# PM Formalization of
# Micro Food Processing Enterprises Scheme

# DETAILED PROJECT REPORT
# FOR
# MUSTARD SAUCE PROCESSING

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# 1. THE PROJECT AT A GLANCE

| | | |
|---|---|---|
| 1 | Name of the Project | Mustard Sauce |
| 2 | Name of the entrepreneur/FPO/SHG/Cooperative | |
| 3 | Nature of proposed project | Proprietorship/Company/ Partnership |
| 4 | Registered office | |
| 5 | Project site/location | |
| 6 | Names of Partner (if partnership) | |
| 7 | No of share holders (if company/FPC) | |
| 8 | Technical advisor | |
| 9 | Marketing advisor/partners | |
| 10 | Proposed project capacity | 150 MT/annum (55, 65, 75,90 and 100% capacity utilization in the 2nd, 3rd, 4th year, 5th year and 6th year onwards respectively |
| 11 | Raw materials | Mustard |
| 12 | Major product outputs | Mustard Sauce |
| 13 | Total project cost (Lakhs) | 18.39 |
| | Land development, building & civil construction | 4 |
| | Machinery and equipments | 5.58 |
| | Utilities (Power & water facilities) | 0.8 |
| | Miscellaneous fixed assets | 1.2 |
| | Pre-operative expenses | 0.90 |
| | Contingencies | 1.10 |
| | Working capital margin | 4.81 |
| 14 | Working capital Management (In Lakhs) | |
| | Second Year | 14.44 |
| | Third Year | 17.07 |
| | Fourth Year | 23.28 |
| 15 | Means of Finance | |
| | Subsidy grant by MoFPI (max 10 lakhs) | 6.44 |
| | Promoter's contribution (min 20%) | 4.60 |
| | Term loan (45%) | 7.36 |
| 16 | Debt-equity ratio | 1.2: 1 |
| 17 | Profit after Depreciation, Interest & Tax | |
| | 2nd year | 23.69 |

| | | |
|---|---|---|
| | 3rd year | 29.43 |
| | 4th year | 35.17 |
| 18 | Average DSCR | 2.16 |
| | Benefit Cost Ratio | 1.97 |
| | Term Loan Payment | 7 Years with 1 year grace period |
| | Pay Back Period for investment | 2 Years |

# 2. GENERAL OVERVIEW AND INTRODUCTION

## 2.1 INTRODUCTION

- India is an important rape seed mustard growing country in the world, occupying largest area and has second position in production after China. The name 'mustard' is derived from the Latin word 'mustum' or must of old wine mixed with crushed seed makes it one of the most important spice in the world . In India, rapeseed mustard is an important source of edible oil followed by ground nut.

- They are cultivated in 4.83 million ha in a wide range of Agro-ecological conditions, resulted in the production of 5.34 million tons of rapeseed mustard in 2OO1 -2002 and our productivity is 1106 kg/ha (Anonymous 2OO2). In the recent past, the area under brown mustard is on the increase at the cost of other Brassicas due to its higher productivity and tolerance to biotic and abiotic stresses. The major area is covered by Indian Mustard. Rapeseed cultivation is confined only to northern India because of late maturity and shattering of pots owing to high temperature prevailing during harvest in February and March.

- Indian mustard(Brassica juncea) is cultivated in the states of Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, North Eastern states,

Orissa, Punjab, Rajasthan, Uttar Pradesh and West Bengal. Its cultivation is also being popularized in some non-traditional areas such as Andhra Pradesh, Karnataka and Tamil Nadu.

- Mustard Seed: The mustard seed ranks fourth among the major oilseeds of the world. India is an important rape seed mustard growing country in the world, occupying largest area and has second position in production after China. The cultivation of the plant for oilseed production is almost entirely confined to the temperate and warm temperate zone of Asia and Europe. Rapeseed thrives best in rich soil in a cool and moist climate. Mustard seed in its various species of white, brown, and black is a close relative of rapeseed. The rapeseed-mustard group includes brown sarson, raya, and toria crops. Indian mustard (Brassica juncea L.) is predominantly cultivated in Rajasthan, UP, Haryana, Madhya Pradesh, and Gujarat. It is also grown under some nontraditional areas of South India including Karnataka, Tamil Nadu, and Andhra Pradesh. The crop can be raised well under both irrigated and rainfed conditions. Being more responsive to fertilizers, it gives a better return under irrigated conditions. Brown sarson (B. Rapa ssp. sarson) has 2 ecotypes lotni and toria. Yellow sarson (B. Rapa var. trilocular) is cultivated in Assam, Bihar, Orissa, and West Bengal as a rabi crop. In Punjab, Haryana, UP, Himachal Pradesh, and Madhya Pradesh, it is grown mainly as a catch crop.

## 2.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF MUSTARD

- Mustard has been one of the most widely grown and used spices in the world for many centuries. It is believed to have originated in Ancient Egypt. The Greeks used Mustard as a medicine and a spice. The Romans emulated the Greeks using it as both food and medicine as well, ascribing it as a cure for anything from hysteria to snakebite to bubonic plague.

- The Romans brought Mustard to Northern France where it was eventually cultivated by Monks. By the 9th century Monasteries were producing considerable amounts of income from Mustard sales.

- The origin of the word mustard is believed to have come from the word Mosto or grape muss, a young unfermented wine which was mixed with ground Mustard seeds by the French Monks.

- Prepared mustard as we know it, began in Dijon, France in the 13th century encouraged by the Mustard loving Pope John XXll of Avignon who created the position of "Grand Moustardier du Pape" or the Grand Mustard-Maker to the Pope for his idle Nephew who lived near Dijon.

- In the early 19th century, the British became the world's first mustard millers – milling the heart of the mustard seed to a fine powder and they established mustard as an industrial food ingredient. The yellow Mustard that we know today was introduced in Rochester New York in 1904 where its pairing with the American hotdog gave rise to its popularity.

- Today this ancient seed is considered an essential ingredient in thousands of products and is being increasingly used for its many unique properties.

## 2.3 VARIETIES

- India is a major producer of mustard and oil seeds in general. There are three main varieties of mustards in the world. Black mustard oil, white mustard oil, and Brown mustard oils are the main varieties. Black mustard oil or Banarasi Rai is derived from black mustards and has a spicy and pungent flavor and aroma. Brown Indian mustard

is another type of mustard that is grown traditionally in India but is now grown in other places too. White mustard or safaid rai is decidedly pungent as it contains particular substances. Producing yellow flowers, it has a hairy stem and the seeds of the plant are large and white. Black mustard is self-sterile and it grows well in temperate climates. it has been grown in Europe since the 13th century. It has recently been Introduced for cultivation more recently in the northern half of the country. Alba and Hirta are two types of mustard varieties grown in southern Europe and West Asia. they are grown during the winter times in Northern India alone as the climate is suitable for it. Mustard has high commercial value and mustard is the principal oilseed grown in India. While some varieties yield more oil, others are more pungent in taste. Traditionally, oil extraction took place using oil ghani technology. The cold pressing technology is used here and therefore, it is more highly valued and priced. Mustards are used as fuels also and they are used in the production of biofuels as it is renewable. After the extraction of the oil, the remaining part can be utilized effectively as a pesticide.

**Important variety of Mustard seeds**

♣Pusa Double Zero Mustard 31 (PDZ-1)

♣Pusa Mustard 30 (LES-43)

♣PusaSwarnim (IGC-01)

♣PusaAditya (NPC- 9)

♣PusaAgrani (SEJ-2)

♣PusaMahak (JD-6)

♣Pusa Mustard 25 (NPJ-112)

♣Pusa Mustard 26 (NPJ-113)

♣Pusa Mustard 27 (EJ-17)

♣Pusa Mustard 28 (NPJ-124)

♣PusaTarak (EJ-9912-13)

♣Jagannath (VSL-5)

♣PusaKarishma (LES-39)

♣Pusa Vijay (NPJ-93)

♣Pusa Mustard 21 (LES-1-27)

♣Pusa Mustard 22 (LET-17)

♣Pusa Mustard 29 (LET-36)

# 3. HEALTH BENEFITS AND NUTRITIONAL INFORMATION

## 3.1 Health benefits

- ✓ Mustard is usually consumed in small amounts. When consumed as a condiment, it is not associated with significant health benefits. However, mustard is a low-calorie alternative to many higher-fat condiments like mayonnaise.

- ✓ Different types of mustard seeds are used for health purposes. For example, some people use the white mustard seed to clear the voice, to increase urination, prevent infection, induce vomiting (best to do this only under the supervision of a doctor), or boost appetite.

- ✓ Black mustard seeds are sometimes used to treat the common cold, reduce discomfort from painful joints and muscles, and reduce arthritis symptoms.

Some consumers use the mustard seed for healthier hair, skin, and nails.

However, there is currently not enough scientific evidence to support any of these cosmetic or medicinal uses of mustard or mustard seed.

## CONSTITUENTS AND HEALTH BENEFITS OF MUSTARD SEEDS

- **Promotes Heart Health**

It is rich in potassium, with 83 milligrams of the nutrient in 100 grams of the sauce. This nutrient helps your heartbeat stay regular. Mustard is also rich in phosphorous, 57 milligrams in 100 grams to be precise, which is believed to protect against heart disorders.

- **Strengthens Teeth and Bones**

The calcium in yellow mustard sauce is vital to the growth and development of bones and teeth. It also supports their structure and hardness. 100 grams of the sauce provides 32 grams of calcium. The phosphorous content with calcium ensures the proper maintenance of bone mass and strength.

- **Aids Nerve Functioning**

The phosphorus content in yellow mustard sauce is vital to nerve functioning. It works with the B vitamins in the body to oversee nerve signaling. The calcium and magnesium content in the sauce also contribute to intracellular functioning and nerve transmission.

- **Relieves Respiratory Disorders**

According to Ayurveda, mustard relieves congestion in the head and lungs. It is hence also promoted as a means to relieve respiratory disorders.

- **Aids in Metabolism**

It is rich in magnesium with 24 milligrams of the nutrient in 100 grams of the condiment. Magnesium plays an important role in metabolic processes and is in charge of the synthesis of protein. Additionally, the phosphorous content in this sauce contributes to the metabolism of carbohydrates, protein, and fats in the body.

- **Fights Cancer**

Mustard contains a lot of phytochemicals called glucosinolates and isothiocyanates. The results showed promising benefits of the condiment in cancer treatment. However, this one benefit remains to be proved.

- **Relief from respiratory disorders:**

Mustard seeds have been valued for their therapeutic effects in curing cold and sinus problems. It is a wonderful decongestant and expectorant which helps in clearing the mucus in the air passage. In Ayurveda, its seeds are considered as the food with warmer tendency and are prized for its healing effects in calming vata and kapha. From many years, different home remedies have involved the usage of mustard seeds or oil for treating a range of sinus related ailments such as addition of ground mustard seeds in a foot soak assists in releasing the congestion caused in the respiratory organs, gargling with tea made of mustard seeds aids in soothing sore throat to name a few. The heating qualities of this plant penetrate deeply inside the tissues and cleans the excess mucus buildup. These heating qualities of mustard also call for a cautionary advice with regard to the burning sensations which may happen to the exposed tissues which are not concealed.

The seeds have also been found effective in curing chronic bronchitis. During an asthmatic attack, massaging a mix of mustard oil and small amount of camphor promotes easy breathing by breaking down phlegm. Plaster or poultice made of its seeds have been used since olden times for treating bronchitis and stimulate healthy circulation in the body.

- **Aches and pains**

Poultice or plaster made from mustard seeds helps in curing pains and spasms as well. Mustard has rubefacient properties and hence when applied as plaster, exercises analgesic effects and provides relief in the paralysis of limbs, rheumatism and other muscular aches. Another important advice to note here is that mustard plaster has warmer effects and may cause sore blistering if applied directly on the naked skin. To avoid that, linen sheet should be used amidst the skin and the plaster.

- **Poison repulsion:**

Mustard seeds possess protective emetic qualities which resists the effects of poison on the body. A decoction made with its seeds helps in cleansing the body especially in the poisoning caused by narcotics and excess intake of alcohol.

- **Ringworm:**

Anti-bacterial properties of mustard seeds have been proven effective in curing the lesions caused by ringworm. Topical application of paste made of mustard seeds on a clean skin washed with warm water helps in soothing the symptoms associated with ringworms.

### 3.2 Nutritional Information Table

Mustard Nutrition :- Values per 100 gm. (Source – USDA national Nutrient data base).

| Principle | Nutrition Value | % RDA |
|---|---|---|
| Energy | 508 Kcal | 25 % |
| Fat | 36 g | 55% |
| Carbohydrates, by difference | 28.09 g | 25 % |
| Protein | 26.08 g | 52 % |
| Sugar | 7 g | -- |
| Dietary Fibre | 12.2 g | 31 % |
| Vitamins | | |
| Thianmin | 0.81 mg | -- |
| Riboflavin | 0.26 mg | -- |
| Niacin | 4.73 mg | -- |
| Pentothenic acid | 0.81 mg | -- |
| Vitamin A | 2.00 mg | -- |
| Vitamin E | 5.07 mg | -- |
| Vitamin C | 7.1 mg | 11% |
| Electrolytes | | |
| Copper | 0.65 mg | 1% |
| Potassium | 738 mg | 15% |
| Sodium | 13 mg | -- |
| Minerals | | |
| Iron | 9.21 mg | -- |
| Phosphorous | 828 mg | -- |
| Zinc | 6.08 mg | -- |
| Selenium | 208.1 mg | -- |
| Manganese | 0.60mg | 2.5% |

## 4. CULTIVATION, BEARING & POST HARVEST MANAGEMENT

- Mustard will grow well in most soils, but will produce the most seed in rich, well-drained, well-prepared soil with a pH of no less than 6.0. It will thrive if given constant

moisture. It likes cool weather; a light frost can even improve the flavor. Black mustard is the least fussy.

- Mustard is blissfully free of insect and disease problems, and larger critters don't seem to like it much either. The hotter and drier the weather, though, the faster the plants go to seed—30 to 60 days, depending on the variety and the climate.
- For best results, add 10 to 15 pounds of 5-10-10 fertilizer per 500 square feet, or the organic equivalent. Thoroughly work the amendments into the top 2 to 3 inches of soil just prior to seeding.

## Cultivation and Bearing:-

**Fertilizers:**

- The mustard cultivars have been observed to be responsive to the application of fertilizers. The response of fertilizers however varies with the water available to crop. lt is a well-established fact that in oilseed Brassicas, among the various items used in the package of practices, the fertilizer application alone contributes to nearly half of the increase in seed yield. Fertilizers are estimated to contribute 40-75% of the increase in yield brought about by adoption of full package of improved practices. For obtaining good yield normal fertilizer dose recommended is 80 Kg nitrogen 60 Kg phosphorus and 40 Kg potash per hectare. For better efficiency under irrigated conditions half of the nitrogen and full doses of phosphorus and potash should be applied as basal dose at the time of planting and the remaining half dose of the nitrogen should be given during the first irrigation.

- In zinc and Sulphur deficient soils, application of 25 Kg. zinc sulphate and Sulphur per hectare could be beneficial. Application of single "superphosphate, Ammonium sulphate, Zinc sulphate or Potassium sulphate wherever possible could also satisfy the requirement of sulphur. Nitrogen and sulphur provide complementary effects on yield and nutrient content and the desired N:S ratio in the seed is 7.5 percent. The magnitude of response to

fertilizers under rain fed conditions can be enhanced by making proper application of fertilizers and following the practices of inter cultivation and mulching.

**After Care:**

- The crop is to be in15-20 days after sowing to maintain plant to plant distance of 10-15 cm and to overcome crowding effect. If the density is low, individual plants tend to branch and utilize the available nutrients and space, and pods extend towards the lower Dart. Inter culture should be done 20-25 days after sowing to remove weeds and to conserve moisture.

- Mulching of inter row space with appropriate materials, after first thinning and weeding conserves moisture resulting in at least 25% increase in yield under rain fed conditions .

- Anti-transparent like PMA or Kaolin have been observed to increase the yield as well as water use efficiency of the crop under dry land conditions {Patil, 1974). Foliara application of Q.1o/o Cycocel (CCC) resulted in significant increase in seed yield over untreated plants (Manohar, 1981).

**Irrigation**

- The water requirement for growing a good mustard crop usually varies between 300to 400 mm/year. The IW/CPE ratio of 0.5 is optimum for the water use efficiency. In case of mustard varieties, two irrigations {30-35days after sowing and again 55 to 60 days after sowing) are needed.

**Diseases**

- The most common diseases affecting mustard in India are alternaria blight, 'whiterust', downy mildew, powdery mildew and phyllody. These diseases lead to a crop loss of about 10-75% depending upon its severity under favorable conditions. The environmental factors congenial for the development and spread of different diseases in epidemic form are temperature 12-25ºC, relative humidity 70 per cent for 'Alternation

blight', temperature 15ºC, relative humidity 70% for white rust and downy mildew and temperature 16-28°C with 60 percent relative humidity for powdery mildew.

**Pests**

- Pests of mustard aphids, saw fly, hairy caterpillar etc. lt is reported that mustard aphid reduces the yield from 9 to 95% at different places in India. The economic thresh hold (ETL) of this insect pest is infestation of 40 aphids per 10 cm length of the twig on the top portion of the central shoot or infestation of 30 percent Plants.

**Post-harvest management:-**

- Oilseed crop, Brassicas are usually prone to shattering. It is more so in case of to za cultivars than in the case of mustard varieties. The crop should be harvested as soon as 75% siliquae on the plant turns yellowish and preferably in the morning hours when the siliquae are damp with the dew. The harvested plants should be kept for sun drying for 3 to 4days. Then the threshing should be done by running a tractor over the dried plants or by trading by the bullocks over the dried plants spread on the threshing floor.

- 'Haramba' isan indigenously made thresher but is not suitable in case of seed production as its rotating blades crush the seeds. To overcome demerits of 'Haramba' a mechanical power thresher, wheat mustard thresher was developed which has better spike tooth drum and blower resulting in less visible damage of1 .23% and mechanical damage 3.78% in Pusa Bold mustard. The seeds should be winnowed, cleaned and be sundried for another 3 to 4 days till the moisture content of the seed becomes 8percent. At this stage seed retains its viability for the next crop season and is also quite safe for its storage. lf the mustard seed is thoroughly cleaned and dried there is no risk of deterioration, In countries, where weather conditions are variable at harvest seed need to be gently dried to reduce the moisture to a safe storage level. While drying the mustard it is important to ensure that the seed temperature never exceeds 52$^{o}$ C or damage to endogenous enzymes

may result which on processing will impair hydrolysis of the glucosinolate to the isothiocyanate, the hot principle.

- Cleaning process is very simple due to round shape and uniform seed size of well-matured seed lots of good varieties. Perforated screens, indented cylinders, ducted air and spiral separators are all effective for removing contaminants. Seed can be stored in bulk bin made of steel, wood or in gunny bags. Quality of whole mustard seed is determined by the quantity of mature and undamaged seeds. Ground mustard quality is dependent on its final use. Mustard is available as various mixtures of ground seeds with or without bran or hull the seed at a variety of different heat and pungent levels.

## 5. PROCESSING & VALUE ADDITION:-

There are several products can be made from mustard as a value-added products. And can be consumed in routine diet.

- Mustard sauce
- Mustard Unfiltered Oil (Having pungent & Spicy Aroma & Taste)
- Mustard Oil Cake
- Blends like Honey Mustard.
- Mustard flavored honey
- Mustard Dips
- Mustard Powder
- Mustard splits for pickles

Brown mustard provides flavor & Color in Bengali curries.

Mustard floor is having preservative Anti-oxidant properties.

Treats on scorpion bites & reduces the pain.

# 6. MANUFACTURING PROCESS OF THE MUSTARD SAUCE

- The invention discloses a mustard sauce comprising the following components in parts by weight: 10-20 parts of a mustard powder, 1-3 parts of white vinegar, 1-3 parts of salt, 1-3 parts of white sugar, 1-3 parts of citric acid, and 20-30 parts of water.

- The preparation process of the mustard source comprises the following technical steps: (1) crushing a mustard coarse powder by a crusher, and passing through a 60-mesh sieve; (2) mixing the mustard powder with water, and blending into a paste; and then adding the white vinegar, and stirring uniformly; (3) heating the blended mustard paste to 80-90°C, and carrying out heat preservation for 2-3 hours; (4) adding a thickener, and stirring uniformly; and (5) bottling the prepared mustard sauce, carrying out sterilizing disinfection for 30 minutes at the temperature of 70-80 DEG C, and cooling to obtain the finished product.

### 6.2 Flow Chart for mustard sauce

**Manufacturing**

The typical Procedure for manufacturing of Mustard sauce is as below:

Mustard Seeds

Flow from height in front of high-speed fan for debris & Dirt removal.

↓

Sorting & Cleaning

↓

*Washing and cleaning (Soaked in water containing chlorine solution (10-20ppm) for 2-5 minutes)

↓

Grinding of Mustard Seeds

↓

Mixing of all ingredients except oil

↓

Cooking in hot oil, till boiling

↓

*Hot filling in Pouches

↓

Cooling

↓

*Final Packaging and Storage

*** Marked points are established Critical Control Points**

## 7. LOCATION OF THE PROPOSED PROJECT AND LAND

- The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages there of i.e., in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc.

- The ideal locations for establishment of exclusive Mustard processing unit are in the production clusters of Mustard growing states/Areas such as Assam, Bihar, Gujarat,

Haryana, Himachal Pradesh, Jammu & Kashmir, Madhya Pradesh, North Eastern states, Orissa, Punjab, Rajasthan, Uttar Pradesh West Bengal and Andhra Pradesh.

## 8. MARKET DEMAND AND SUPPLY FOR MUSTARD BASED PRODUCTS

- The spices-based products especially mustard like, consumption is picking up due to increasing income and changing food habits. Therefore, demand for spice-based products are prevalent across length and breadth of the country throughout the year.

- Mustard sauce & other products if highlighted properly for all these health benefits can occupy significant cold products market.

- The global sauce (& other adjuncts) value is expected to reach a mammoth one by 2023, recording an anticipated high CAGR during the forecast period (2018-2023).... A very few market giants dominate the global **market** occupying the major selling market.

- Only thing to be done over here is to replace the existing products with mustard & other spices related products with proper demonstration.

## 9. MARKETING STRATEGY FOR MUSTARD SAUCE.

✓ **Marketing strategy** is a long-term, forward-looking approach and an overall game plan of any organization or any business with the fundamental goal of achieving a sustainable competitive advantage by understanding the needs and wants of customers.

- ✓ The increasing urbanization and income offers huge scope for marketing of fruit-based products. Urban organized platforms such as departmental stores, malls, super markets can be attractive platforms to sell well packaged and branded Mustard Based products**.**

## 10.DETAILED PROJECT ASSUMPTIONS

| Parameter | Assumption | |
|---|---|---|
| Capacity of the Mustard sauce mfg. Unit | 150 | MT/ annum |
| Utilization of capacity | 1st Year Implementation, 70% in second, 80% in third and 90% in fourth year onwards | |
| Working days per year | 300 | days |
| Working hours per day | 10 | hours |
| Interest on term and working capital loan | 12% | |
| Repayment period | Seven year with one year grace period is considered. | |
| Average prices of raw material | 35 | |
| Average sale prices per Kg | 90 | Rs/kg |
| Pulp extraction | 95 | |
| Mustard Sauce | 1 Kg Mustard Sauce from 0.503 kg Mustard | |

- ✓ This model DPR for manufacturing unit is basically prepared as a template based on certain assumptions that may vary with capacity, location, raw materials availability etc.
- ✓ An entrepreneur can use this model DPR format and modify as per requirement and suitability.
- ✓ The assumptions made in preparation of this particular DPR are given in This DPR assumes expansion of existing unit by adding new line.

- ✓ Herewith in this DPR, we have considered the assumptions as listed below in the tables of different costs, which may vary as per region, seasons and machinery designs and supplier.
    1. Mustard cost considered @ Rs. 35/- per kg.
    2. Sugar Cost considered @ Rs. 35/- per kg.
    3. Red Chilli & Oil cost considered @ Rs. 150/- per kg.
    4. Yield from mustard to paste is considered as 95 %, which may vary depend on degree of cleanliness of the seed, and seed purchase is assumed as a bulk & in that 5% approx. will be eliminated as a rejection due to over ripened, decayed, diseased, rotten etc.
    5. Machinery cost may also vary from vendor to vendor.
- ✓ Land and civil infrastructures are assumed as already available with the entrepreneurs.
- ✓ We took less sugar content as fruit is itself sweeter, cost can be reduced by increasing sugar content.

## 11. PROJECT START-UP COSTING SHEETS

**Land and Building**.

| Land and Civil Infrastructures | |
|---|---|
| 1. Land 300 sq. ft | Assumed land already developed and has 300 sq. ft. built in area. Rs. 4.00 Lakhs |
| 2. Built up processing area 300 Sq. Ft. | |
| Total | **Rs. 4.00 Lakhs** |

- Land and civil infrastructures are assumed as already available with the entrepreneurs.

Still we have considered approx. 4 lac Rs. as a construction cost for safer side of the entrepreneur.

**Machinery and Equipment: - Rs. 5.58 Lacs**

| Sr. No | Equipment | Capacity | Quantity | Power KW | Area Sq. Feet | Amount (in Lakhs) |
|---|---|---|---|---|---|---|
| 1 | High Speed Fan | Std. | 1 | 0.5 | 4 | 0.3 |
| 2 | Pulverizer | 50 kg / Hour | 1 | 1.5 | 4 | 0.6 |
| 3 | Gas Operated Cooking Kettle with Scrapper | 200 Liter | 1 | 0 | 16 | 0.6 |
| 4 | Filling & capping Machine | 100 BPM | 1 | 1.5 | 32 | 2.7 |
| 5 | Batch Coding Machine | Suitable | 1 | 0.1 | 1 | 0.12 |
| 6 | Weighing Balance | Suitable | 1 | 0.1 | 4 | 0.06 |
| 7 | Accessories | Suitable | 1 | | -- | 1.2 |
| | TOTAL | | | | | **5.58** |

**Other costs:-**

**Utilities and Fittings:-**

| Utilities and Fittings | |
|---|---|
| 1. Water | Rs. 0.8 Lacs total |
| 2. Power | |

**Other Fixed Assets:-**

| Other Fixed Assets | |
|---|---|
| 1. Furniture & Fixtures | Rs. 1.2 Lacs total |
| 2. Plastic tray capacity | |
| 3. Electrical fittings | |

**Pre-operative expenses**

| Pre-operative Expenses | |
|---|---|
| Legal expenses, Start-up expenses, | 0.9 LAC |

| | |
|---|---|
| Establishment cost, consultancy fees, trials and others. | |
| Total preoperative expenses | 0.9 LAC |

Contingency cost to be added as approx. 1.1 Lac.

So total start-up cost at own land & Premise may be somewhat similar to **18.39 lacs**. This is according to survey done at X location India. This may vary on location, situation and design change over.

**Working capital requirement (in lacs)**

| | | 55% | 65% | 75% |
|---|---|---|---|---|
| Particulars | Period | Year 2 | Year 3 | Year 4 |
| Raw material stock | 15 days | 2.28 | 2.70 | 3.68 |
| Work in progress | 15 days | 4.57 | 5.40 | 7.36 |
| Packing material | 15 days | 0.90 | 1.06 | 1.45 |
| Finished goods' stock | 15 days | 3.57 | 4.22 | 5.76 |
| Receivables | 30 days | 7.15 | 8.45 | 11.52 |
| Working expenses | 30 days | 0.78 | 0.92 | 1.26 |
| Total current assets | | 19.26 | 22.76 | 31.04 |
| Trade creditors | | 0.00 | 0.00 | 0.00 |
| Working capital gap | | 19.26 | 22.76 | 31.04 |
| Margin money (25%) | | 4.81 | 5.69 | 7.76 |
| Bank finance | | 14.44 | 17.07 | 23.28 |

## 12.INSTALLED CAPACITY OF THE MUSTARD SAUCE MANUFACTURING UNIT

The maximum installed capacity of the Mustard Sauce manufacturing unit in the present model project is proposed as 150 tons/annum or 500 kg/day Mustard sauce manufacturing. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day. The 1$^{st}$ year is assumed to be construction/expansion period of the project; and in the 2$^{nd}$ year 55 percent capacity, 3$^{rd}$ year 65

percent capacity and 4th year onwards 75 percent capacity utilization is assumed in this model project.

**Total Project Cost and Means of Finance (Rs. in Lakhs)**

| Particulars | Amount in Lakhs |
|---|---|
| i. Land and building (20 x 32 x 12 ft - LxBxH) | 4 |
| ii. Plant and machinery | 5.58 |
| iii. Utilities & Fittings | 0.8 |
| iv. Other Fixed assets | 1.2 |
| v. Pre-operative expenses | 0.90 |
| vi. Contingencies | 1.10 |
| vii. Working capital margin | 4.81 |
| Total project cost (i to vii) | 18.39 |
| Means Of finance | |
| i. Subsidy | 6.44 |
| ii. Promoters Contribution | 4.60 |
| iii. Term Loan (@10%) | 7.36 |

**Manpower Requirement**

| Total Monthly Salary (Rs.) | No | Wages | Total Monthly |
|---|---|---|---|
| Supervisor (can be the owner) | 1 | 15000 | 15000 |
| Technician | 1 | 12000 | 12000 |
| Semi skilled | 2 | 7600 | 15200 |
| Helper | 1 | 5500 | 5500 |
| Sales man | 1 | 8000 | 8000 |
| | | **Total** | **55700** |

## 13.EXPENDITURE, REVENUE & PROFITABILITY ANALYSIS.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | 150 | MT | | | | |
| | **75.45** | | | | | | |
| | **Particulars** | **1st Yr** | **2nd Yr** | **3rd Yr** | **4th Yr** | **5th yr** | **6th yr** |
| A | Total Installed Capacity (MT) | 75.45 MT Mustard/Annum | 82.5 | 97.5 | 112.5 | 135 | 150 |
| | Capacity utilization (%) | Under Const. | 55% | 65% | 75% | 90% | 100% |
| B | **Expenditure (Rs. in Lakh)** | 0 | | | | | |
| | Mustard(Av. Price @ Rs. 35/Kg ) | 0.00 | 14.52 | 17.16 | 19.80 | 23.76 | 26.40 |
| | Sugar @ Rs. 35/kg | 0.00 | 0.99 | 1.17 | 1.35 | 1.62 | 1.80 |
| | Salt @ Rs. 3/Kg | 0.00 | 1.86 | 2.19 | 2.53 | 3.04 | 3.38 |
| | Other materials @ 500/kg | 0.00 | 1.44 | 1.71 | 1.97 | 2.36 | 2.63 |
| | Packaging materials | 0.00 | 9.90 | 11.70 | 13.50 | 16.20 | 18.00 |
| | Utilities (Electricity, Fuel) | 0.00 | 0.44 | 0.52 | 0.59 | 0.71 | 0.79 |
| | Salaries (1st yr only manager's salary) | 1.80 | 6.43 | 6.43 | 6.43 | 6.43 | 6.43 |
| | Repair & maintenance | 0.00 | 0.70 | 0.80 | 0.90 | 0.90 | 0.90 |
| | Insurance | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| | Miscellaneous expenses | 0.50 | 2.30 | 2.30 | 2.30 | 2.30 | 2.30 |
| | **Total Expenditure** | **2.60** | **38.88** | **44.28** | **49.68** | **57.63** | **62.93** |
| C | **Total Sales Revenue (Rs. in Lakh)** | **0.00** | **74.25** | **87.75** | **101.25** | **121.50** | **135.00** |
| | Sale of Mustard sauce (Av. Sale Price @ Rs.90/kg) | 0.00 | 74.25 | 87.75 | 101.25 | 121.50 | 135.00 |
| D | **PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows** | **-2.60** | **35.37** | **43.47** | **51.57** | **63.87** | **72.07** |
| | Depreciation on civil works @ 5% per annum | 0.20 | 0.19 | 0.18 | 0.17 | 0.16 | 0.15 |
| | Depreciation on machinery @ 10% per annum | 0.56 | 0.50 | 0.45 | 0.41 | 0.37 | 0.33 |
| | Depreciation on other fixed | 0.12 | 0.10 | 0.09 | 0.07 | 0.06 | 0.05 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | assets @ 15% per annum | | | | | | |
| | Interest on term loan @ 12% | 0.77 | 0.74 | 0.71 | 0.68 | 0.64 | 0.60 |
| | Interest on working capital @ 12% | 0.00 | 1.73 | 2.05 | 2.79 | 2.79 | 2.79 |
| E | Profit after depreciation and Interest (Rs. in Lakh) | **-4.24** | **33.84** | **42.04** | **50.24** | **62.64** | **70.93** |
| F | Tax (assumed 30%) (Rs. in Lakh) | **0.00** | **10.15** | **12.61** | **15.07** | **18.79** | **21.28** |
| G | Profit after depreciation, Interest & Tax (Rs. in Lakh) | **-4.24** | **23.69** | **29.43** | **35.17** | **43.85** | **49.65** |
| H | Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh) | 0.77 | 0.74 | 0.71 | 0.68 | 0.64 | 0.60 |
| I | Coverage available (Rs. in Lakh) | 0.77 | 0.74 | 0.71 | 0.68 | 0.64 | 0.60 |
| J | Total Debt Outgo (Rs. in Lakh) | 0.26 | 0.28 | 0.31 | 0.34 | 0.38 | 0.42 |
| K | Debt Service Coverage Ratio (DSCR) | 3.00 | 2.62 | 2.28 | 1.97 | 1.69 | 1.44 |
| | Average DSCR | 2.16 | | | | | |
| L | Cash accruals (PBDIT-Interest-Tax) (Rs. in Lakh) | -3.37 | 24.48 | 30.15 | 35.82 | 44.44 | 50.19 |
| M | Payback Period | 2.5 Years | | | | | |
| | (on Rs. 18.39 Lakhs initial investment) | | | | | | |

## 14. REPAYMENT SCHEDULE

| Year | Beginning | PMT | Interest | Principal | Ending Balance |
|---|---|---|---|---|---|
| 1 | 735,791.08 | 102,068.34 | 76,522.27 | 25,546.06 | 710,245.01 |
| 2 | 710,245.01 | 102,068.34 | 73,865.48 | 28,202.86 | 682,042.16 |
| 3 | 682,042.16 | 102,068.34 | 70,932.38 | 31,135.95 | 650,906.21 |
| 4 | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | 650,906.21 | 102,068.34 | 67,694.25 | 34,374.09 | 616,532.11 |
| 5 | 616,532.11 | 102,068.34 | 64,119.34 | 37,949.00 | 578,583.12 |
| 6 | 578,583.12 | 102,068.34 | 60,172.64 | 41,895.69 | 536,687.42 |
| 7 | 536,687.42 | 102,068.34 | 55,815.49 | 46,252.85 | 490,434.58 |
| 8 | 490,434.58 | 102,068.34 | 51,005.20 | 51,063.14 | 439,371.44 |
| 9 | 439,371.44 | 102,068.34 | 45,694.63 | 56,373.71 | 382,997.73 |
| 10 | 382,997.73 | 102,068.34 | 39,831.76 | 62,236.57 | 320,761.16 |
| 11 | 320,761.16 | 102,068.34 | 33,359.16 | 68,709.18 | 252,051.98 |
| 12 | 252,051.98 | 102,068.34 | 26,213.41 | 75,854.93 | 176,197.05 |
| 13 | 176,197.05 | 102,068.34 | 18,324.49 | 83,743.84 | 92,453.20 |
| 14 | 92,453.20 | 102,068.34 | 9,615.13 | 92,453.20 | 0.00 |
| | | 1,428,957 | 693,166 | 735,791 | (735,791.08) |

## 15.ASSETS' DEPRECIATION

| Assets' Depreciation (Down Value Method) | | | | | | Amounts in Lakhs | | |
|---|---|---|---|---|---|---|---|---|
| Particulars | 1st yr | 2nd yr | 3 rd yr | 4th yr | 5th yr | 6th yr | 7th yr | 8th yr |
| Civil works | 4.00 | 3.80 | 3.61 | 3.43 | 3.26 | 3.10 | 2.94 | 2.79 |
| Depreciation | 0.20 | 0.19 | 0.18 | 0.17 | 0.16 | 0.15 | 0.15 | 0.14 |
| Depreciated value | 3.80 | 3.61 | 3.43 | 3.26 | 3.10 | 2.94 | 2.79 | 2.65 |
| | | | | | | | | |
| Plant & Machinery | 5.58 | 5.02 | 4.52 | 4.07 | 3.66 | 3.29 | 2.97 | 2.67 |
| Depreciation | 0.56 | 0.50 | 0.45 | 0.41 | 0.37 | 0.33 | 0.30 | 0.27 |
| Depreciated value | 5.02 | 4.52 | 4.07 | 3.66 | 3.29 | 2.97 | 2.67 | 2.40 |
| | | | | | | | | |
| Other Fixed Assets | 0.80 | 0.68 | 0.58 | 0.49 | 0.42 | 0.35 | 0.30 | 0.26 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Depreciation | 0.12 | 0.10 | 0.09 | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 |
| Depreciated value | 0.68 | 0.58 | 0.49 | 0.42 | 0.35 | 0.30 | 0.26 | 0.22 |
| | | | | | | | | |
| All Assets | 10.38 | 9.50 | 8.71 | 7.99 | 7.34 | 6.75 | 6.21 | 5.72 |
| Depreciation | 0.88 | 0.79 | 0.72 | 0.65 | 0.59 | 0.54 | 0.49 | 0.45 |
| Depreciated value | 9.50 | 8.71 | 7.99 | 7.34 | 6.75 | 6.21 | 5.72 | 5.27 |

## 16.FINANCIAL ASSESSMENT OF THE PROJECT

**Benefit Cost Ratio (BCR) and Net Present Worth (NPW)**

| Particulars | 1st yr | 2nd yr | 3 rd yr | 4th yr | 5th yr | 6th yr | 7th yr | 8th yr | |
|---|---|---|---|---|---|---|---|---|---|
| Capital cost (Rs. in Lakh) | 18.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| Recurring cost (Rs. in Lakh) | 2.60 | 38.88 | 44.28 | 49.68 | 57.63 | 62.93 | 62.93 | 62.93 | |
| Total cost (Rs. in Lakh) | 20.99 | 38.88 | 44.28 | 49.68 | 57.63 | 62.93 | 62.93 | 62.93 | 400.24 |
| Benefit (Rs. in Lakh) | 0.00 | 74.25 | 87.75 | 101.25 | 121.50 | 135.00 | 135.00 | 135.00 | |
| Total Depreciated value of all assets (Rs. in Lakh) | | | | | | | | 5.27 | |
| Total benefits (Rs. in Lakh) | 0.00 | 74.25 | 87.75 | 101.25 | 121.50 | 135.00 | 135.00 | 140.27 | 795.02 |
| Benefit-Cost Ratio (BCR): (Highly Profitable project) | **1.986** | | | | | | | | |
| Net Present Worth (NPW): | 394.79 | | | | | | | | |

## 17.BREAK-EVEN ANALYSIS

| **Sr. No.** | **Particulars** | 1st yr | 2nd yr | 3 rd yr | 4th yr | 5th yr | 6th yr | 7th yr | 8th yr |
|---|---|---|---|---|---|---|---|---|---|
| | Capacity utilization (%) | Under Const. | 55% | 65% | 75% | 90% | 100% | 100% | 100% |
| | Production MT/Annum | | 82.5 | 97.5 | 112.5 | 135 | 150 | 150 | 150 |
| A | Fixed Cost (Rs. in Lakh) | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Permanent staff salaries | 6.432 | 6.432 | 6.432 | 6.432 | 6.432 | 6.432 | 6.432 | 6.432 |
| | Depreciation on building @ 5% per annum | 0.20 | 0.19 | 0.18 | 0.17 | 0.16 | 0.15 | 0.15 | 0.14 |
| | Depreciation on machinery @ 10% per annum | 0.56 | 0.50 | 0.45 | 0.41 | 0.37 | 0.33 | 0.30 | 0.27 |
| | Depreciation on other fixed assets @ 15% per annum | 0.12 | 0.10 | 0.09 | 0.07 | 0.06 | 0.05 | 0.05 | 0.04 |
| | Interest on term loan | 0.77 | 0.74 | 0.71 | 0.68 | 0.64 | 0.60 | 0.56 | 0.51 |
| | Insurance | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| | **Total Fixed Cost (Rs. in Lakh)** | **8.38** | **8.26** | **8.16** | **8.06** | **7.96** | **7.87** | **7.78** | **7.69** |
| **B** | **Sales Revenue (Rs. in Lakh)** | **0** | **74.25** | **87.75** | **101.25** | **121.5** | **135** | **135** | **135** |
| C | Variable Cost (Rs. in Lakh) | | | | | | | | |
| | Mustard (Av. Price @ Rs.35/Kg ) | 0.00 | 14.52 | 17.16 | 19.80 | 23.76 | 26.40 | 26.40 | 26.40 |
| | Sugar @ 35 per kg | 0.00 | 0.99 | 1.17 | 1.35 | 1.62 | 1.80 | 1.80 | 1.80 |
| | Salt @ 3 per kg | 0.00 | 1.86 | 2.19 | 2.53 | 3.04 | 3.38 | 3.38 | 3.38 |
| | Other ingredients | 0.00 | 1.44 | 1.71 | 1.97 | 2.36 | 2.63 | 2.63 | 2.63 |
| | Packaging materials | 0.00 | 9.90 | 11.70 | 13.50 | 16.20 | 18.00 | 18.00 | 18.00 |
| | Casual staff salaries | 0.00 | 4.93 | 4.93 | 4.93 | 4.93 | 4.93 | 4.93 | 4.93 |
| | Utilities (Electricity, Fuel) | 0.00 | 0.44 | 0.52 | 0.59 | 0.71 | 0.79 | 0.79 | 0.79 |
| | Repair & maintenance | 0.00 | 0.70 | 0.80 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| | Miscellaneous expenses | 0.50 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 |
| | Interest on working capital @ 12% | 0.00 | 1.73 | 2.05 | 2.79 | 2.79 | 2.79 | 2.79 | 2.79 |
| | **Total Variable Cost (Rs. in Lakh)** | **0.50** | **38.51** | **44.23** | **50.37** | **58.32** | **63.62** | **63.62** | **63.62** |
| D | Break Even Point (BEP) | | | | | | | | |
| | as % of sale | - | 12.00 | 10.00 | 8.00 | 8.00 | 7.00 | 7.00 | 6.00 |
| | Break Even Point (BEP) in terms of sales value (Rs. in Lakhs) | - | 8.91 | 8.78 | 8.10 | 9.72 | 9.45 | 9.45 | 8.10 |

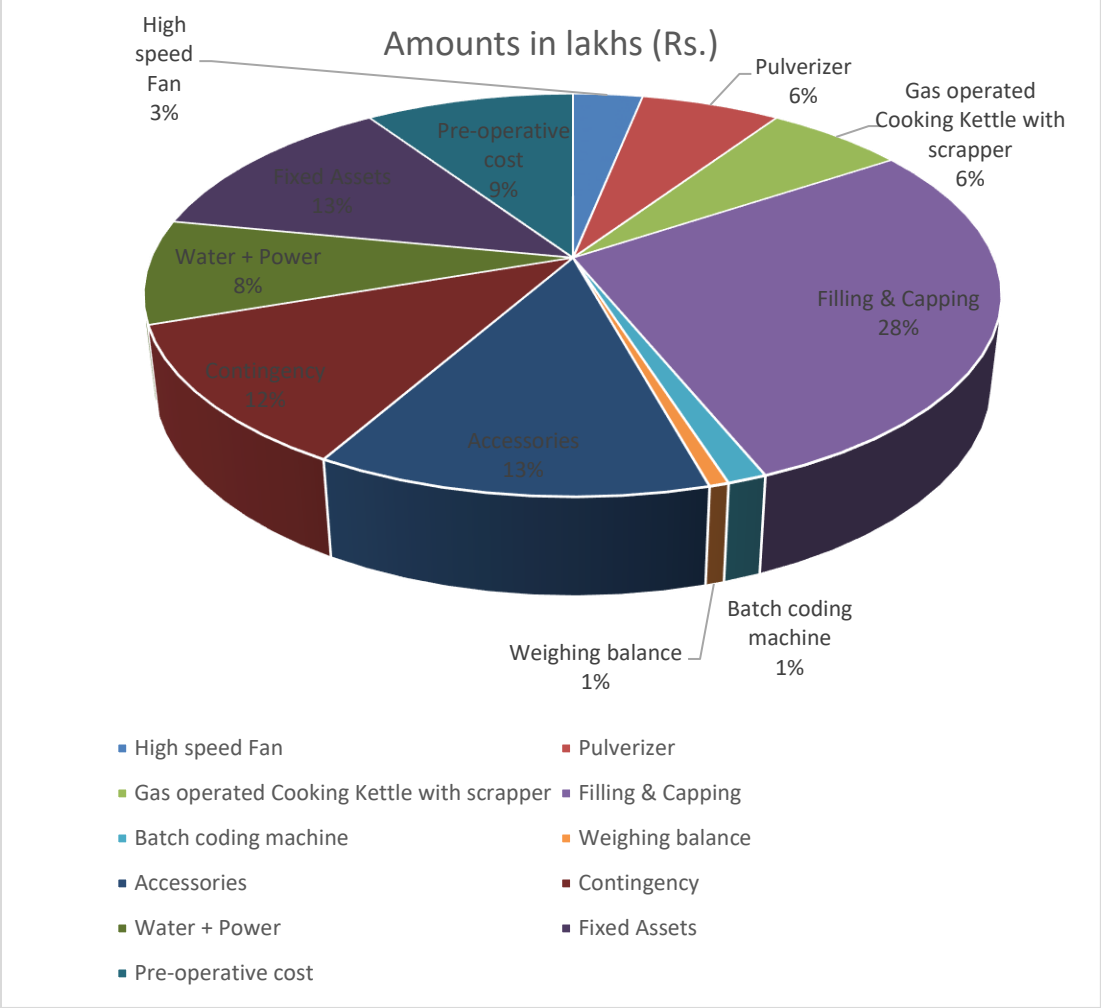
## 18.RAW MATERIAL REQUIREMENTS FOR THE UNIT

- A sustainable food processing unit must ensure maximum capacity utilization and thus requires an operation of minimum 280-300 days per year to get reasonable profit.

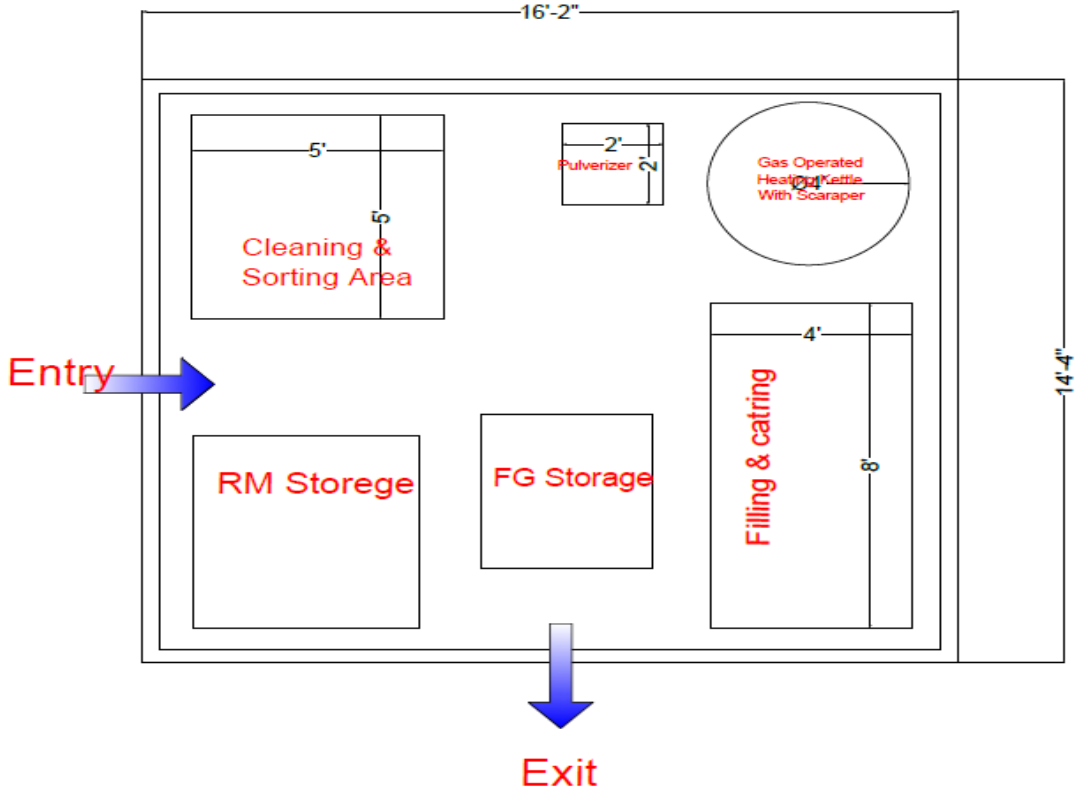
Therefore, ensuring uninterrupted raw materials supply requires maintenance of adequate raw material inventory.

- The processor must have linkage with producer organizations preferably FPCs through legal contract to get adequate quantity and quality of raw materials which otherwise get spoiled.
- In the Mustard sauce manufacturing project, the unit requires 280 kg/day,330 kg/day and 380 kg/day raw ripened fruit at 55, 65 and 75 percent capacity utilization, respectively.
- If there are shortages in supply, then the entrepreneur can use other seasonal seeds / Spices for same purpose to achieve maximum capacity utilization for higher economic efficiency.
- The fruit must be plucked from plant at mature stage; and then stored below 6°C temperature.

a. Pie chart for better understanding of expenses of each head.




## 19. TYPICAL MUSTARD SAUCE MANUFACTURING UNIT LAYOUT




- **The figures depicted here are in feets.**

## 20.MACHINERY SUPPLIERS

There are many machinery suppliers available within India for fruits-based beverage processing machineries and equipments. Some of the suppliers are:

1. Bajaj Process pack Limited, Noida, India
2. Shriyan Enterprises. Mumbai, India

## 21.LIMITATIONS OF THE DPR

i. This DPR has provided only the basic standard components and methodology to be adopted by an entrepreneur while submitting a proposal under the Formalization of Micro Food Processing Enterprises Scheme of MoFPI.

ii. This DPR is made to provide general methodological structure not for specific entrepreneur/crops/location. Therefore, information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of business, background of proposed project, location, raw material base/contract sourcing, entrepreneur's own SWOT analysis, market research, rationale of the project for specific location, community advantage/benefit, employment generation etc. are not given in detail.

iii. The present DPR is based on certain assumptions on cost, prices, interest, capacity utilization, output recovery rate and so on. However, these assumptions in reality may vary across places, markets and situations; thus the resultant calculations will also change accordingly.

## 22.GUIDELINES FOR THE ENTREPRENEURS

i. The success of any prospective food processing project depends on how closer the assumptions made in the initial stage are with the reality of the targeted market/place/situation. Therefore, the entrepreneurs must do its homework as realistic as possible on the assumed parameters.

ii. This model DPR must be made more comprehensive by the entrepreneur by including information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of entrepreneur's business, project location, raw material costing base/contract sourcing, detailed market research, comprehensive dehydrated product mix based on demand, rationale of the project for specific location, community advantage/benefit from the project, employment generation, production/availability of the raw materials/crops in the targeted area/clusters and many more relevant aspects for acceptance and approval of the competent authority.

iii. The entrepreneur must be efficient in managing the strategic, financial, operational, material and marketing aspects of a business. In spite of the assumed parameter being closely realistic, a project may become unsustainable if the entrepreneur does not possess the required efficiency in managing different aspects of the business and respond effectively in changing situations.

iv. The machineries should be purchased after thorough market research and satisfactory demonstration.

v. The entrepreneur must ensure uninterrupted quality raw materials' supply and maintain optimum inventory levels for smooth operations management.

vi. The entrepreneur must possess a strategic look to steer the business in upward trajectory.

vii. The entrepreneur must maintain optimum (not more or less) inventory, current assets. Selecting optimum source of finance, not too high debt-equity ratio, proper capital budgeting and judicious utilization of surplus profit for expansion is must.

viii. The entrepreneur must explore prospective markets through extensive research, find innovative marketing strategy, and maintain quality, adjust product mix to demand.

ix. The entrepreneur must provide required documents on land, financial transaction, balance sheet, further project analysis as required by the competent authority for approval.

x. The entrepreneur must be hopeful and remain positive in attitude while all situations.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