

START-UP AVENUES WITH BANANA PRODUCTS

P. Suresh Kumar¹, D. Amelia Keran²,
K. N. Shiva¹, C. Sivananth², K. Kamaraju³
and S. Uma⁴

¹Principal Scientist, ²Research Scholar, ³Technical officer, ⁴Director,
ICAR-NRC for Banana, Tiruchirappalli, Tamil Nadu

INTRODUCTION

Bananas are incredibly healthy, convenient, delicious and one of the most inexpensive fresh fruits, containing many essential nutrients like potassium, magnesium and vitamins like A, B along with starch and fiber content, that benefit weight loss, digestion, and heart health. The banana industry is an important part of the global industrial agro business. In addition to banana export and domestic fresh consumption, processing of banana into different products could mean additional income for banana farmers and entrepreneurs. Considering the importance, our institute has developed market driven immune boosting unusual and remarkable technologies and products with high commercial impact.



Minimally processed banana products (unripe-fruit, flower, central core stem & rhizome/ corm)

With the emergence of quick service restaurants (QSR), convenient foods are need of the hour for working women. Minimal processing of unripe plantain slices, its male inflorescence (flower), inner central core stem and rhizome has tremendous domestic and export market opportunity. Pre-treatment of the above parts with mild chemicals like potassium metabisulphite (KMS, 0.05%) and/ or citric acid (0.05%) has the possibility to enhance the shelf life of the products up to 10 days when packed in HDPE bags and store under refrigerated condition ($7\pm 1^{\circ}\text{C}$). Natural extract like garlic extract could also be used.

Low-fat banana chips (Microwave/ Vacuum)

Snack industry is expected to witness a stellar growth from 500 to 5000 crores in near future owing to change in food habits and consumption patten. Endowed with unique favour, banana chips are gaining attention in domestic and international market. Owing to consumer inclination towards healthy foods, low fat chips in market shelves can have added advantage. Surface treatment of unripe banana slices (Nendran/ Popoulu) with hydrocolloids can render less oil absorption during deep fat frying and reduce oil percentage by 25%. Similarly, microwave treatment and vacuum frying can also render less oil absorption in banana slices. HDPE pack with nitrogen flush can maintain the chips nutritive and sensory attribute intact up to 60 days.



FUNCTIONAL GREEN BANANA FLOUR-BASED PRODUCTS

Utilization of green banana and plantain for its flour is of interest as a possible resource to make healthy functional products with its higher resistant starch and low glycemic index. By simple dehydration of raw banana slices in hot air oven and grinding it can yield green banana flour with higher resistant starch, fiber and minerals. Green banana flour could be considered as an ideal supplement in the products such as pasta, bread, spaghetti, cookies, noodles and baby foods. Dessert banana flour could be used in variety of industrial applications with its better thermal characteristics like lesser cooking time than the other flours. A combination of malted maize, soybean and roasted groundnut flour along with unripe green banana flour can be a recommendable weaning food for infants. In similar way, its suitable combination with other ingredients paves its way into the market shelf in the form of health mix drink and soup mix. It is also a preferable replacement of all-purpose flour (up to 40%) in bakery products (bread, cookies, muffins etc.) and extruded products (Pasta, spaghetti, noodles etc.). As millets are gaining importance, banana flour could be a better option to enhance the shelf life and to make better composite flours, which could be used for making variety of products.



BANANA STARCH AND MODIFIED STARCH

Starch, a white powder, without out any taste or odour becomes household name and not new to anyone today. With the growing demand, new sources are being explored for starch extraction and utility. Unripe green bananas are found to be an excellent reserve material, contains up to 80–90% starch (DWB). Banana starch has a great potential, from its digestion and functional pre-biotic properties, to have application in processed foods and become a commercially viable starch product with higher resistant starch.

Being a non-conventional source, it has numerous uses as an ingredient in food systems and other industrial applications. It is unique enough both nutritionally and functionally. With the advantageous features for unripe green banana as a source of starch, and its further modification can definitely be considered as a fortunate thing to the starch starving sectors which looking for an alternate biological starch source for a long period. This can be added with ice-cream, pasta, extruded products, excipient in pharmaceutical and symbiotic food development

DEHYDRATED RIPE BANANA

The emerging trend among consumers to select protein and fiber enriched snacks is fuelling the demand for dry fruits Market. Dehydrated ripe banana or banana fig are leathery and dry product with a competing potential in global market. Traditional banana like karpooravalli and Elakki (Neypoovan) with high sugar content are much suitable for banana figs. Further value addition of honey dip, and green tea extract coating can further improve its market value. This can be a multi dense food with lesser weight. Best wholesome dry fruit for defence personnel and school children to impart immediate energy.



BANANA FRUIT SUGAR

Fruit sugars are gaining attention due nutraceutical benefits. The natural matrices of ripe banana powder contain a high amount of carbohydrates and bioactive compounds with potential pre-biotic beneficial effects on human health and can be used as functional ingredient in food preparation. Conventional driers like tray driers takes long time to dry, due to their dense physical structure and high sugar content. Foam-mat drying of banana pulp with addition of permissible hydrocolloids could be a better choice with product quality on par with freeze and spray drying. With intense taste and indulgent natural flavours the product is of very good choice for pudding, fudge, pan cake and bakery filling along with all-purpose flour. It can also be suggested for compaction into tablet forms for nutraceutical consumption. The prominent secondary metabolites in fruit sugar can facilitates the decrease in oxidative stress by scavenge the free radicals. In addition, it has better prebiotic activity score and opens up new vista of opportunity for using it to promote selective growth of specific beneficial organisms and to make probiotic rich synbiotic foods.

BASIL SEED SUSPENDED BANANA READY TO SERVE (RTS) BEVERAGE WITH NO ADDED SUGAR

The processing of tropical fruits into clarified and concentrated juice is an important route of development and valorisation of products. Fruit juices have gained much popularity recently and provided an alternative substitute to caffeinated beverages. Commercially banana RTS with basil seed suspension is least available. The TSS, acidity, optical density and shelf life of banana RTS beverage increases with increase in sugar levels. The complication in suspending basil seeds is that, due to density differences with beverage, it is common tendency for seeds to either settle at the bottom or to float at the top. With proper packaging and storage condition this product can rule the retail market shelves which are previously filled only with fruit flavoured basil/chia seed suspended beverage with added sugars.



WINE AND VINEGAR

As an alternative to full-strength wine, tropical fruit wines with a reduced alcohol content offer a number of potential social and health benefits for consumers and have been commercially available for over two decades. Considering the immense potential health benefits of banana, the aerobic fermentation of its enzymatic clarified juice with *Saccharomyces cerevisiae* has the ability to yield banana wine with medium alcohol content and high phenolic content. With changing consumers perception for high-quality nutritional content wine with diverse flavours, taste and appearance besides dominant commercial red wine leads to a new horizon for further tropical fruit wines.

Apple cider vinegar may be the most well-known type of fruit vinegar, but banana can also be competitive product for making fruit vinegar. It can impart a yielding flavour when added in different global cuisine. It also has many health benefits on top of its potent flavour. Banana vinegar can be a better choice than synthetic vinegar with immense nutrient content like potassium and magnesium.

LOW-SODIUM BANANA STEM AND FLOWER PICKLE

Increased promotional activities by the main manufacturers have increased the popularity of cross-cultural cuisine. Eating low-sodium pickle is the great way to add more essential minerals & vitamins into the diet and improving digestion and maintain blood pressure. Banana inflorescence and central core stem with rich bioactive properties can be utilized for the development of pickles (thokku). Even the industrial player who are ruling the retail market shelves with variety of pickles have not displayed these exotic pickles from banana parts. The usage of sea salt alternative salts with low sodium content at definite proportions without compromising on sensory properties adds additional market value and consumer preference to these products. MSME could utilize the opportunity with these products to maximize their profit and sustainability.



CENTRAL CORE STEM JUICE

India shares 20 % of the world banana production, and generates >80 million tons (MT) of pseudostem biomass, which is more than double the quantity of bunch harvested (30 MT). 2007). In India, banana central core stem is used in various ayurvedic and siddha formulations to cure kidney related disorders, worms in intestine, diseases related to mental health, burn injuries and wounds. The phenol, flavonoids and antioxidant activities are known to be higher in it. This part of banana contains up to 92% of moisture. Hence a simple extraction or mechanical crushing can give maximum yield of banana stem juice. Banana central core stem juice could be potentially utilized as an effective source of antioxidant, anti-inflammatory, anti-urolithiatic and antitumor agent.

PECTIN FROM BANANA PEEL

Pectin is an approved food additive (INS 440) capable of forming gels with sugar /acid and therefore is being used as a gelling agent. Pectin has shown to improve cholesterol metabolism and supports normal blood pressure. New applications of pectin in functional foods, pharmaceuticals and biomedical continue to emerge, making pectin extraction and commercialisation an attractive investment. Exploring the opportunities to use banana peel for the extraction of pectin would be a most sustainable and profitable alternative way of adding value to the industrial waste, besides fulfilling the demands of the pectin industry.

CELLULOSE FROM BANANA FIBER

Banana fibres present important advantages such as low density, appropriate stiffness and mechanical properties and high disposability and renewability. Additionally, they are recyclable and biodegradable. These natural fibres of banana are rich source of cellulose. They can be used in the textile industry. Cotton, linen, and other natural fibres may be used directly or processed to make rayon. Microcrystalline cellulose and powdered cellulose are used as drug fillers and as food thickeners, emulsifiers, and stabilizers. Personal hygiene products, non-woven fabrics could be made using banana fiber and its derivatives. It can also be used in composites and epoxy industries.

CONCLUSION.

Food companies are speeding up their innovation activity to cater the consumers in India, who are aware of nutraceutical markets. It is interesting to see that many of these companies are also incorporating local elements in their launches so that they are rooted in familiarity. These innovative processed products from banana that are rich in bioactive compounds can be a game changer when introduced into the market.

