Research Journal of Family, Community and Consumer Sciences _____ ISSN 2320 – 902X
Vol. **3(5),** 1-3, July **(2015)** *Res. J. Family, Community and Consumer Sci.*

Assessment of Nutritional and Physiochemical properties of Banana Flour

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Available online at: www.isca.in, www.isca.me
Received 21st April 2015, revised 2nd June 2015, accepted 14th July 2015

Abstract

Banana is one of the most important fruit crops of tropical and sub tropical regions. In respect of area India ranks second and first in production only after mango. Considering the nutritive value and fruit value of banana it is the cheapest among all other fruits. Though India is the largest producer of banana, hardly five percent of the produce is processed. A need therefore prevails to develop suitable technology for the processing of the fruit. In the present study, to preserve the fruit for an extended period, Peeled, sliced and treated bananas were oven dried for 18 hrs at 60°c . The dried bananas were ground to make banana powder. The flour was analysed for proximate composition (moisture, protein, carbohydrate, crude fat, energy and fibre). Mineral composition (iron, calcium, sodium, potassium, magnesium, manganese, phosphorous) β carotene and vitamin c. For the estimations the standard procedures of AOAC 2000 were followed. For assessing the physical properties, the banana flour was assessed for pH, total solids, total sugars, water holding capacity (WHC), oil holding capacity (OHC), and titratable acidity. Banana powder is an excellent source of carbohydrate and is also a concentrarted source of potassium, phosphorus, calcium and magnesium. In addition banana powder is rich in dietary fibre too. The physiochemical properties of banana flour make it suitable for incorporating and blending with almost all kinds of recipes.

Keywords: Banana flour, physiochemical, dehydration.

Introduction

Banana is the largest produced and maximum consumed amongst the fruits cultivated in India. It is highly nutritive and very delicious. India leads the world in banana production with an annual output of 14.2 million tons. Due to non ideal post harvest practices proper storage facilities and mis handling of produce about 25-40% are wasted and only2% is processed into value added products. To increase the utilization of banana, production of unripe banana flour and its incorporation to various innovative products is usually practiced in banana producing countries. Banana flour prepared from unripe banana possess the thickening and cooking properties almost similar to that of starch[1]. In most of the South East Asian countries, however, banana is mainly consumed ripe; hence, preparation of banana flour from ripe fruit will increase the utilization of the fruit and could be used to prepare value added products requiring solubility, sweetness and high energy content.

In the present study the banana flour from the ripe banana was prepared with an intention to study the nutritional and culinary potential of the flour for the preparation of derivative products.

Material and Methods

Preparation of banana flour: Bananas were bought from twenty different markets from Jaipur City, India. A total of 140-160 bananas, more yellow than green in the ripeness stage 5 were purchased from each market location. Ripeness stage 5 was selected as it corresponds to various uses in industrial transformation and traditional culinary preparations[2]. In total 2000 bananas were purchased for all samples. The fruits were peeled and cut into transverse slices of about 2 mm thickness. The slices were then dipped in 0.5 % (w/v) sodium metabisulphite solution for 5 min, drained and dried in oven at 60°C for 18 hrs. The dried samples were ground to pass through 60 mesh screen to obtain banana flour. The yield of flour was calculated by dividing the amount of flour produced by the amount of fresh banana used, and the results were converted to g/Kg (g of flour/Kg of banana). The flour was stored in airtight plastic packs in cold storage (15±2°C) for further analysis.

Proximate analysis of the banana flour: The moisture content, ash, fat, crude fibre, crude protein were determined using AOAC[3]. The carbohydrate content was determined by difference. The energy content was determined by using bomb calorimeter.

Determination of the mineral composition of the banana flour: The mineral analysis was carried out using the atomic absorption spectroscopy. An amount of 10g banana flour was weighed into a porcelain crucible. It was placed in a muffle furnace and ashed at 500°C overnight. The white ash obtained was dissolved in 10% HNO_3. The solution was boiled to ensure complete dissolution of the ashed residue. After cooling for some time, it was filtered into a 100 ml volumetric flask. The filtrate was finally diluted to the mark with distilled water and mixed well. Before the readings of the sample on the Atomic Absorption Spectroscopy (AAS), standards for calibration were prepared. All elemental standards were stock standards of 1000mg/L. Calibration standards were prepared by serial

titratable acidities of the pulp were 0.11% and 0.10% for malic acid and citric acid respectively. These two acids are the predominant organic acid in banana. Acids tend to decrease with the maturity of the fruit while the sugar content increases[8]. The low percentages of acid obtained show that the banana used were fairly ripe.

Table-3
Physiochemical Properties of Banana Flour

Parameter	Values
Total solids	90.1 ± 0.07
Total sugars	4 .62 ±0.07
pH	4.60 ±0.07
Malic cid	0.11 ±0.07
Citric acid	0.10 ±0.07
WHC	
1	0.79 ±0.07
1	0.80 ±0.07
1	2.40 ±0.07
OHC	
2	0.81 ±0.03
2	0.85 ±0.04
2	0.90 ±0.06

1 water holding capacity g water / g dry sample. 2 oil holding capacity g oil/ g dry sample

Mean WHC increased with the temperature and ranged between 0.79 to 2.40 g/g dry sample. These values were similar to those reported by Abbas et al [6]. The average water holding capacity of banana flour implies the potential of banana flour to be used as thickner in liquids and semiliquid foods. WHC could be related to the physical state of starch, dietary fiber and protein[9] in the flour. It was the release of amylase which has the capacity to effectively bind water molecules that yielded a higher WHC[1]. Starch is however, not the principal component of ripe banana[10] leaving dietary fibres and protein as the main contributing factors. The highest water holding capacity was at 80°C.

Mean OHC ranged between 0.81 to 0.90 g/ dry samples at the three temperatures assessed. These values are comparable to the values reported by Rodriguez Ambriz and Abbs[1,6]. OHC is characterized by the hydrophilic tendency of the starches present in the flour[1.] Good oil absorption capacity of the flour makes them useful in food preparation that involves oil mixing, such as the bakery products where oil is an important ingredient.

Conclusion

Banana is one of the most popular and consumed fruit in tropical regions. Dehydration of banana and preparation of banana flour could increase the shelf life of the quickly perishable fruit and would increase the utilization. Reduction in post harvesting losses would be of great significance to growers and consumers too. The nutritional potential and the physiochemical properties of banana flour also make it suitable to be incorporated in various recipes and could be expected to give health benefits.

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