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Dehydrated star fruit (Averrhoa Carambola L) powder as flavour enhancer in green chutney

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Abstract

Fresh fruits play an important part in our diet. They are protective foods containing various nutrients. The star fruit (Averrhoa carambola l) which is low in calories is one such fruit loaded with vitamin C which can contribute to 30% of our daily requirement in 100g. Due to these properties, it has got diverse utilization in food and for medicinal purposes. This study approaches towards, preparation and utilization of dehydrated star fruit powder as a flavour enhancer in green chutney. The work aimed at determining the sensory acceptability, level of vitamin C content, titratable acidity and pH. Two variants of green chutney incorporated with dehydrated star fruit powder (V1-5g and V2-10g) along with one standard (S-10g raw mango powder) were prepared. The sensory evaluation results revealed that V2 with 10g dehydrated star fruit powder was highly accepted overall (4.02) when compared to other samples. The results of chemical analysis for vitamin C, titratable acidity and pH values of the dehydrated star fruit powder were found to be 4.07mg/100g, 1.575% and 1.98 respectively. From this study, it was concluded that the dehydrated star fruit powder worked as an excellent flavour enhancer in the green chutney preparation and was well accepted.

Keywords: star fruit, dehydration, dry powder

Introduction

Fresh fruits and vegetables are a very important part of our lives. They are also an important source of health-promoting agents as they provide vitamins, minerals and fibre required for maintaining good health hence known as protective foods. India is known for the cultivation of tropical and subtropical fruits and vegetables; one such fruit is star fruit (*Averrhoa carambola*). It has the highest antioxidant properties amongst the various Indian tropical fruits **(**Amitabye L.R *et al*., 2003**)** **[1]**. This fruit has attained huge interest across the globe due to its nutritional content and the presence of biologically active compounds that provide health benefits and reduce the risk of certain diseases.

The fruit is pentagonal, commonly known the Star fruit, is very firm and juicy with a refreshing taste. Fruits are yellow to green; the yellow fruit tends to be more acidic in flavour and the green ones sweeter. The fruit is a berry and has a profound odor of oxalic acid and the flavour tends to more towards sour than sweet. Commercial acceptance has been limited because the fruit is susceptible to shipping damage and requires storage below 70 °F to maintain optimum quality. As a food, it can be sliced up into attractive star shapes, which can then be added as a garnish to fruit salad and fish. It is also a good fruit for juicing. They are also used in various stews and curries. In Malaysia, they are often stewed with sugar and cloves, alone or along with apples. The Chinese cook it along with fish; partially under-ripe fruits are salted, pickled or made into jam or other preserves in India. The slices of the fruit are often candied and put into sterilized jars. The fruits can also be processed into various products like jelly, candy and dried fruits are widely used in confectionery, baking and sweet industries **(**Babu K. *et al*., 2006) [4]**.**

The juice of some varieties has a pH of about 1.9–2.0 and about 15–16mg of ascorbic acid per 100g of juice; hence it is a rich source of vitamin C. Juice also contains iron and phosphorous. An Indian scientific study showed 10.40mg ascorbic acid in the sweet variety and 15.4mg in the sour variety. The ascorbic acid content of both waxed and unwaxed fruits stored at 10ºC was reported as 20 mg/100 ml of juice. All parts of the Carambola tree are rewarded with medicinal properties. The fruits are regarded to be laxative, anti-scorbutic, anti-dysenteric and anti-phlogistic. The fruit juice is a good remedy for piles and is useful in relieving thirst and febrile excitement, treating asthma, colic and jaundice. They have slight intoxicating and emetic properties. The conserve of the fruit is said to allay biliousness and diarrhea and relieve a hangover. In Brazil, the fruit is recommended as a diuretic in kidney and bladder complaints and is believed to have a beneficial effect in the treatment of eczema **(**Babu K. *et al*., 2006 and Anon, 1985**)** [4, 3]**.**

The fruit has the highest antioxidant properties amongst the various Indian tropical fruits as it is a significant source of phenolic antioxidants hence helps in lowering cholesterol, maintaining blood pressure and body weight. This fruit has anti-inflammatory activity, anti-ulcer activity, hypoglycemic activity as well as antimicrobial activity. This fruit is added in our diet can meet around 30% of our daily requirement of Vitamin C in just 100g **(**Anita Kanwar and Savita Budhwar, 2018) [2].

In this study, the star fruit (Averrhoa Carambola L.) was dehydrated and made into a dry powder to utilize in green chutney preparation and determine the level of vitamin C,

titratable acidity and pH.

Objectives

To develop and incorporate the dehydrated star fruit powder as a flavour enhancer in green chutney preparation.
To standardise the recipe by conducting a sensory analysis.
To analyse the vitamin C, titratable acidity and *pH* in the prepared powder.

Materials and methods

Sample preparation

The star fruit (*Averrhoa carambola L.)* was procured from the local market at Chennai, Tamil Nadu. The fruits were washed with potable water and were cut into 1 cm thick slices. A pre-treatment was given to the sliced fruit by dipping it in 1% calcium hydroxide (slaked lime) solution to prevent non – enzymatic browning before dehydrating the fruit. The fruit colour, flesh colour and shape were assessed by visual appearance.
The fruits were dehydrated in a tray drier at 60°C to 70°C until most of the moisture was removed. The fruits were dried enough to grind into powder. The amount of fresh fruit taken was 100 g for dehydration which yielded 7.805 g of powder. The dehydrated fruit was ground into fine powder in an electric mixer.

Preparation of Chutney

The green chutney was formulated through optimizing the addition of dehydrated star fruit dry powder as 2 variants (V1- 5g powder, V2- 10g powder) and one standard (S- 10g raw mango powder) into the green chutney to compare the acceptability on sensory parameters (table 1).

Table 1: Ingredients used for preparation of green chutney

Ingredients	Samples prepared		
	Standard -S	***Variant1-V1***	***Variant2-V2***
Coriander leaves	50g	50g	50g
Mint leaves	50g	50g	50g
Cumin seeds	5g	5g	5g
Black pepper	2.5g	2.5g	2.5g
Carambola (Star fruit) powder	-	5g	10g
Raw mango powder	10g	-	-
Rock salt	2.5g	2.5g	2.5g
Sugar	1g	1g	1g
Green chilly	1g	1g	1g
Water	30ml	30ml	30ml

The coriander and mint leaves were washed in potable water to remove mud and dirt. The spice ingredients like cumin seeds, black pepper were roasted and ground along with other ingredients in mixture jar according to each variation and ground into a fine smooth consistency.

Sensory evaluation of prepared green chutneys

For the evaluation 3 green chutneys were prepared. Two variants with the addition of the dehydrated star fruit powder (V1-5g powder and V2-10g powder) and one standard was prepared with the addition of raw mango powder (S-10g). A blind method of 5 points hedonic scale was used for sensory evaluation. The samples were compared with the standard for evaluating their acceptability in terms of sensory scores.

Chemical analysis of dehydrated star fruit powder

The dehydrated star fruit powder was analysed for its vitamin c, titratable acidity and pH. Vitamin C and titratable acidity were done using the titrimetric method. The pH was taken using the pH meter in the laboratory.

Results and discussion

Sensory evaluation of the green chutneys

The results of the sensory analysis of standard (S) and the sample green chutney prepared revealed that V2 with 10g dehydrated star fruit powder was highly accepted overall (4.02) when compared to other samples. However, as the level of addition of star fruit powder increased from 5g to 10g the scores for appearance/colour decreased. Hence variation 1 with 5g star fruit powder was better accepted in terms of appearance (3.86).

Chemical analysis of dehydrated star fruit powder

The results of the chemical analysis are presented in table 2 and the same presented in graph (figure 1).

Vitamin C estimation

The vitamin C content of the fresh star fruit was 25.8mg per 100g of edible portion. After dehydration by tray drying method, the vitamin C content of the dehydrated star fruit powder was found to be 4.07mg/100g. In a similar study with star fruit in jam preparations using sour and sweet star fruit, vitamin C was found to be 1mg and 0.98mg respectively **(**Anita Kanwar and Savita Budhwar, 2018) [2].

Titratable acidity

The titratable acidity of the dehydrated star fruit powder was found to be 1.575%. In the work done by Anita Kanwar and Savita Budhwar, 2018 [2] the titratable acidity was 1.00 and 0.98 in jams prepared using sour and sweet star fruit respectively. The star fruit was found to be rich in oxalic acid with the levels of 0.98% in unripe fruit and 0.51% in half-ripe fruit **(** N *et al*., 2009) [7].

Table 2: Chemical analysis of dehydrated (Averrhoa Carambola L) powder

Chemical analysis result		
Parameters	***Amount in 100g Half Ripe Fruit***	***Amount in 100g Dehydrated Powder***
Vitamin C (mg/100g)	25.8	4.07 ± 0.0544
Titratable acidity (% oxalic acid)	0.51	1.575 ± 0.0272
pH	2.7	1.98 ± 0.0033

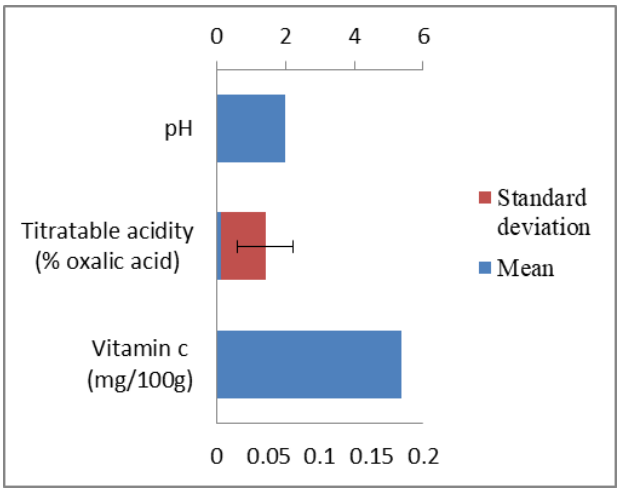

Fig 1: Chemical analysis of dehydrated (Averrhoa Carambola) powder.

pH

The pH of the dehydrated star fruit powder was found to be 1.98. In the ripe and half-ripe star-fruits, the pH was reported as 3.44 and 2.7 respectively by **(** N *et al*., 2009) [7]**.** In the study on star fruit juice by Nirali C.S *et al*., 2017 the pH values ranged from 3.44-4.

Conclusion

From the present study, it could be concluded that star fruit in dehydrated powder form could be an excellent flavour enhancer in the preparation of green chutney. The sensory acceptability of their utilization in green chutney preparation was well accepted. However, it could be observed that dehydration of the fruit has reduced the vitamin C content by 0.021% and titratable acidity of the dehydrated star fruit powder increased by 1.065%. This powder can also be used as a substitute for salt as it possesses sour note.

Further scope

The dehydrated star fruit powder can be utilized in other food products especially in RTE products as a flavour enhancer and salt substitute and further chemical and microbial analysis can be done.

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