

Raw and Ripe Banana Powder for Nutritional and Economic Sustainability

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Abstract: The present investigation was undertaken with an objective to assess the nutritional composition of raw and ripe banana powder. It was prepared by drying fully grown, mature and peeled, raw and ripe Bananas in a dryer. The peeled fruit was treated with KMS (1%) for 10 min before drying to improve the color and shelf life of the final product. Banana powder preparation is usually carried out as a means of preservation and value addition. The drying process removes about 96% of water content. Dehydrated Mitle raw banana product was found to be a far more concentrated source of calories-264.67 Kcal, Carbohydrates (76.67g), Protein (2.67g), and about 3 times higher in potassium (961mg) than the source fruit, respectively. Whereas, dehydrated ripe banana powder was found to produce 362 Kcal of energy, carbohydrate (86.50g) and Protein (3.69g) per 100g. Both the products were highly nutritive and shelf stable up to 1 year. These products can be blended with other cereal flours in the form of composite flours for making dosa, chakli, bhaji powder, chutney powder, millet mix, nippattu, confectionaries and weaning formulations.

Keywords: Raw and ripe banana powder and nutritional composition.

INTRODUCTION

Banana which is also called as “Apple of Paradise” is one of the largest produced and consumed fruit in the world. Botanical name of Banana is *Musa Paradisica*. Banana fruit is consumed by millions of people around the world as part of their daily diet and for nutrient enrichment. It is a staple food in East Africa and is also the most important world traded tropical fruit. Global export is 15.5 million tonnes which includes the Cavendish varieties like Dwarf Cavendish, Grand Naine, Robusta and Lacatan (Radha and Mathew, 2007). Bananas are grown extensively throughout the tropical and subtropical regions of the world. It has been represented as the number one fruit crop in the world, in terms of both production and trade. The writings of the Greek, Romans and Arabians indicated banana as a remarkable fruit of India. The production data of banana showed an increasing

trend from 1955 onwards and projection for 2020 AD is around 36 million tonnes. The total export of banana was reported as 6-7 million tonnes per annum to the countries like Russia, Nepal, Germany and Middle East (Chadha, 1995).

India is the largest producer of banana in the world with a total area of approximately 490 thousand hectares and an annual production of 16.81 million tonnes. Banana occupies 12.36 per cent of total area under fruit crops and 32 per cent of total fruit production in India. The important states producing banana in India are Maharashtra, Tamil Nadu, Karnataka, Gujarat and Andhra Pradesh. The total area under banana cultivation in Tamil Nadu was 88,114 hectares with a production of 4.40 million tonnes (Narayana et al., 2006).

It is one of the cheapest and easily available fruits of tropical and sub-tropical regions. It is one of a very important commodity for developing

countries. It is used as a staple food and is used as desert in many countries. It is highly perishable in nature. It is rich in antioxidants and nutrients that are useful in tackling diseases like cancer, inflammation, diabetes etc. Due to its perishability and larger availability, this fruit is difficult to store and supply.

Banana powder is very popular among in Uttara Kannada and Dakshina Kannada of Karnataka. So far no systematic studies were carried out on preparation, standardization and storage of these products. Hence, the present study was taken up to standardize the Banana Powder and it is converted into different forms and consumed. Some of the examples of banana products are Banana fruit powder, Banana fruit chocolates, Banana cake, chakli, nippattu etc.

MATERIALS AND METHODS

The present study was undertaken to develop and standardize the Banana Powder and products from fruit banana powder.

Preparation of Banana powder

Bananas brought from the market are cleaned and all the extraneous matter are removed. They are then peeled and blanched in hot water for 5mins. Blanched Bananas are then sliced and dried in the cabinet drier for 8-10 hours. Dried slices are grinded and sieved in 80mm sieve. Prepared powder is incorporated and used in preparation of fruit chocolate.

Estimation of Moisture (%)

Moisture of the sample was determined by taking about 10g of powdered sample in a moisture cup and dried in an oven at 105 °C till the weight of the moisture cup is constant. Each time before weighing, the moisture cup was cooled in desiccators. The moisture content of the sample is expressed in g/100g of sample (Anon., 2019).

$$\text{Moisture content (\%)} = \frac{\text{Initial weight (g)} - \text{Final weight (g)}}{\text{Weight of the sample (g)}} \times 100$$

Estimation of Proteins (%)

The protein content of the dried sample was estimated as per cent total nitrogen by the Micro Kjeldhal method (Anon., 2019). For the digestion of sample, the Kelplus-Classic Dx (Pelican

equipment) digestion unit was used. The distillation was carried out in Kelplus Classic Dx (Pelican equipment) automatically. The nitrogen content was calculated using the following formula given below. The detailed procedure is given in appendix I.

$$\text{Nitrogen content (\%)} = \frac{1.4 \times \text{Normality of the acid} \times \text{titrant value}}{\text{Weight of the sample (g)}} \times 100$$

The protein content (%) was estimated by multiplying the nitrogen content with the nitrogen-to-protein conversion factor i.e. 6.25.

$$\text{Protein content (\%)} = 6.25 \times \% \text{ Nitrogen}$$

Estimation of Fats (%)

The fat content of the sample was determined by using the solvent extraction method. The dry sample (5 g) was weighed accurately into a thimble and plugged with cotton. The thimble was placed in a Socs plus apparatus and extracted with petroleum ether for about 1 hour. The ether was then evaporated and flask with the residue dried in an oven at 80-100 °C cooled in desiccators and weighed (Anon., 2019).

$$\text{Fat content (\%)} = \frac{\text{Initial weight of beaker (g)} - \text{The final weight of beaker (g)}}{\text{Weight of the sample (g)}} \times 100$$

Estimation of Crude fibre (%)

The crude fiber content of the sample was estimated by gravimetric method. The fat-free sample was hydrolyzed with acid and subsequently with alkali and the residue obtained after final filtration was weighed, incinerated or ashed till whitish ash obtained, cooled and weighed again. The loss in weight of the sample after ashing was the crude fiber content of the sample (Anon., 2019). The detailed procedure is given in appendix II.

$$\text{Crude fiber (\%)} = \frac{\text{Weight after oven drying} - \text{Weight after ashing in muffle furnace}}{\text{Weight of the sample (g)}} \times 100$$

Estimation of Carbohydrates

The carbohydrate content was calculated by difference method i.e. deducing the sum of the

value of moisture, protein, fat, ash and crude fiber from 100 (Anon., 2019).

$$\text{Total carbohydrate (g/100g)} = 100 - [\text{Moisture} + \text{Fat} + \text{Protein} + \text{Ash}]$$

$$\text{Available carbohydrate (g/100g)} = 100 - [\text{Moisture} + \text{Fat} + \text{Protein} + \text{Ash} + \text{Crude fiber}]$$

Estimation of total Energy

The calorific value was derived by multiplying carbohydrates, protein and fat contents of raw Banana powder with water constants viz., 4, 4 and 9 respectively and expressed as per 100 g basis (Anon., 2019).

$$\text{Total energy} = [(4 \times \text{Carbohydrate}\%) + (9 \times \text{Fat}\%) + (4 \times \text{Protein}\%)]$$

Estimation of total Ash

Total ash was estimated by taking about 5g of the sample into a crucible. The crucible is placed on a clay pipe triangle and heated followed by heating in a muffle furnace for about four to five hours at about 600 °C then cooled and weighed. This is repeated for two consecutive weights same and the ash was almost white or greyish white (Anon., 2019).

$$\text{Ash content (\%)} = \frac{\text{Weight of crucible with sample} - \text{Weight of the crucible after ashing}}{\text{Weight of the sample (g)}} \times 100$$

RESULT AND DISCUSSION

The present study was undertaken to know the nutrient composition of raw and fruit banana powder and developed products from fruit banana powder are presented in this paper.

Table 1 : Nutrient Composition of Mitle Raw Banana powder. (on dry weight basis)

Parameter	g/100gm
Moisture (%)	3.98
Protein	2.67
Fat	0.25
Total Ash	2.12
Crude fibre	1.06
Carbohydrates	76.67
Energy (Kcal)	264.67
Minerals	
Potassium (mg)	112.9
Calcium (mg)	23.5

Table 1 represents the nutrient composition of Raw Banana powder. The moisture content of raw Banana powder was 3.98 per cent. Reduction in its content is attributed to the drying process undertaken. Protein content of Raw Banana powder was 2.67 g. Fat content in raw banana powder 0.25g. The amount of crude fibre in raw banana powder was found to be 1.06 g. The amount of carbohydrates was 76.67 g and energy was 264.67 Kcal per 100 g. Ash content was found to be 2.12. The minerals such as potassium and calcium were 112.9 mg and 23.5 mg per 100 g respectively.

Table 2: Nutrient Composition of Mitle fruit banana powder:

Sl.No	Parameter	g/100gm
1	Moisture (%)	7.93
2	Protein	3.67
3	Fat	0.20
4	Total Ash	1.70
5	Crude fibre	0.70
6	Carbohydrates	86.50
7	Energy (Kcal/100gm)	362.00

Table 2 represents the nutrient composition of Ripe Banana powder. The moisture content of ripe Banana powder was 7.93 per cent. Reduction in its content is attributed to the drying process undertaken. Protein content of Ripe Banana powder was 3.67 g. Fat content in ripe banana powder 0.20g. The amount of crude fibre in ripe banana powder was found to be 0.70 g. The amount of carbohydrates was 86.50 g and energy was 362 Kcal per 100 g. Ash content was found to be 1.70.

Table 3: Nutrient Composition of Mitle Banana fruit chocolate

Sl.No	Parameter	g/100gm
1	Moisture	8.40
2	Protein	3.15
3	Fat	0.35
4	Total Ash	0.99
5	Crude fibre	0.55
6	Carbohydrates	87.11
7	Energy (Kcal/100gm)	364.00

Table 3 revealed the nutrient composition of Mitle Banana fruit chocolate. It has been

found that Banana fruit chocolate had moisture, protein, fat, crude fibre, carbohydrate, energy and ash were in the range of 8.40, 3.15, 0.35, 0.55, 87.11, 364 and 0.99 respectively.

CONCLUSION

It can be concluded that raw and ripe banana powder has high market value because of their high nutritive value, therapeutic benefits and storage stability upto 6 months and could be used as enrich stuff and an excellent improved supplement of diet.

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