

Development of Value Added Products from Cashew Apple Powder

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ABSTRACT: Cashew apple is a rich source of vitamin C, organic acids, antioxidants, minerals and carbohydrates and long been used in traditional medicines for the treatment of many diseases. They are highly perishable in nature. The drying of cashew apple can be an excellent alternative to increase its shelf life.. The development of dried cashew apple powder, which maintains the relevant sensory properties as unaltered as possible, can contribute to the development of some value added products, which could be acceptable to the consumers. A trial was carried out for the preparation of different value added products from cashew apple powder such as cashew apple chocolate and cashew apple cake, at Cashew Research Station, Madakkathara, Thrissur, Kerala. Cashew apple chocolate was prepared from cashew apple powder by adding milk powder, sugar, cashew nut, cardamom powder and butter in different combinations. Sample prepared with 200g milk powder, 100g cashew powder, 200g sugar, 50g butter, 4g cashew nut and 1g cardamom powder was found to have better appearance, maximum flavour, taste, sweetness and over all acceptability. Tannin content of this sample was found to be 0.42% and vitamin C content was 58.2mg/100g. The sample showed very low count of bacteria and yeast and fungus were almost nil even after six months of storage. Cashew apple cake was prepared using maida, cashew apple powder, egg, condensed milk and butter in various combinations. The sample prepared by using 30g maida and 20 g cashew apple powder and one egg showed maximum acceptability. The cashew apple cake could be stored for one month without microbial spoilage.

Key words: Cashew apple, chocolate, cake, acceptability, organoleptic scoring

The cashew tree (*Anacardium occidentale*) is one of the major foreign exchange earning plantation crops grown in India. The economic part is the nut attached to a false fruit commonly called cashew apple. Cashew apple is a valuable source of minerals and vitamins. Cashew apple contains 85% juice, 10% of which is sugar. It is rich in ascorbic acid, thiamine, niacin and riboflavin. Indeed, cashew apple juice is reported to contain five times as much vitamin C as citrus juice (Akinwale, 1) and ten times that of pineapple juice (Ohler, 9). The cashew apple juice also has medicinal uses. For instance, its high tannin content makes it a suitable remedy for sore throat and chronic dysentery in Cuba and Brazil (Morton, 7). It is also reported to have anti-bacterial properties. The people of Kerala use cashew apple for many stomach ailments. Its use as a raw material for a variety of fruit based products can trigger revolution in cashew industry.

According to Mathew *et al* (5) cashew apple production in our country is estimated as 60 lakh tons per annum; of which very little is consumed either as fresh fruit or in few cases processed into drinks or pulp, the rest gets wasted; because of the perishable nature. The astringency in cashew apple makes it less palatable in the fresh stage. The cashew apple left after the removal of cashew nut is highly perishable and hence suitable storage methods also become essential.

The drying of cashew apple can be an excellent alternative to increase its shelf-life. It allows conversion of perishable materials into stabilized product by lowering the water activity to appropriate levels. It also prevents microbial spoilage and quality deterioration due to undesirable biochemical reactions. In addition, drying reduces wastage and post-harvest losses. The development of dried cashew apple as cashew apple powder, which

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maintains the relevant sensory properties as unaltered as possible, can contribute to the development of some value added products, which would be acceptable to the consumers.

Dehydrated cashew apple powder would serve as a vitamin C rich powder that can be blended with other flours for nutrient enrichment. Cashew apple powder blended recipes, viz, sweet cookies, masala cookies, bread spread, wheat laddu, chocolate, sponge cake, soup, etc were reported by Vaidehi and Babu Ray (14).

Technologies have been standardized for the effective utilization of cashew apple for product preparation at Cashew Research Station, Madakkathara, Thrissur, Kerala. As a part of the value addition trials, two products from cashew apple powder viz. cashew apple chocolate and cashew apple cake were standardized and the results are summarized hereunder.

RESEARCH METHODS

Collection of cashew apple

The fully ripe cashew apples were collected from the fields of Cashew Research Station, Madakkathara. For the preparation of cashew apple powder, good quality ripe cashew apples were selected, cleaned and dipped in 5% salt solution for 3 days for de-tanning, changing the salt solution daily. After three days these were washed thoroughly in clean water and dipped in potassium metabisulphite (KMS) solution (2g/l) for 2 days. Again washed, sliced, blanched for 20 minutes in boiling water, drained, dried, powdered and sieved. This powder was used for making chocolate and cake.

1. Cashew apple chocolate

Four different combinations of cashew apple chocolate were tried, the details of which are given below:-

- Sample 1 – Cashew apple powder (100g) + milk powder (200g) + sugar (200g) + butter (50g) + cashew nut (4g) + cardamom powder (1g)
- Sample 2 – Cashew apple powder (100g) + milk powder (200g) + sugar (200g) + ghee (25g) + cashew nut (4g) + cardamom powder (1g)
- Sample 3 – Cashew apple powder (100g) + milk powder (200g) + sugar (200g) + butter (80g) + cashew nut (4g) + cardamom powder (1g)

- Sample 4 – Cashew apple powder (100g) + milk powder (200g) + sugar (150g) + butter (50g) + cashew nut (4g) + cardamom powder (1g)

Cashew apple powder and milk powder were mixed well in a bowl. Sugar was dissolved in equal quantity of water and boiled till it reached single thread stage. Added milk powder- cashew apple powder mix, nuts, butter and cardamom powder to the sugar syrup as per the treatments and mixed well. The mixture was poured into moulds to get the desired shape and cooled in refrigerator for 2 hours.

2. Cashew apple cake

Six different combinations of cashew apple cake were tried, the details of which are given below:-

- Sample 1 – Cashew apple powder (25g) + maida (25g) + powdered sugar (50g) + butter (75g) + egg (1 no) + baking powder (a pinch) + salt (a pinch)
- Sample 2 – Cashew apple powder (25g) + maida (25g) + powdered sugar (50g) + butter (50g) + egg (1 no) + baking powder (a pinch) + salt (a pinch)
- Sample 3 – Cashew apple powder (25g) + maida (25g) + powdered sugar (50g) + vanaspathi (25g) + egg (1 no) + baking powder (a pinch) + salt (a pinch) + milk (to mix)
- Sample 4 – Cashew apple powder (20g) + maida (30g) + powdered sugar (75g) + butter (75g) + egg (1 no) + baking powder (a pinch) + salt (a pinch) + milk (to mix) + vanilla essence (2 drops)
- Sample 5 – Cashew apple powder (25g) + maida (25g) + powdered sugar (75g) + butter (75g) + egg (1 no) + baking powder (a pinch) + salt (a pinch) + vanilla essence (2 drops)
- Sample 6 – Cashew apple powder (20g) + maida (30g) + butter (75g) + baking powder (a pinch) + salt (a pinch) + condensed milk (200g) + vanilla essence (2 drops) + sodium bicarbonate (1g)

Cashew apple powder and maida were mixed along with a pinch of salt and baking powder. The flour mixture was sieved to get uniform distribution of the ingredients. The required quantity of butter/ vanaspathy and sugar were beaten together to get fluffy and light texture. Added this to the prepared

flour mixture and mixed well. Then beaten egg and vanilla essence were added as per the treatments and mixed well. This mixture was poured into a moulds and baked at 150 ° c for 20 minutes.

For samples 2, 3 & 4 egg white and egg yolk were beaten together but samples 1 & 5 were prepared by beating egg white and yolk separately. In these two treatments egg white was first mixed with butter and sugar mixture. Then flour mixture was added followed by the beaten egg yolk. In sample 6, condensed milk was used instead of egg.

Organoleptic evaluation

Organoleptic and quality analyses of cashew apple chocolate and cake were carried out among selected 10 members who were asked to give score for various parameters like appearance, colour, flavour, taste, texture, sweetness, and overall acceptability and data tabulated.

Chemical analysis

Tannin and vitamin C were determined using standard procedures. Vitamin C was estimated by the method suggested by A.O.A.C (2) and tannin content was determined as tannic acid by colorimetric method using Folin dennis reagent (Sadasivam and Manickam, 10).

Statistical Analysis

Data collected from organoleptic studies were subjected to statistical analysis. Kendall's coefficient of concordance was used to assess the degree of agreement among the 10 judges.

Microbial analysis

The microbial analysis of the samples was done and the count of bacteria, fungi and yeast were taken at different storage periods and tabulated.

RESEARCH FINDINGS AND DISCUSSION

Cashew apple, the nutritious fruit, is being underutilized due to many reasons, but can be very well exploited for the preparation of many value added products including confectionery items. One of the main problems in post harvest utilization of cashew apple is that the apple cannot be stored even for a day (Nanjundaswamy, 8). The fruits are highly susceptible to injury and microbial spoilage (Chattopadhyaya and Ghosh, 4). Dehydration is an alternative to increase shelf life of fruits and making powder can further lead to the development of value added products.

1. Cashew apple chocolate

The results of the organoleptic scoring of the cashew apple chocolate are presented in Table 1 and Figure -1. Sample prepared with 200g milk powder, 100g cashew powder, 200g sugar, 50g butter, 4g cashew nut and 1g cardamom powder was found to have better appearance maximum flavour, taste, sweetness and over all acceptability. Tannin content of this sample was found to be 0.42% and vitamin C content was 58.2mg/100g (Table 2). The vitamin C in cashew apple is estimated as 216mg/100g (Mini and Mathew,6). May be due to the heating effect, a reduction in the vitamin C content was observed in the product. However, even after the full preparation of the chocolate, there is vitamin C content of 58.2mg/100g, which indicates the nutritional value of the chocolate. Chocolate is a sweet preparation liked by almost all the consumer segments, hence there is good scope for this product in the processing sector. Shivaleela and Vaidehi (11) prepared recipes for making wheat laddu, sponge cake, soup, sweet kadabu and chocolate using cashew apple powder at the rate of 10% substitution. Sobhana *et al* (12,13) reported the production of a few confectionery items from cashew apple powder including chocolate and biscuit with good consumer acceptance.

Table 1
Organoleptic scoring of cashew apple chocolate

Samples	Appearance	Colour	Flavour	Taste	Texture	Sweetness	Overall Acceptability
1	2.64	2.32	2.64	2.96	2.75	3.07	3.21
2	2.29	2.25	2.64	2.61	3.29	2.79	2.96
3	2.56	3.04	2.57	2.04	2.29	1.89	2.14
4	2.11	2.39	2.14	2.39	1.68	2.25	1.68
Kendalls W (a)	0.145	0.172	0.090	0.132	0.417	0.253	0.411
Assumption significance	0.107	0.065	0.286	0.135	0.001	0.014	0.001
Significance	1.07	0.65	2.86	1.35	0.01	0.14	0.01

Table 2
Quality analysis of cashew apple chocolate

Samples	Vitamin C (mg/100g)	Tannin (%)
1	58.20	0.42
2	52.30	0.38
3	54.60	0.45
4	50.90	0.50

The selected sample was stored under room temperature and refrigerated conditions and subjected to microbial analysis, after 3 and 6 months

of storage. The sample showed very low count of bacteria and fungus was almost nil and yeast was not detected after 3 months as well as 6 months of storage (Table 3).

Table 3
Microbial analysis of cashew apple chocolate in storage

Sample 1	Microbial count in 1gm of sample (cfu/g), 3 months after storage			Microbial count in 1gm of sample (cfu/g) 6 months after storage		
	Bacteria × 10 ⁶	Fungus × 10 ⁴	Yeast × 10 ³	Bacteria × 10 ⁶	Fungus × 10 ⁴	Yeast × 10 ³
Under room temperature	10	NIL	NIL	17	NIL	NIL
Under refrigerated condition	5	NIL	NIL	12	NIL	NIL

2. Cashew apple cake

Cake is a baked food item liked by almost all persons and is usually made using *maida* as the base material. In this experiment cashew apple powder was tried along with *maida* to get a different taste as well as for the diversified use for cashew apple powder in food industry. The data generated by the organoleptic scoring of different cashew apple cake preparations are presented in Table 4 and Figure-2. The organoleptic scoring of cake revealed that sample prepared by using 30g *maida* and 20 g cashew apple powder along with condensed milk (sample 6) showed maximum acceptability followed by the sample prepared using egg instead of condensed milk (sample 4). The accepted samples were subjected to microbial analysis after 1 month of storage in refrigerated condition. Microbial analysis showed that the selected samples of cashew apple cake do not have microbial growth above the permissible limit (Table-5.). Again the samples were stored for one more month, but they have undergone microbial spoilage. Usually cake is made with egg which is not consumed by vegetarians. The present recipe for making cake from cashew apple powder without egg is more advantageous since vegetarian people can also consume the same.

According to Babu Ray *et al* (3) cashew apple powder can be blended in regular traditional recipes to get high fiber, light flavoured dishes, thus enhancing the nutritional quality of traditional foods and they have successfully prepared sponge cake, chocolate, soup and sweet kadabu using cashew apple powder as one of the ingredients. In the present study also chocolate and cake prepared from cashew apple powder got good consumer acceptance, indicating a different use for cashew apple, which otherwise is a wasted fruit. Sponge cake and bread spread were successfully prepared from cashew apple powder by Vaidehi and Babu Ray (14). The production of the value added product, cake, from

cashew apple powder is an achievement in the economic utilization of cashew apple as reported by the above workers.

Table 4
Organoleptic scoring of cashew apple cake preparations

Samples	Appearance	Colour	Flavour	Taste	Texture	Sweetness	Overall Acceptability
1	3.90	4.15	3.80	3.95	4.20	3.65	3.95
2	2.85	2.40	2.60	2.30	2.40	2.65	2.85
3	2.40	3.00	3.00	2.70	2.60	2.80	2.60
4	4.95	4.60	4.05	4.15	4.65	4.40	4.25
5	2.50	2.50	2.65	2.85	2.75	2.65	2.55
6	4.40	4.35	4.90	5.05	4.80	4.85	4.80
Kendalls W (a)	0.449	0.428	0.338	0.469	0.411	0.386	0.391
Significance	0.00	0.01	0.05	0.00	0.01	0.02	0.02

Table 5
Microbial analysis of cashew apple cake after one month of storage under refrigerated condition

Sample No.	Microbial count in 1g of sample (cfu/g)		
	Bacteria × 10 ⁶	Fungus × 10 ⁴	Yeast × 10 ³
4	21	Nil	5
6	15	4	4

At present cashew apple, a nutritious fruit, is being almost wasted, even though, technologies are available for its economic utilization. The value added products standardized from cashew apple, including chocolate and cake, can contribute much to the processing industry. This can be achieved through Self help Groups or such women groups, prevailing in our country who can start cashew apple processing which will enhance their earnings. The additional income from cashew through cashew apple processing will encourage more farmers to grow cashew, thus paving way for increased area and production under cashew in our country.

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