓
Removed shell
↓
Prick wood apple with fork and put it in lime water over night
↓
Wash properly and boil it for 2 minutes
↓
Make sugar syrup (add flavour to it)
↓
Dip wood apple in sugar syrup
↓
Keep in air tight container

Source:-http//www.indobase.com/recipes/details/woodapple-murabbas.php
Fig 3:- Flow diagram of prepared murabba.

PREPARATION OF CHUTNEY

Beal (ripe)
↓
Washing
↓
Breaking of shell
↓
Removal of pulp
↓
Mixing with sugar and salt and leaving for an hour
↓
Keeping all ingredients except vinegar in utensil, putting in mixture and cooking on low flame
↓
During cooking add flavour and water
↓
Cooking to consistency (up to 105^0C)
↓
Addition of vinegar
↓
Cooking for 2 to5 minutes
↓
Filling hot in a dry sterilized bottle
↓
Sealing (airtight)
↓
Storage at ambient temperature (in cool and dry place)

Source: Srivastava and Kumar (2009)
Fig 4:- Flow diagram of prepared chutney

RESULTS AND DISCUSSION

Above table shows that nutritive value of bael candy with flavours. Result revealed that highest energy was found in T_2 (310Kcal) followed by T_1 (309Kcal) and T_3 (308Kcal). Protein content was highest in treatment T_2 (0.73g) followed by T_1 (0.67g) and T_3 (0.62g). Above table

shows that nutritive value of bael candy with flavours. Result revealed that highest energy was found in T_2 (310Kcal) followed by T_1 (309Kcal) and T_3 (308Kcal). Protein content was highest in treatment T_2 (0.73g) followed by T_1 (0.67g) and T_3 (0.62g). Fat content was highest in treatment T_2 (0.11g) followed by T_1 (0.10g) and T_3 (0.10g). Carbohydrate content was highest in treatment T_2 (76.60g) followed by T_1 (76.41g) and T_3 (76.33g). Fiber content was highest in treatment T_2 (1.09g) followed by T_1 (0.98g) and T_3 (0.96g).Calcium content was highest in treatment T_2 (36.95mg) followed by T_1 (36.23mg) and T_3 (36.09mg). Iron contentwas highest in treatment T_2 (0.28mg) followed by T_1 (0.27mg) and T_3 (0.25mg). Phosphrous content was highest in treatment T_2 (18.28mg) followed by T_1 (17.62mg) and T_3 (17.22mg).

Table 4.1 - Nutritive value of candy with flavours (100g)

Treatment	Energy (Kcal)	Protein (g)	Fat (g)	Carbohydrate (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphous (mg)
T_1(Ginger)	309	0.67	0.10	76.41	0.98	36.23	0.27	17.62
T_2(Cardamom)	310	0.73	0.11	76.60	1.09	36.95	0.28	18.28
T_3(Rose extract)	308	0.62	0.10	76.33	0.96	36.09	0.25	17.22

Table 4.2 - Nutritive value of jam with flavours (100g)

Treatment	Energy (Kcal)	Protein (g)	Fat (g)	Carbohydrate (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphous (mg)
T1(Ginger)	265	0.96	0.15	65.03	1.46	48.22	0.41	25.84
T2(Cardamom)	267	1.04	0.17	65.32	1.63	49.31	0.42	26.83
T3(Rose extract)	265	0.94	0.15	64.91	1.44	48.02	0.37	25.25

Above table shows that nutritive value of bael jam with flavours. Result revealed that highest energy was found in T_2 (267Kcal) followed by T_1 (265Kcal) and T_3 (265Kcal). Protein content was highest in treatment T_2 (1.04g) followed by T_1 (0.96g) and T_3 (0.94g). Fat content was highest in treatment T_2 (0.17g) followed by T_1 (0.15g) and T_3 (0.15g). Carbohydrate content was highest in treatment T_2 (65.32g) followed by T_1 (65.03g) and T_3 (64.91g). Fiber content was highest in treatment T_2 (1.63g) followed by T_1 (1.46g) and T_3 (1.44g).Calcium content was highest in treatment T_2 (49.31mg) followed by T_1 (48.22mg) and T_3 (48.02mg). Iron content was highest in treatment T_2 (0.42mg) followed by T_1 (0.41mg) and T_3 (0.37mg). Phosphrous content was highest in treatment T_2 (26.83mg) followed by T_1 (25.84mg) and T_3 (25.25mg).

Table 4.3 - Nutritive value of murabba with flavours (100g)

Treatment	Energy (Kcal)	Protein (g)	Fat (g)	Carbohydrate (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphous (mg)
T1(Ginger)	292	0.79	0.18	71.85	1.17	41.03	0.36	20.91
T2(Cardamom)	293	0.85	0.20	72.09	1.31	41.90	0.37	21.71
T3 (Rose extract)	291	0.77	0.18	71.75	1.15	40.27	0.33	20.43

Above table shows that nutritive value of bael murabba with flavours. Result revealed that highest energy was found in T_2 (293Kcal) followed by T_1 (292Kcal) and T_3 (291Kcal). Protein content was highest in treatment T_2 (0.85g) followed by T_1 (0.79g) and T_3 (0.77g). Fat content was highest in treatment T_2 (0.20g) followed by T_1 (0.18g) and T_3 (0.18g). Carbohydrate content was highest in treatment T_2 (72.09g) followed by T_1 (71.85g) and T_3 (71.75g). Fiber content was highest in treatment T_2 (1.31g) followed by T_1 (1.17g) and T_3 (1.15g).Calcium content was highest in treatment T_2 (41.90mg) followed by T_1 (41.03mg) and T_3 (40.27mg). Iron content was highest in treatment T_2 (0.37mg) followed by T_1 (0.36mg) and T_3 (0.33mg). Phosphrous content was highest in treatment T_2 (21.71mg) followed by T_1 (20.91mg) and T_3 (20.43mg).

Table 4.3 - Nutritive value of chutney with flavours (100g)

Treatment	Energy (Kcal)	Protein (g)	Fat (g)	Carbohydrate (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphous (mg)
T1(Ginger)	231	1.28	5.39	44.29	1.79	53.59	0.66	36.82
T2(Cardamom)	233	1.38	5.42	44.61	1.98	54.74	0.67	37.86
T3(Rose extract)	230	1.27	5.39	44.17	1.77	53.38	0.63	36.20

Above table shows that nutritive value of bael chutney with flavours. Result revealed that highest energy was found in T_2 (233Kcal) followed by T_1 (231Kcal) and T_3 (230Kcal). Protein content was highest in treatment T_2 (1.38g) followed by T_1 (1.28g) and T_3 (1.27g). Fat content was highest in treatment T_2 (5.42g) followed by T_1 (5.39g) and T_3 (5.39g). Carbohydrate content was highest in

treatment T_2 (44.61g) followed by T_1 (44.29g) and T_3 (44.17g). Fiber content was highest in treatment T_2 (1.98g) followed by T_1 (1.79g) and T_3 (1.77g).Calcium content was highest in treatment T_2 (54.74mg) followed by T_1 (53.59mg) and T_3 (53.38mg). Iron content was highest in treatment T_2 (0.67mg) followed by T_1 (0.66mg) and T_3 (0.63mg). Phosphrous content was highest in treatment T_2 (37.86mg) followed by T_1 (36.82mg) and T_3 (36.20mg).

EFFECT OF FLAVOURS ON OVERALL ACCEPTABILITY OF BAEL MURABBA

It is evident from table 4.12.1.and figure 4.12.1 that the highest score for overall acceptability was (8.36) scored by T_1 followed by T_2 (8.30) and T_3 (8.01).

Table 4.4.2-Average sensory score for overall acceptability of experimental bael murabba with flavours

	Treatments		
Replication	**T_1(ginger)**	**T_2 (cardamom)**	**T_3(rose extract)**
1	8.80	8.60	8.13
2	8.10	8.33	8.06
3	8.80	8.26	8.40
4	8.26	8.13	7.73
5	7.93	8.20	7.73
Total	41.79	41.51	40.05
Mean±S.E.m	8.36±0.07	8.30±0.11	8.01±0.05
Range	8.10 – 8.80	8.13 – 8.60	7.73– 8.40

4.4.3- Analysis of variance for overall acceptability of bael murabba with flavours

Source of variation	**d.f.**	**S.S.**	**M.S.S.**	**F. cal.**	**F.Tab (5%)**	**Result**
Due to treatment	2	0.22	0.11	2.75	$F_{2,8=4.46}$	Non-significant
Due to replication	4	0.80	0.20	5.00		
Due to error	8	0.34	0.04			
Total	14					

ANOVA table 4.12.2 show non-significant difference ($p \leq 0.05$) between three treatments of murabba because the calculated value of 'F' (2.34) is lower than the tabulated value of F (4.46) on 2 and 8 d.f. at 5 percent probability level. It can conclude that treatment had no significant influence on overall acceptability of murabba.

EFFECT OF FLAVOURS ON OVERALL ACCEPTABILITY OF BAEL CHUTNEY

It is evident from table 4.16.1.and figure 4.16.1 that the highest score for overall acceptability was (8.06) scored by T_1 followed by T_2 (7.98) and T_3 (7.96).

Table 4.4.5- Average sensory score for overall acceptability of experimental bael chutney with flavours

	Treatments		
Replication	**T_1(ginger)**	**T_2 (cardamom)**	**T_3 (rose extract)**
1	8.06	8.86	7.86
2	7.8	8	8
3	8.26	7.93	8
4	8.13	8.06	7.86
5	8.06	8.06	7.86
Total	40.33	39.93	39.8
Mean± S.E.m	8.06±0.06	7.98±0.07	7.96±0.01
Range	7.8 – 8.26	7.93 – 8.86	7.86 – 8

4.4.6- Analysis of variance for overall acceptability of bael chutney with flavours

Source of variation	**d.f**	**S.S.**	**M.S.S.**	**F.cal.**	**F.Tab (5%)**	**Result**
Due to treatment	2	0.03	0.015	0.78	$F_{2,8=4.46}$	Non-significant
Due to replication	4	0.08	0.02	1.05	-	-
Due to error	8	0.159	0.019	-	-	--
Total	14	-	-	-	-	-

ANOVA table 4.6.2 show non-significant difference ($p \leq 0.05$) between three treatments of chutney because the calculated value of 'F' (0.78) is lower than the tabulated value of F (4.46) on 2 and 8 d.f. at 5 percent probability level. It can conclude that treatment had no significant influence on overall acceptability of chutney.

4.4.7 Effect of flavours on overall acceptability of bael jam

It is evident from table 4.8.1 and figure 4.8.1 that the highest score for overall acceptability was (7.80) scored by T_1 followed by T_2 (7.50) and T_3 (7.24).

4.4.9 – Average sensory score for overall acceptability of bael jam with flavours

Replication	**Treatments**		
	T_1 (ginger)	**T_2 (cardamom)**	**T_3 (rose extract)**
1	8.10	7.6	7.7
2	8.30	8.2	7.4
3	7.70	7.5	7.5
4	7.40	7.1	6.7
5	7.5	7.1	6.9
Total	39	37.5	36.2
Mean±S.E.m	7.80±0.06	7.50±0.08	7.24±0.07
Range	7.4 – 8.3	7.1 – 8.2	6.7 – 7.7

4.4.10 Analyses Of Variance for overall acceptability of bael jam with flavours

Source of variation	**d.f.**	**S.S.**	**M.S.S**	**F.cal**	**F.Tab (5%)**	**Result**
Due to treatment	2	0.788	0.394	10.64	$F_{2,8=4.46}$	Significant
Due to replication	4	1.833	0.458	12.38	$F_{4,8=3.84}$	
Due to error	8	0.299	0.037			
Total	14					

ANOVA table 4.1.2 shows that the calculated value of 'F' (10.64) due to treatment is greater than the tabulated value of F (4.46) on 2 and 8 d.f. at 5 percent probability level. Therefore it can conclude that there was significant difference ($p \leq 0.05$) between the three treatments of jam regarding overall acceptability. The significant difference thus obtained was further analyzed

by comparing the means of the two treatments against C.D are present in the table 4.8.3.

Table 4.4.11- Comparison of all possible combinations of treatment against critical difference value

Treatment mean value	T_3(7.24)	T_2(7.50)
T_1(7.80)	0.56^S	0.3^{NS}
T_2(7.50)	0.26^{NS}	0

CD=0.28, S=Significant, NS=Non-significant

Difference between the means of two treatments against the CD value indicates significant difference between treatment T_1, T_3 while non-significant difference was found between the treatment T_1, T_2 and T_2, T_3. Treatment T_1scored highest value for overall acceptability of the jam so it is concluded as best treatment.

SUMMARY AND CONCLUSION

The experimental trials were replicated five times in each treatment. The herbs used in various flavored preserved products "candy, jam. murabba and chutney. The products were prepared with three treatment i.eT_1, T_2 and T_3 at 2 percent incorporation level of flavours respectively. The organoleptic analysis of products was done by panel of judges scored with the help of score cards based on nine point hedonic scale and their nutritive value was calculated as ICMR pattern of calculation based on the book of Nutritive Value of Indian Foods by Gopalan *et al* (2007). With regards to all sensory characteristics, in case of candy, the best score with regard to colour and appearances T_1 (8.40), body and texture T_1 (8.52), taste and flavor T_1(8.28) and overall acceptability T_1 (8.39). In case of jam, the best score with regard to colour and appearances T_1 (8.16), body and texture T_1 (7.24), taste and flavor T_1 (7.96) and overall acceptability T_1 (7.80). In case of murabba, the best score with regard to colour and appearances T_1 (8.52), body and texture T_1 (8.68), taste and flavor T_1 (8.40) and overall acceptability T_1 (8.36). In case of chutney, the best score with regard to colour and appearances T_1 (8.52), body and texture T_3 (8.32), taste and flavor T_2 (8.48) and overall acceptability T_1 (8.06).

Nutritive value of prepared candy by incorporation of different flavour showed that the energy Protein ,Fat Carbohydrate Fiber, Calcium, Iron, and Phosphrous increases by incorporation of ginger and cardamom whereas the nutritive value does not increases by incorporation rose. This showed ginger T_1 and cardamom T_2 are slight increase nutrition as compared to rose extract. The calculated nutritive value of prepared products showed maximum energy was found in T_2 (310Kcal) followed by T_1 (309Kcal) and T_3 (308Kcal) and carbohydrate content was highest in treatment T_2 (76.60g) followed by T_1 (76.41g) and T_3 (76.33g) in candy. But protein content was highest in treatment T_2 (1.38g) followed by T_1 (1.28g) and T_3 (1.27g). Fat content was highest in treatment T_2 (5.42g) followed by T_1 (5.39g) and T_3 (5.39g). Fiber content was highest in treatment T_2 (1.98g) followed by T_1 (1.79g) and T_3 (1.77g).Calcium content was highest in treatment T_2 (54.74mg) followed by T_1 (53.59mg) and T_3 (53.38mg). Iron content was highest in treatment T_2 (0.67mg) followed by T_1 (0.66mg) and T_3 (0.63mg). Phosphrous content was highest in treatment T_2 (37.86mg) followed by T_1 (36.82mg) and T_3 (36.20mg) in chutney. Result obtained from the present study revealed that the incorporation of various flavour such as ginger, cardamom and rose extract in bael products candy, jam, murabba and chutney were well acceptable.

On the basis of finding, candy, jam and murabba prepared with ginger was found to best in the case of colour and appearance, body and texture, taste and flavor and overall acceptability. But in case of chutney the best treatment was found in colour and appearances T_1 (ginger). The nutritive values of all the products were comparatively each other. The low cost of all products was found T_1 (ginger) as compared to T_2 (cardamom) and T_3 (rose extract).

RECOMMENDATION

From the investigation, it is clearly seen that the different preserved products can be prepared from the wood apple fruit for longer duration consumption.

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