

Formulation and Storage Stability of *Cocos nucifera* Flower Value Added Papad

Nisha Raj¹ and K. Arulmozhi^{2*}

¹Assistant Professor, Department of Hotel Management, Yuvakshetra Institute of Management Studies, Palakkad, Kerala

^{2*}Assistant Professor, Department of Food and Nutrition, Vellalar College for Women, Erode; arulyuva@rediffmail.com

Abstract

Edible flowers are flowers that are used to add color, fragrance, and flavor to a garnish or as an integral part of a dish, such as a salad. Consumption of various types of edible flowers provides excellent health benefits because they are a rich source of phytochemicals that are good for disease risk reduction. High intake of edible flowers has been reported to be associated with a lower incidence of chronic diseases such as cardiovascular disease and cancer. The main objective of this study is to assess the nutrient content of *Cocos nucifera* flower, to formulate the value added *Cocos nucifera* flower papad and its storage stability. Findings of the study revealed that *Cocos nucifera* flower contains noticeable amount of energy, vitamin C, calcium, phosphorus and high amount of potassium. Variation I of the value added papad was highly acceptable. Microbial analysis revealed that variation I (10^{-3}) was safe upto 15 days.

Keywords: Cocos nucifera flower, Papad, Edible Flowers

1. Introduction

Edible flowers, which have been used in the culinary arts for centuries, are experiencing renewed popularity. Flower is an important part of plant which contains a great variety of natural antioxidants, such as phenolic acids, flavonoids, anthocyanin and many other phenolic compounds¹.

Coconut flower (*Cocos nucifera*) is a natural and delicious alternative to wheat and grain that's packed with dietary fiber and is a good source of protein too. Coconut flower is gluten-free and is a good alternative for patients with celiac disease². Coconut flower nectar is full of vitamins and minerals, many of which are lacking in most diets³.

Coconut flower sugar has low glycemic value and is recommended for diabetics as it helps in slow energy release⁴.

Papad is an indigenous savory food item mostly prepared at household level and served as an accompaniment to a meal or at the end of it. It is commonly made with black gram flour but the composition of papad

varies by the addition of a large number of ingredients such as cereal flour, pulse flour, soya flour spice mix and different vegetable juices to improve both organoleptic and nutritional characteristics⁵.

New innovations in food processing and novel ready-to-cook foods with medicinal value is of increased demand in the recent trend, with this view the present study was carried out to analyse the nutrient content of dried coconut flower, to formulate and standardize the value added papad using coconut flower, to evaluate the sensory characteristics and to analyse the storage stability of the formulated papad.

2. Methods and Materials

2.1 Nutrient Analysis of Coconut Flower (*Cocos nucifera*)

The nutrients like energy, vitamin C, calcium, phosphorus and potassium were analyzed for the coconut flower powder using standard procedures.

*Author for correspondence

2.2 Formulation and Standardization of Value Added Coconut Flower Papad

To learn the techniques of papad preparation the investigator personally visited a very famous homemade papad processing unit located in Palakkad. As the home made papad had high commercial acceptance, the same ingredients were used for the preparation of coconut flower papad.

Different variations of coconut flower papad were prepared by altering the proportion of all the ingredients for standardization. Three groups of coconut flower papad were prepared Variation I, Variation II, and Variation III and it is given in the Table 1.

2.3 Preparation of Value Added Papad

Papad is thin and circular in shape prepared by blending legumes (black gram, Bengal gram, cow pea etc) or rice flour as well as fruits or vegetables (potato, sweet potato, jack fruit etc) mixed with common salt, spices, edible oil and alkaline mucilaginous additives⁶.

Food ingredients namely unrefined black gram flour (with husk), coconut flower powder, water, salt and spices

like cumin seed pepper powder were used for the preparation. (Figure 1).

2.4 Organoleptic Evaluation of Fortified Coconut Flower Papad

The coconut flower papad was fried in coconut oil at the temperature of 175^o C and were served to group of 10 panel members with a score card to elicit the acceptability of the papads. The sensory characteristics like appearance, texture, taste, and flavor and over all acceptability were evaluated through 5 point hedonic scale from 10 panel members. From the variation V1, V2, V3, Variation V1 was selected through organoleptic evaluation as it received the higher acceptability scores than other variations and it was used for further study. The different variations of papad are represented in Plate 1.

2.5 Microbial Analysis

Microbial analysis of value added papad was done at the first day of packing (initial) and after 15 days of storage at room temperature to determine the shelf life of value added papad.

Table 1. Standardization of Coconut Flower Papad

Variations	Unrefined black gram flour	Coconut flower powder	Water (ml)	Spices Cumin:pepper
Control	100(g)	-	35	1:1
V1	98(g)	2(g)	35	1:1
V2	94(g)	6(g)	35	1:1
V3	90(g)	10(g)	35	1:1

Black gram + Cumin seed + Pepper + Coconut flower + Water powder



Ingredients were made into Dough



Balls were rolled into papad



Sun dried

Figure 1. Papad making process.

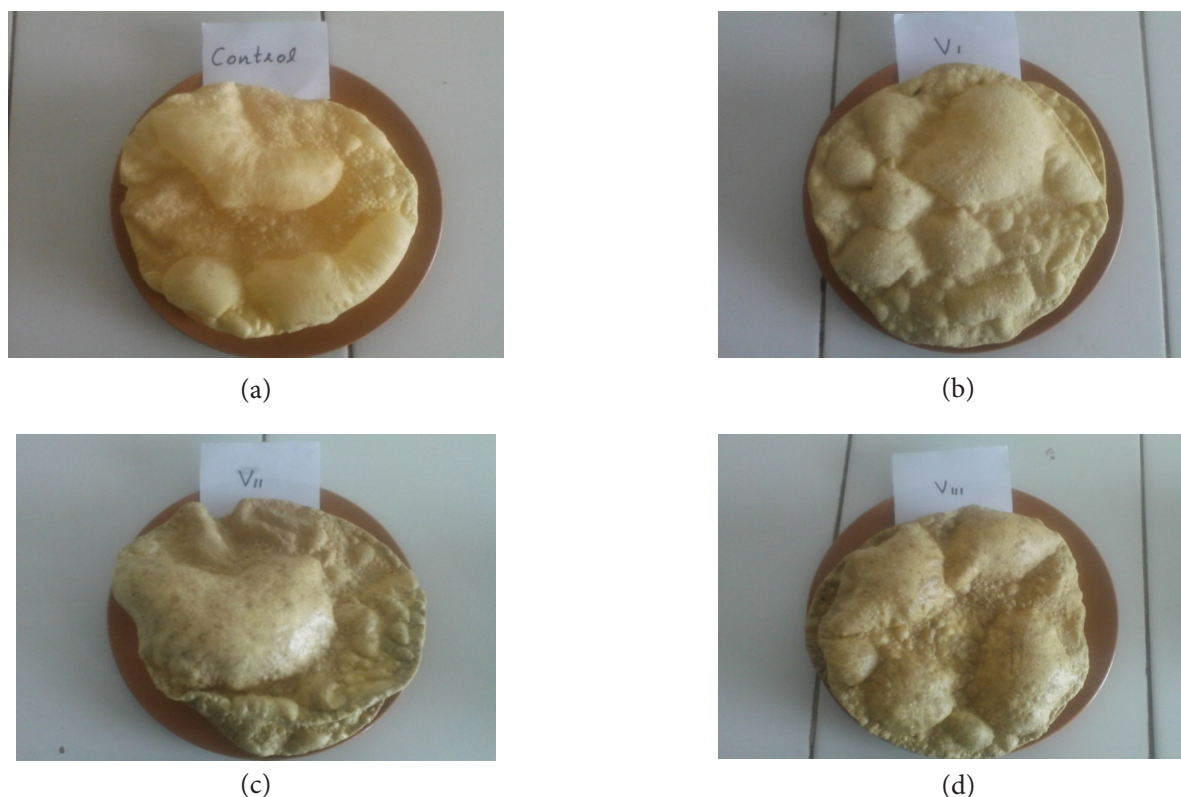


Plate 1. Standardization of fortified coconut flower papad. (a) Control. (b) Variation I. (c) Variation II. (d) Variation III.

3. Results and Discussion

3.1 Nutrient Analysis of *Cocos nucifera* Flower powder

Nutrient analysis was done to detect the quantity of nutrients present in coconut flower powder. The coconut flower powder was analyzed for energy, vitamin C, calcium, phosphorous, and potassium is given in Table 2.

Table 2 clearly depicts that the nutrient content of *Cocos nucifera* flower has 310.24 Kcal of energy, 23 mg of vitamin C, 1600 mg of potassium, 48 mg of calcium and 70 mg of phosphorus.

From this analysis it can be observed that *Cocos nucifera* flower contains the nutrients needed for normal functioning of human body and it can be used in value addition of normal products.

3.2 Organoleptic Evaluation of Value Added Coconut Flower Papad

Organoleptic evaluation of value added coconut flower papad prepared from unrefined black gram flour,

Table 2. Nutrient analysis of coconut flower powder (100g)

Sl. No.	Nutrients	Amount
1	Energy	310.24 Kcal
2	Vitamin C	23 mg
3	Calcium	48 mg
4	Phosphorus	70 mg
5	Potassium	1600 mg

coconut flower powder, water and spices were assessed by ten panel members using the score card with a five point rating scale. In the evaluation, the panel members were asked to judge the quality of product with respect to appearance, flavour, taste, texture and over all acceptability.

3.2.1 Comparison of Mean Organoleptic Score of Control and Different Variations of Value Added Papad

The mean organoleptic score of control and different variations of value added papad is given in the Table 3.

Table 3. Comparison of mean organoleptic score of control and different variations of value added papad

Sensory characteristics	Control	Variation I	Variation II	Variation III
Appearance	4.7±0.5	4.8±0.42	4±0.47	3.9±0.57
Flavour	4.9±0.3	4.6±0.52	3.6±0.52	3.3±0.48
Taste	5±0.0	4.7±0.48	4.2±0.42	3.2±0.42
Texture	4.7±0.5	4.7±0.48	3.9±0.57	3.4±0.52
Overall acceptability	4.8±0.4	4.6±0.52	3.7±0.48	3.4±0.52

Table 4. Total viable count of control papad and variation I papad

Storage period	Control papad		Variation I	
	10 ⁻²	10 ⁻³	10 ⁻²	10 ⁻³
Initial	NIL	NIL	NIL	NIL
15 Days	∞	75	∞	45

From the above table it was clear that variation I of the value added papad received the highest mean score in all sensory attributes such as appearance (4.8±0.42), flavour (4.6±0.52), taste (4.7±0.48), texture (4.7±0.48) and over all acceptability (4.6±0.52) when compared with Variation II and Variation III. So Variation I was selected for microbial analysis to determine the shelf life.

3.3 Microbiological Analysis for Storage Stability of Value Added Papad

The value added papad was kept for a period of 15 days and was subjected to microbial analysis.

3.3.1 Total Viable Count

Bacillus Species are the major contributor to spoilage of products, which causes ropes spoilage⁶. The total viable count of control and Variation I fortified coconut flower papad is given in Table 4.

The above Table 4 showed that the total viable count of control papad and variation I fortified papad was nil during initial storage period. But after 15 days, there were numerous organisms to count in 10⁻² dilution in control papad as well as Variation I papad. The total viable count was 75 after 15 days of storage in 10⁻³ dilution for control papad and 45 colonies after 15 days of storage in 10⁻³ dilution for Variation I papad. Variation I was devoid of broken or frayed edges, adhering dirt, insect infestation

or fungal growth and was in the permissible limit recommended by BIS.

4. Conclusion

Cocos nucifera flower can be used as food supplement and value added *Cocos nucifera* flower papad Variation I scored higher in organoleptic evaluation compared with other two variations. The nutrient content of *Cocosnucifera* flower showed noticeable amount of Energy, vitamin C, calcium, phosphorus and high amount of Potassium. The storage stability of value added *Cocos nucifera* flower papad determined by microbial analysis indicated that the Variation I papad was safe up to 15 days.

5. References

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