

# Banana

Banana is widely consumed both as fresh table fruit and as processed food such as banana chips, banana shake, banana puree, banana flour, banana wafers etc. There are multiple business opportunities that are available to FPOs growing Bananas. Some of the business opportunities that are suitable for FPOs are mentioned below and the technologies related to those businesses are detailed in this document.

S. No.	Business Opportunity	Brief description
1	Fresh Banana – Store and sell	Bananas are usually harvested in unripe stage and are stored for short-term in cold storage. Whenever the prices are favorable during season, the unripe bananas are ripened and sold off in the markets
2	Banana Puree	Ripe bananas can be made into puree and sold to functional beverage or infant food manufacturers
3	Banana Chips	Unripe banana can be processed into banana chips and sold as (branded) snacks to retailers/ consumers
4	Banana Powder	Low grade banana or ripened bananas can be processed into powder form and sold to B2B segment, e.g., Confectionery, Nutritional supplement companies etc.

Other business opportunities include ready to serve banana wine, banana beer, banana pulp, banana flour etc. These business opportunities are not detailed in this document as they may not be suitable for FPOs due to high investment costs, significant volume of banana required around the year for business viability, difficulties in marketing due to competition, unsuitability of varieties grown in Maharashtra, etc.

## 1 Fresh – Store and sell

Bananas are usually harvested in unripe stage and stored in cold storages or cool places by the FPOs (in case of absence of cold storage facilities).

Technology	Type	Eligible for Matching Grant
Plastic Crates	Implement	Yes
Ethylene Foam Layers	Consumable	No
Packhouse	Civil construction	Yes
Conveyor Lines	Equipment	Yes
Bubble Washer	Equipment	Yes
Pre-cooling chamber	Equipment	Yes
Storage: - Cold Storage	- Civil construction (or)	Yes

Technology	Type	Eligible for Matching Grant
(or) - Container Cold Rooms	- Equipment	
Ripening Chamber	Equipment	Yes
Corrugated fibre boards	Consumables	No
Reefer Truck	Vehicle + Equipment	Yes

#### Process:

- Harvested bananas should be arranged in crates at the field to minimize damage to the fruit. The crates should be covered with ethylene foam layers to prevent early ripening of the fruits
- At the packhouse, bananas should be washed with a bubble washer to remove dirt and pathogen
- Washed bananas are then sorted & graded manually. Conveyor lines can be used for manual sorting and grading
- The washed and sorted bananas should be pre-cooled from a temperature range of 30–32 °C (temp. immediately following harvest) to about 13–15 °C (to storage temperature) before storing the banana in cold storage
- Many container cold rooms come with pre-cooling facility. In such cases, separate setting up of separate pre-cooling chambers are not required
- The harvested (unripe) bananas are then stored in cold storage to increase the shelf life of the bananas. The bananas can be stored in cold storage for about 6–7 weeks
- The bananas can be transferred to a ripening chamber for ripening the green bananas before selling in the market (when the market conditions are better)
- To prevent damage of produce during transportation, bananas can be packed in corrugated fibre boards boxes lined with polyethylene sheets
- The bananas can be transported to long–distance markets in reefer trucks

#### Advantages:

- Sorting and grading of bananas help FPOs to sell the bananas through appropriate channels and realize higher prices (Grades 1 and 2 to retailers and exporters, lower grades to processors)
- Storing of bananas can help in overcoming sudden price crashes and ability to sell banana when the market prices are better
- Year round availability of banana helps in having high utilization of infrastructure
- FPO can rent the cold storage to farmers on subscription or usage charge basis for additional income during low utilization

#### Disadvantages / Challenges:

- The cost of establishment and operating the cold storage facilities are high
- Price risk – the market price of banana may go further down forcing the FPOs to sell at lower prices in spite of incurring storage costs

## 2 Banana Puree – Bulk Sales

Banana puree is one of the major value added products in which banana is processed into. The banana puree is manufactured from perfectly ripened varieties of bananas and has a wide market potential, with banana puree used as a raw material for functional beverages, baby nutrition food, confectionery items, and cosmetic industry. The puree can be sold to institutional buyers and exporters.

Technology	Type	Eligible for Matching Grant
Shed for unit	Civil construction	Yes
Fruit pulper	Equipment	Yes
Pulp & Juice Pasteurizer Machine	Equipment	Yes
Pulp storage tank – Stainless steel tank	Equipment	Yes
Aseptic bags	Consumable	No
Pulp filling machines	Equipment	Yes
Mild steel drums	Equipment	Yes

Banana puree unit should be combined with the equipment suggested in the above business activity as not all bananas can be processed to puree.

### Process:

- Aseptic banana puree is manufactured from high-quality and perfectly ripened varieties of bananas
- The unripe harvested bananas are kept in the ripening chamber and the fruits are ripened naturally to maintain the fresh and natural flavor of the fruit
- The fruits are washed with chlorinated water initially and then with fresh water to eliminate foreign dust and dirt
- The banana is peeled off and inspection is done on the conveyor
- The fruits are crushed in the fruit pulper to produce banana puree
- The banana puree is pasteurized by heating up to 85 – 95 °C and stored in pulp collection tank
- Eventually, the banana puree is packed in aseptic bags in MS drums with a poly liner inside

### Advantages:

- Lower grades fetch very low prices in open-market. Processing them into puree provides better prices to the FPO

### Disadvantages / Challenges:

- Since the puree is sold in bulk form in the B2B market, the margin realized by the FPO may not be high
- FPO should maintain good utilization of the unit to for breakeven and profitability

## 3 Banana Chips

Banana chips are gaining worldwide popularity owing to their nutritional content. Inside the food industry, the demand for banana chips is increasing from the snacks and ready to cook food sector. Banana wafers can be packaged and sold by the FPOs in the nearby markets through retail stores.

Technology	Type	Eligible for Matching Grant
Shed for unit	Civil construction	Yes
Fruit Slicer	Equipment	Yes
Dryers: - Solar dryer (or) - Electric dryer	Equipment	Yes
Air Fryer	Equipment	Yes
Continuous band sealer	Equipment	Yes

Banana chips unit should be combined with the equipment suggested in the first business activity as not all bananas can be processed to chips. FPOs should also considering making banana chips from varieties that are suitable or has demand to be consumed as banana chips as not all varieties are suitable for making banana chips.

### Process:

- Good quality and green cooking bananas need to be used. The bananas are peeled using hand and sliced cross-wise into thin, round slices. Alternately, a mechanical slicer may be used to get uniform slices
- Immediately after slicing the slices are placed in saltwater @ 3 to 5% of salt to the water. Added salt gets into the slices and improves taste and acceptability of the product. If slices are not placed in water, they turn brown and later give an unacceptable dark product
- The banana slices will then be dried, either through solar dryer or electric dryer
- The dried salt soaked slices are then air fried in an air-fryer to get the final banana chips, which can then be packed in plastic bags through a continuous band machine

### Advantages:

- Lower grade unripe bananas fetch very low prices in open-market. Processing them into chips provides better prices to the FPO

### Disadvantages / Challenges:

- Banana chips have become a commodity, with the chips being highly in demand as snacks. The price realization, though higher than through table variety banana for lower grades, might be low due to competition from other market players

### Alternative Process:

- Banana slices can also be converted into chips through traditional Oil Fryers. Oil fried bananas may not be as healthy as air fried bananas but are widely consumed.

## 4 Banana Powder

Banana powder market is expected to witness high growth owing to its high medicinal and nutritional characteristics. Development of ingredients with high health and wellness functionality is one of positive trend supporting the growth of banana powder market. Rapid urbanization along with the changing lifestyle and dietary habits plays a significant role in increasing the demand for banana powder. Banana powder market can be segmented on the basis of application. The market can be segmented into food, pharmaceuticals, animal feed, and cosmetics. Food application can be further sub-segmented on the basis of puffed food, infant food, seasonings, instant food, and others.

Technology	Type	Eligible for Matching Grant
Shed for unit	Civil construction	Yes
Steam Jacketed Kettle	Equipment	Yes
Fruit Slicer	Equipment	Yes
Dryers: - Solar dryer (or) - Electric dryer	Equipment	Yes
Pulverizer	Equipment	Yes
Vibratory Sieve	Equipment	Yes
Form Fill Seal Packaging machine	Equipment	Yes
Boiler	Equipment	Yes

Banana powder unit should be combined with the equipment suggested in the first business activity as not all bananas can be processed to puree.

**Process:**

- Ripe bananas are steam boiled in a steam jacketed kettle, post which they are cooled, and the skin is peeled off manually. Boilers can be used to produce steam required for heating of the steam jacketed kettle
- The boiled banana is sliced by passing through a mechanical slicer. The slices should be dried either using a solar dryer or electric dryers
- The dried slices are then grinded into fine powder using a Pulverizer. The powder is then passed through a vibratory sieve to get fine banana powder
- The powder can be packed in aluminum foil laminated pouches using a form fill packaging machine. The shelf life of the banana powder, under ambient conditions, is around one year

**Advantages:**

- The over ripe and lower grade bananas can be converted into powder form to increase the shelf life and better price can be realized by the FPOs

**Disadvantages / Challenges:**

- Direct B2C sales through online channels is challenging, as it will require investments for marketing and competing with established brands