

settle at the bottom or to float at the top. With the use of suitable stabilizing agents, basil seed can be uniformly distributed. With proper pasteurization and packaging condition the products can be stored up to 1 months.

### Ripe Banana Powder

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. With conventional driers, ripe banana pulp takes long time to dry, due to their dense physical structure and high sugar content. The technology developed by ICAR- NRCB, makes the banana pulp more porous, that will facilitate quicker drying.



### Wine and Vinegar

Aerobic fermentation of clarified banana juice with *Saccharomyces cerevisiae* can yield banana wine with high phenol content. Further, anaerobic fermentation of banana wine with *Acetobacter*



*acetica* produce banana vinegar. With the increase in global demand for fruit vinegar, banana vinegar has good market potential.

### UTILIZATION OF OTHER PARTS OF BANANA

#### Low sodium banana stem and inflorescence pickle

The banana male bud and central core stem are least utilized after harvesting the bunches. It is converted into a high value-added product by making

flower (thokku) and stem pickles. The process of flower pickle involves removal of pistil, blanching, grinding and addition of spices and oil. The steps of preparing central core stem pickle comprises extraction of stem from pseudostem, slicing and cutting into small pieces, removal of fibre, blanching, and addition of spices.

#### Banana central core stem candy

Pre-treatment in sugar solution of sliced tender central core stem and further drying can produce sweet banana stem candy with a shelf life of 30 days in HDPE packs.

#### Low calorie banana stem RTS beverage

In indigenous systems of medicine, pseudostem juice is a well-known remedy for urinary disorders, stomach troubles like diarrhoea, dysentery and flatulence. It can be prepared by grinding sliced central stem and filtering it with muslin cloth. Sucralose recorded low starch hydrolysis when compared with other treatments. Juices prepared with the composition of Sucralose is therefore could be an alternative for people with special caloric requirements and it is suggested for diabetic patients. Addition of ginger extract can improve its acceptability. It can be stored safely up to 3 months without any spoilage. Cookies from the central stem powder could add dietary fibre content in the biscuits and cookies.

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## GREEN BANANA BASED PRODUCTS

### Minimally processed banana slices

With the emergence of quick service restaurants (QSR), convenient foods are catching up. Similarly, the banana slices, with its loads of nutrients, plays a major role in the diet of Indian population. Minimal processing of Monthan slices pre-treated chemicals like potassium metabisulphite (KMS, 0.5%) and citric acid (0.5%) enhanced the shelf life upto 10 days when packed in HDPE bags at refrigeration ( $7\pm 1^\circ\text{C}$ ) temperature. popular in the market.

### Low-fat banana chips

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%. HDPE pack with nitrogen flush can maintain the chips nutritive and sensory attribute up to 30 days.

### Green banana flour

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 high resistant starch content for its functional properties, 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 lower thermal characteristics and thus requires lesser cooking time than the other flour.



### Raw banana pickle

Pickling of steamed raw banana dices with suitable spices, can give it a shelf life of about 6 months. Addition of vinegar and vegetable oil can improve its sensory acceptability.

### Banana starch

The large quantity of green cull bananas has the potential of being used to improve banana economics and eliminate the large environmental problem. Raw banana is a potential resource for industrial processing and starch production. Banana starch with very low GI can be stored in HDPE packs up to 6 months.



### Nutraceutical and functional health mixes

The potential of exploiting green banana flour for weaning food has tremendous potential. A combination of malted maize and soybean, roasted groundnut and cooking banana can be recommendable weaning food for infants between the ages of 6 months and 2 years. Other products like health mix drink and soup mix paves way to market shelves for its health benefits.

## Bakery products and extruded products

Green Banana flour with high starch content (available and resistant) can be



blended with other cereal flours and can be used as a potential ingredient for bakery products containing slowly digestible carbohydrates. Supplementation of banana flour to wheat flour aided in increasing resistant starch and phenolic content of wheat breads. It is a preferable replacement of all-purpose flour (up to 40%) in preparation of bread, cookies, biscuits and cold extruded products (pasta and noodles).

## RIPE BANANA BASED PRODUCTS

### Dehydrated ripe Banana

Dehydrated ripe Banana popularly known as banana figs are high in demand in the market. Varieties with high TSS (23



$^\circ\text{Brix}$ ) (Udhayam and Karpuravalli) are suitable for making figs. The economic viability of the end product, quality and certification is essential for successful venture in export market.

### Basil seed suspended banana RTS

Enzymatic hydrolysis can yield clarified banana juice. 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