

Study of immature banana powder and its utilization in *Kurdai*

■ K.G. Chavan and K.P. Babar

Received : 10.04.2018; Accepted : 13.04.2018

See end of the Paper for authors' affiliation

Correspondence to :

K.G. Chavan

Department of Agricultural Engineering, Maharashtra Institute of Technology, Aurangabad (M.S.) India
Email : kapilchavan08@gmail.com

■ **Abstract** : *Kurdai* is Indian traditional wheat fermented food, native to Maharashtra and parts of Gujarat. It is prepared by soaking whole wheat in water for 3 days, during which the batter undergoes fermentation. The batter is then finely ground to obtain a milky white extract, which is cooked with water forming soft and stiff dough. The dough is then passed through a press to get *Kurdai*, which is then dried and stored. It is locally popular as a snack food after being deep fried for consumption. Banana fruit has a very short post harvest shelf life because of its highly perishable nature. Short shelf life and increased production necessitates development of non-conventional products from banana. To prevent the losses of green banana drying method was applied to convert raw banana into banana powder by drying the raw banana flakes in tray dryer at 60°C for 10hrs. To make proper use and avoid wastage of banana we have introduced *kurdai* with banana powder which is rich in nutrients. Now-a-days consumers demand convenience, quality, and innovative food products. Consumers expect the food producers to deliver high quality products for a reasonable price. In addition, consumer's tastes and preferences are also changing. Health is considered important, but not at the expense of quality. Consumers want to experience novel and interesting foods, which are fresh, convenient and tasty. Increased attention to health along with the unavailability of unique foods plus a strong consumer demands for convenience creates the need for convenience foods. Technology is also a challenge to the food industry.

■ **Key words** : Wheat flour, Banana powder, Fibre, Functional property, Nutritional property

■ **How to cite this paper** : Chavan, K.G. and Babar, K.P. (2018). Study of immature banana powder and its utilization in *Kurdai*. *Internat. J. Agric. Engg.*, 11(Sp. Issue) : 127-130, DOI: 10.15740/HAS/IJAE/11.Sp. Issue/127-130.

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 only 2% is processed into value added products. To increase the utilization of banana, production of immature banana powder and its incorporation to various innovative products is usually practiced in banana producing countries. Banana powder

prepared from unripe banana possess the thickening and cooking properties almost similar to that of starch. In most of the South East Asian countries, however, banana is mainly consumed ripe; hence, preparation of banana powder 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.

Banana is the common name of herbaceous plants of the genus *Musa* and for the fruit they produce. Banana plants are monocotyledons, perennial and important crops in the tropical and subtropical world region. They include

desert banana, plantain and cooking banana. Cooking banana is a major staple food; it is starchy, rich in carbohydrate, calcium, phosphorous, iron and other food nutrients. Banana is one of the major fruit crops of tropics and subtropics forming a staple diet of millions across the globe. It is rich in carbohydrates with calorific value. It is a sweet and salt free diet. Banana ranks first in production and second in area, among the fruits grown in India. Production of 291 lakh metric tones annually from an area of 846 lakh hectares. In India Maharashtra 3rd ranks of production in banana. In Maharashtra state banana is grown with 65,000 hectares with approximate production of 30 lakh MT of fruits and the productivity of Jalgaon district is 50 MT (2015-16). Other major banana growing districts are Buldhana, Dhule, Nandurbar, Nanded and Parbhani.

There are so many varieties grow in India. In Maharashtra Dwarf Cavendish (AAA) and Robusta (AAB) mostly grow. New economical strategy to increase utilization of banana includes the production of banana powder when the fruit is immature, and to incorporate the flour into various innovative products such as slowly digestible cookies, high-fibre bread and edible films. The clear advantages presented by green banana powder includes a high total starch (73.4%); resistant starch (17.5%) and dietary fibre content (14.9%) (Saifullah *et al.*, 2009).

Fruits and vegetables are an important component of a healthy diet. Some fruits like bananas offer great medical benefits. This is partly because bananas aid in the body's retention of calcium, nitrogen, and phosphorus, all of which work to build healthy and regenerated tissues. In the following paragraphs, we will discuss some of these benefits. Bananas can be used to fight intestinal disorders like ulcers. Bananas are one of the few fruits that ulcer patients can safely consume. Bananas neutralize the acidity of gastric juices, thereby reducing ulcer irritation by coating the lining of the stomach. Not only can bananas relieve painful ulcer systems, and other intestinal disorders, they can also promote healing. The fruit is also used as treatment for burns and wounds. For immediate pain relief, beat a ripe banana into a paste and spread it over a burn or wound. For best results, cover the area with a cloth bandage. Even banana leaves can be used as a cool compress for burns or wounds. Other medical benefits of bananas include aiding in constipation and diarrhea relief, treatment of arthritis,

treatment of anemia.

Now-a-days consumers demand convenience, quality, and innovative food products. Consumers expect the food producers to deliver high quality products for a reasonable price. In addition, consumer's tastes and preferences are also changing. Health is considered important, but not at the expense of quality. Consumers want to experience novel and interesting foods, which are fresh, convenient and tasty. Increased attention to health along with the unavailability of unique foods plus a strong consumer demands for convenience creates the need for convenience foods. Technology is also a challenge to the food industry. Banana is usually eaten either as supplementary food or as a whole meal (Shaikh *et al.*, 2017). Bananas that are usually consumed fresh at full ripe stage are the most popular cultivars. The cooking types are usually referred to as plantain. In Nigeria, the unripe banana pulp is usually grated and used for the preparation of popular traditional complimentary food called "oto mboro" for infants by the Efik and Ibibio ethnic groups. The green bananas are also boiled, fried or toasted and eaten with palm oil, stew or vegetable soup. Processing of green bananas into flour is one of the means of post harvest preservation of the crop. Nutritionally, banana pulp is rich in carbohydrate, vitamin A, B6, and C, mineral elements such as potassium, magnesium, iron and phosphorus, but low in sodium and protein content.

Drying has remained one of the popular methods for preserving food for many years. The drying process involves reducing water from the product to an acceptable level for marketing, storage, or processing. Given the absence of sufficient water, microorganisms are unable to grow and multiply. Many of the enzymes that cause food spoilage cannot function without water. The old method of food drying is executed by spreading the food material on the ground and exposing the food to sunlight. This method is practiced until today for certain products because of the advantages of simplicity and economy. However, open sun drying has some maintain drawbacks. Open sun drying requires longer drying time and product quality is difficult to control because of inadequate drying, high moisture, fungal growth, tomato encroachment of insects, birds and rodents and others. Open sun drying also requires a large space (Misha *et al.*, 2013).

Drying is usually conducted by vaporizing water in the product. Thus, the latent heat of vaporization must

be supplied. Airflow is also required to remove the vapor away from the product. The lower the humidity of hot air supplied to the drying chamber is, the better the drying rate, as the less humid air can carry more moisture from the product surface than the more humid air. Generally, increasing the temperature and velocity shortens the as food and pharmaceutical products, high temperature decreases product quality. In this case, drying at low temperature and humidity is required to maintain the fresh color of the product using the desiccant system. Without the use of the desiccant system, high temperature is required to obtain low humidity. Several advantages of using desiccant material in drying. The same product dried with different techniques produces different levels of product quality (Hiia *et al.*, 2009). An example, refractance-window (RW) drying method can maintain the antioxidant compounds such as L-ascorbic acid, total flavonoids and lycopene content except in phenolic compounds which was found to be more in tomato powder produced by convection drying (Abul-Fade *et al.*, 2011).

Many dryer types have been used in the domestic The solar and industry sectors. The dryers that are commonly used are tray dryers, tunnel dryers, drum dryers, fluidized bed dryers, spray dryers, flash dryers, rotary dryers, belt dryers, vacuum dryers and freeze dryers. Among these dryers, the tray dryer is the most extensively used the out because of its simple and economic design. The food is spread out on trays at an acceptable thickness so that the product can be dried uniformly. Heating may be produced by hot air stream across the trays, conduction from heated trays, or radiation from heated surfaces. In a tray dryer, more products can be loaded as the trays are arranged at different levels. The key to the successful operation of the tray dryer is uniform airflow distribution over the trays. The tray dryer may be applied to a solar dryer or any conventional dryer that uses fossil fuel or electrical allow energy. Good airflow distribution will ensure the final moisture content of the dried products on the trays are uniform. Normally the moisture content is determined by using electronic balance to get the difference between a final and initial mass of the product (Bakhshipour *et al.*, 2012) used a machine vision system integrated with the neural networks to predict the moisture content of raisin.

Bananas were bought from research center from

Jalgaon City, India. The fruits were peeled and cut into transverse slices of about 2 mm thickness. The slices were then dipped in 0.5 % (w/v) citric acid solution for 5 min, for avoid enzymatic browning and dried in oven at 40, 50, 60, 70, 80°C for 14, 12, 11, 10, 7 hrs. And sun drying upto moisture content 8-10 %. 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 for further analysis (Joshi *et al.*, 2015).

Fermentation is the scientific process of breakdown of complex sugars to simpler substances by microbial action. Consumption of fermented foods has been a tradition throughout history mainly because they were produced as a method to prevent spoilage. There has been little scientific awareness on indigenous traditional fermented foods (Davidson and Ziavonic, 2003). The major target of food processing such as fermentation is preservation. With microbes developing resistance to antimicrobial compounds, and increased public concern towards the use of synthetic approaches, natural methods of food preservation have been the focus of many research groups. Natural antimicrobials from microbial sources (Kumar *et al.*, 2015).

Nutritional composition :

Nutritional composition of banana powder, composition of green banana powder, banana powder nutrition information, how many calories in banana powder per 100 g.

Table 1 : Average composition of the banana powder

Components	Immature banana powder (g/100 g)
Protein	4.33
Lipids	0.701
Carbohydrates	83.94
Ash	2.72
Starch	68.42
Fiber	15.52
Moisture	11.25

Value addition of banana powder :

Bananas were bought from research center from Jalgaon City, India. A total of 140- 160 bananas, 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. In total 200 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) citric acid solution for 5 min, for avoid enzymatic browning and dried in oven at 60°C for 10 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.

Conclusion :

Banana is one of the most popular and consumed fruit in tropical regions. Drying 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. The substitution of unripe banana flour for significantly increased RS content of *kurdai* without any effect on panelist acceptability. Therefore, the preparation of unripe banana flour and applying it in the preparation of functional food (banana flour *kurdai*) which is high in resistant starch, is promising and this product is likely beneficial for human health. More investigations on applying the unripe banana to other food products are needed and the limitation of using banana powder would be its color and taste which might affect some quality aspect of some food products :

Authors' affiliations:

K.P. Babar, Department of Agricultural Engineering, Maharashtra Institute of Technology, Aurangabad (M.S.) India

REFERENCES

- Abul-Fadl, M.M. and Ghanem, T.H. (2011).** Effect of Refractance-window (RW) drying method on quality criteria of produced tomato powder as compared to the convection drying method. *World Appl. Effect Sci. J.*, **15**(7) : 953-965.
- Bakhshipour, A., Jafari, A. and Zomorodian, A. (2012).** Vision based features in moisture content measurement during raisin production. *World Appl. Sci. J.*, **17**(7) : 860-869.
- Davidson, P.M. and Ziavonic, S. (2003).** The use of natural antimicrobials. In : Food Preservation Techniques (CRC Press, England), 5-23.
- Hiia, C.L., Lawb, C.L., Clokea, M. and Suzannah, S. (2009).** Thin layer drying kinetics of cocoa and dried product quality. *Bio Systems Engg.*, **102** : 153-161.
- Joshi, Pallavi and Varma, Kanika (2015).** Assessment of Nutritional and Physiochemical properties of Banana Flour. *Res. J. Family, Community & Consumer Sci.*, **3**(5).
- Kumar, Pavitra K., Deshmukha, Shrinivas R. and Sonawane, Sachin K. (2015).** Production of bacteriocin from *Pediococcus Pentosaceus* isolated from *Kurdai*. *Annals. Food Sci. & Technol.*, **16** (2).
- Misha, S., Mat, S., Ruslan, M.H., Sopian, K. and Salleh, E. (2013).** Review on the application of a tray dryer system for agricultural products. *World Appl. Sci. J.*, **22** (3): 424-433.
- Saifullah, R., Abbas, F.M.A., Yeoh, S. and Azhar, M.E. (2009).** Utilization of green banana flour as a functional ingredient in yellow noodle. *Internat. Food Res. J.*, **16**: 373-379.
- Shaikh, Sarah, Bornare, D.T. and Syed, Ayesha (2017).** Process optimization for making unripe banana flour and its utilization in Vermicelli. *Internat. J. Adv. Scientific Res. & Engg. Trends*, **2** (10).

1st
Year
★★★★★ of Excellence ★★★★★