

**DETAILED PROJECT REPORT**  
**LITCHI BEVERAGES MANUFACTURING UNIT.**



**INDIAN INSTITUTE OF FOOD PROCESSING TECHNOLOGY**

**Ministry of Food Processing Industries, Govt. of India**

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### Project At a Glance

1	Name of the Project	Litchi Beverages
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 shareholders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	150 MT/annum (70, 80 & 90% capacity utilization in the 2nd, 3rd and 4th years' onwards respectively
11	Raw materials	Litchi Fruit
12	Major product outputs	Litchi Beverages
13	Total project cost (Lakhs)	26.64
	Land development, building & civil construction	5.18
	Machinery and equipment	17.41
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	0.25
14	Working capital Management (In Lakhs)	
	Second Year	18.09
	Third Year	20.67
	Fourth Year	26.58
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	8.7912
	Promoter's contribution (min 20%)	5.328
	Term loan (45%)	12.52
16	Debt-equity ratio	2.35 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	1.11
	3rd year	2.59
	4th year	4.05
18	Average DSCR	2.16
	Benefit Cost Ratio	1.047
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

# 1 GENERAL OVERVIEW OF LITCHI PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

## 1.1 INTRODUCTION

India ranks second for fruits and vegetables producer in the world followed by China. India, during 2017-18 has produced about 97358 thousand MT fruits and 184394 thousand MT vegetables in about 6506 Thousand Ha and 10259 Thousand Ha respectively (Horticulture statistics At a glance, 2018, MoA & FW Gol). In spite of this, the per capita availability of fruit in India is 107 gm/day which is below the recommended 120 gm/day. India's share of global exports of fresh fruits and processed fruit products is also quite meager compared to other major fruit producers of the world (Bung, 2012). Unfortunately, fruits and vegetables being perishable in nature get wasted to the tune of 20-30 % in the supply chain due to improper handling, transportation and poor post-harvest management; and only 2 % of them are processed in to value added products and the rest is consumed fresh. Litchi ranks seventh in area and ninth in Production of fruits. Litchi Fruits are appreciated for their sugar content and also rich in Vitamins, proteins, fats, carbohydrates, minerals, fibrous matter and Minerals.

Litchi (*Litchi chinensis*) is one of the most important subtropical fruits of India and belongs to the family *Sapindaceae*. It is a delicious juicy fruit of excellent quality. It is widely consumed fruit Beverages by People. Litchi Beverages is refreshing after any hectic activity or on a dry, hot day to quench thirst.

## 1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF LITCHI

**Litchi**, (*Litchi chinensis*), also spelled **lichi**, evergreen tree of the soapberry family (*Sapindaceae*), grown for its edible fruit. Litchi is native to Southeast Asia and has been a favourite fruit of the Cantonese since ancient times. Litchi is of local importance throughout much of Southeast Asia and is grown commercially in China and India. Its introduction into the Western world came when it reached Jamaica in 1775. The

first Litchi fruits in Florida—where the tree has attained commercial importance—are said to have ripened in 1916. To a lesser extent the tree has been cultivated around the Mediterranean, in South Africa, and in Hawaii. The litchi is native to low elevations of the provinces of Kwangtung and Fukien in southern China, where it flourishes especially along rivers and near the seacoast. It has a long and illustrious history having been praised and pictured in Chinese literature from the earliest known record in 1059 A.D. Cultivation spread over the years through neighboring areas of southeastern Asia and offshore islands. Late in the 17th Century, it was carried to Burma and, 100 years later, to India. It arrived in the West Indies in 1775, was being planted in greenhouses in England and France early in the 19th Century, and Europeans took it to the East Indies. It reached Hawaii in 1873, and Florida in 1883, and was conveyed from Florida to California in 1897. In time, India became second to China in litchi production, total plantings covering about 30,000 acres (12,500 ha). There are also extensive plantings in Pakistan, Bangladesh, Burma, former Indochina, Taiwan, Japan, the Philippines, Queensland, Madagascar, Brazil and South Africa.

Litchi is a minor crop in most countries. It is estimated that the world annual production is between 2.6 and 2.8 million tons. The duration of litchi fruit harvest highly relies on cultivars, latitudes and altitudes. Due to both chill requirement for floral induction and sensitivity to cold damages, litchi is a typical subtropical fruit tree and only commercially grown in two narrow strips from 17 to 26 degree latitude of the Southern and Northern Hemispheres. Litchi is produced in the elevation from nearly sea level to 1,100 m in the high areas. In most litchi producing countries and regions, even in China, the selection for quality cultivars is very limited. Irregular bearing is still a pending issue in some areas mainly caused by unreliable flowering. In China, litchi tree numbers have been slightly reduced due to tree thinning and orchard reformation. However, the production has kept on increasing, from 1.45 million tons in 2005 to around 1.9 million tons in 2011. The domestic market is the main orientation. High labor costs, lack of cold chain facilities and low initiatives of growers are the major non-technical constraints in the industry. Litchi research and development has been strongly supported by the Chinese Government since 2005. The National Litchi and Longan Research System was set up in 2008 and 16 researchers are screened to take care of industry research. Twelve experimental stations responsible for field experiments and technology

demonstration and training for growers have been set up in six provinces. The system is considered to be a very important contributor to the sustainable development of the industry.

India is the second largest producer of litchi in the World after China. Other major producing countries are Thailand, Australia, South Africa, Madagascar and Florida in US.

Among fruit crops, litchi ranks seventh in area and ninth in production but is sixth in terms of value in India. The national average productivity of litchi is 6.1 t/ha, which is much lower than the realizable yield of the crop under well managed condition. The average productivity of litchi in Bihar is 8.0 tonnes/ha. and in West Bengal it is 10.5 tonnes/ha. In other states the productivity is much lower, the lowest of 1.0 t / ha in Uttaranchal. South Africa (28 %), Thailand (25 %) followed by China (20 %) hold a major share in the litchi trade while India's share is hardly 1 %. In International markets the fruit remain available in plenty during November to March from countries like Australia (November – March), Mauritius (February – March), South Africa and Madagascar (November – January).

At present litchi fruits are exported by India mainly to the Netherlands, U.A.E., Saudi Arabia and Canada. APEDA and NAFED are the major export promoters of litchi. The demand from Arab countries, Europe and USA is increasing day by day. However, very little effort has been made by India to capture some part of the world market from China, the main player.

Major Litchi producing states in India are Bihar, Tripura, West Bengal, Uttar Pradesh, Punjab and Haryana. Litchi being exacting in climatic and soil requirements has limited distribution. It is grown in the states of Bihar, Tripura, West Bengal, Uttar Pradesh, Punjab and Haryana. Of the total production of Litchi in India, 74 percent is contributed by Bihar. The second largest Litchi producing state is West Bengal followed by Tripura and Assam. Productivity is highest in Bihar followed by West Bengal. An interesting

feature of distribution of Litchi in India is that maturity commences first in Tripura, followed by West Bengal then Bihar. The first and second week of May is the time for harvest in the eastern region, while Litchi of Bihar matures in the 3<sup>rd</sup> -4<sup>th</sup> week of May and continues up to the first week of June. Litchi in Uttar Pradesh and Punjab is ready for harvest during the 2<sup>nd</sup> - 3<sup>rd</sup> week of June. In Himachal Pradesh, Litchi of the same cultivar is harvested in the last week of June. Interestingly, in most of the states the best Litchi orchards are seen along the rivers, big or small.

### 1.3 VARIETIES

There are different varieties of Litchis growing worldwide. Varieties of Litchis growing worldwide are described below.

The varieties of Litchis growing worldwide are ‘No Mai Tze’, ‘Kwa Iuk’, ‘Kwai mi’, ‘Hsiang li’, ‘his Chio tsu’, ‘Shan chi’, ‘mauritus’, ‘Maclen’, ‘Brewster’, ‘Haak Yip’, etc.

Varieties of Litchis growing in India are described below.

Litchi varieties grown in India are highly variable under different climate and soil conditions. Singh (1954) described 33 varieties and classified them into 15 groups varieties of Litchi grown in India have also been subsequently described (Singh, 1998). When distinguishing the cultivar, the shape of skin segments and protuberances are the reliable and stable genetic characteristics. Fruit size, shape and taste are also variables but are influenced by other than genetic factors. Indian cultivars vary greatly in vegetative flushing pattern, flush colour and flowering ability. The cultivars also show variation in yield, cracking, and physico-chemical quality. Shahi among the early group and China among the mid-season groups appeared to be promising in Jharkhand state.

#### **Shahi:**

This is one of the commercial cultivar cultivated for table purpose in Muzaffarpur area of Bihar, which matures, in the third week of May. Fruits are oval and oblong conical in shape

and crimson-red tubercles appear on uranium-green background at maturity. It is heavy bearing variety with large fruits and average yield of 90-100kg/tree.

### **Swarna Roopa:**

It is a selection in litchi identified and released by CHES, Ranchi with high T.S.S and resistant to fruit cracking. This is the first variety developed in India.

### **China:**

It is commercially cultivated for table purpose in Muzaffarpur area of Bihar. It is a semi-dwarf variety with fruits ripening from the third week of May. Average yield is 80-100 kg/tree. Fruits are medium large, globose, with a mixture of red and orange colour.

### **Kasba:**

It is mostly grown in eastern part of Bihar. Fruits medium-large, heart-shaped with red tubercles on reddish background at maturity. It ripens during the first week of June. Average yield is 80/100 kg/tree.

### **Elachi:**

The tree is moderately vigorous, attaining an average height of 5 to 6 m and spread of 6-7 m. Fruits are conical and orange-red in colour. The variety is cultivated for table purpose with an average yield of 50-60 kg/tree.

### **Purbi:**

It is mostly grown for table purpose in eastern part of Bihar. Fruits are medium-large, oblong-conical in shape, which ripen at the end of May or first week of June. At maturity red tubercles appear on pinkish brown background. The average yield is 90-100 kg/tree.

### **Early Seedless (Syn. Early Bedana):**

It is the earliest variety and is mainly grown for table purpose and processing in Uttar Pradesh and Punjab. It is a medium to poor-yielding variety but bears regularly. The yield of fruit



varies from 50-60 kg/tree. Fruits are small to medium in size, heart to oval in shape with carmine red tubercles at maturity. Pulp is creamy white with T.S.S. 19.8%. Overall fruit quality is good.

### **Rose Scented:**

It is commercially cultivated for table purpose in Muzaffarpur area of Bihar. Besides high fruit quality, it is famous for distinct rose aroma and hence called Rose Scented. It is a mid-season variety that starts ripening in the first week of June. Average yield is around 80-90 kg/tree. Fruits are medium to large in shape mostly oval or heart shaped and deep rose pink in colour. Pulp greyish white soft moderately juicy with T.S.S. 20%. The average yield varies between 80-90kg/tree.

### **Bombai:**

This is an important commercial variety cultivated for table purpose in West Bengal. It ripens during first to second week of May. The trees are vigorous and attain an average height of 6.7 m and spread 7- 8 m. Average yield is 80-90 kg/tree. Fruits are large in size, mostly obliquely heart-shaped colour at maturity with carmine red tubercles on uranium-green background. In this variety each developed fruit has another tiny under-developed fruit attached to the fruit stalk. Pulp is greyish-white, soft juicy with T.S.S. 17%.

### **Calcutta:**

It is the best of all the varieties grown in northern parts of India for table purpose. It can be successfully cultivated even in hotter areas provided there is protection from strong hot winds and provision for plenty of water for irrigation. The average yield is 80-100 kg/tree. It is a late season variety and the fruits ripen in the last week of June. Trees of this variety attain an average height of 4m and spread of 6 m. Fruits are large in size, oblong, with tyrian rose colour and dark tubercles at maturity. Pulp is dirty creamy white, soft, juicy, very sweet with T.S.S. 18.17%.

### **Dehra Dun:**

This variety is mainly grown for table purpose in Uttar Pradesh and Punjab. In Bihar, it is cultivated under the name of 'Dehra-Rose'. It is a late-season variety and fruits start ripening in third week of June. Fruit yield is 80-90 kg/tree. Trees are medium in size attaining a height of 5 m and spread of 7 m. Fruits are medium in size, obliquely heart-shaped to conical, colour at maturity bright rose pink. Pulp is greyish-white, soft moderately juicy with T.S.S. 17%. This variety is highly susceptible to sunburn and cracking.

### **Gulabi:**

This is another important variety cultivated for table purpose in north India. It is a late-season variety and fruit ripens in fourth week of June. It bears profusely and regularly with 90-100 kg fruits/tree. Trees attain a height of 6.0 m and spread of 7.0 m. Fruits are medium in size, oblong-oval heart-shaped, mandarin red tubercles appear on shrimp red to carmine red background at maturity. Pulp is greyish white, firm sweet with T.S.S. 18.2%.

### **Late Large Red:**

It is one of the important litchi varieties mainly grown in Bihar and its adjacent states. This variety bears profusely every year with an average yield of 80-100 kg/tree. Fruits are large in size, oval or oblong conical with crimson red tubercles. Pulp greyish white. Soft moderately juicy with T. S. S. 20.3%.

## **1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION**

Litchi contains good amount of Vitamin C, Vitamin B-complex and phytonutrient flavonoids. It is a rich source of nutrient that is required for the production of blood. It provides manganese, magnesium, copper, iron and folate that are required for the formation of RBC. Litchi contains good amount of Vitamin B-complex which increase metabolism fat, protein and carbohydrate. It contains high amount of antioxidants which is effective to prevent early ageing. Litchi contains a good amount of potassium, which is required to maintain sodium level. It helps to maintain blood pressure and it reduces the risk of stroke and heart attack. Also it contains minerals like manganese, magnesium, iron, copper and folate that maintain

blood pressure. Litchi contains high amount of dietary fiber which proves best nutrient that promote cardiovascular health.

- **Carbohydrates:** Besides water, Litchis are mainly composed of Carbohydrates, with very little protein and fat and few calories. It contains 1.5-1.7 grams of Carbohydrates. The majority of the Carbs in litchi comes from sugars, which are responsible for sweet taste, they are relatively low in fiber.
- **Vitamin C:** The most abundant vitamin in Litchis. One Litchi provides around 9% of the Reference Daily Intake (RDI) for vitamin C.
- **Potassium:** Litchis are good source of Potassium. An essential nutrient that may improve heart health when eaten in sufficient amounts

Litchis are rich in various anti-oxidant bioactive plant compounds, which are beneficial to health.

These are the main plant compounds in Litchis:

**Epicatechin:** A flavonoid that may improve heart health and reduce your risk of cancer and diabetes

**Rutin:** A flavonoid which may help protect against chronic diseases, such as cancer, diabetes, and heart disease

**Oligonol :** Oligonol is a dietary supplement. It's a patented mixture of antioxidants (proanthocyanidins) derived from Litchi skin and green tea, developed by the Amino Up Chemical Corporation in Japan. The antioxidants are chemically altered to increase their uptake from your gut. Several studies indicate that Oligonol may reduce abdominal fat, fatigue, and inflammation after exercise

Nutritional value per 100 g

<b>Nutritional composition of Litchi fruit per 100 gm</b>	
<b>Energy (Kcal)</b>	60
<b>Total Carbohydrate (g)</b>	16.53
<b>Vitamin – C (mg)</b>	71.5
<b>Potassium (mg)</b>	171
<b>Phosphorus (mg)</b>	31
<b>Niacin (mg)</b>	0.603
<b>Riboflavin (mg)</b>	0.065
<b>Iron (mg)</b>	0.31

## **CONSTITUENTS AND HEALTH BENEFITS OF LITCHIS**

### **Health benefits:**

- Anticancer Effect
- Promote Cardiovascular Health
- Improve Digestion
- Prevent Cataract
- Act against Influenza
- Aid weight loss
- Regulate Blood vessel Rupture
- Anti-Inflammatory agents

- Provide Instant Energy
- Protect from Herpes Virus
- Strengthen Immunity
- Regulate Blood Pressure
- Provide Stronger bones
- Prevent Anemia
- Increase Libido
- Prevent signs of aging
- Remove blemishes
- Reduce sunburns
- Promote hair growth

## **1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-**

The Litchi tree is dense, round-topped, slow-growing, 30 to 100 ft (9-30 m) high and equally broad. Its evergreen leaves, 5 to 8 in (12.5-20 cm) long, are pinnate, having 4 to 8 alternate, elliptic-oblong, abruptly pointed, leaflets, somewhat leathery, smooth, glossy, dark-green on the upper surface and grayish-green beneath, and 2 to 3 in (5-7.5 cm) long. Colour of leaves varies from light green to dark green. The tiny petalless, greenish-white to yellowish flowers are borne in terminal clusters to 30 in (75 cm) long. Showy fruits, in loose, pendent clusters of 2 to 30 are usually strawberry-red, sometimes rose, pinkish or amber, and some types tinged with green. Fruits are round or heart shaped having thin, leathery skin. The colour of fruits varies with cultivar, and is red or rose or pinkish. The edible portion or fruit is the aril, which is immediately beneath the skin. Flavour of the aril varies with cultivar, which is distinctive. Most are aromatic, oval, heart-shaped or nearly round, about 2.5 cm wide and 4 cm long; have a thin, leathery, rough or minutely warty skin, flexible and easily peeled when fresh. Immediately beneath the skin of some varieties is a small amount of clear, delicious

juice. The glossy, succulent, thick, translucent-white to grayish or pinkish fleshy aril which usually separates readily from the seed, suggests a large, luscious grape. The flavor of the flesh is subacid and distinctive. There is much variation in the size and form of the seed. Seeds are bold but in some cultivars seeds are partially developed, due to failure of pollination, referred to as ‘chicken-tongue’ seed. The trees with small seeded fruits are prized because of the greater portion of pulp.

### **Cultivation and Bearing:-**

Since, flower bud differentiation, flowering, fruit set, fruit quality and flavour development in Litchi is influenced significantly by temperature and humidity, it has adapted well in the sub-tropics where summer months are hot and wet and winter months are dry and cool. Hot summers free from hot wind and winters free from frost are essential.

Litchi cultivation is highly successful in areas having minimum temperature of 10°C from December to February and 38°C from April to June. However, temperature of 32°C during these months is considered to be optimum. It is highly specific to climatic requirement for its establishment, plant growth and fruiting, and consequently spread of area. A moist atmosphere, occasional rainfall, cool dry winter free from frost and hot winds are ideal for its cultivation. In Litchi growing areas in India the temperature varies from 21°C to 37.8°C during flowering and fruiting. It has been observed that flower initiation in Litchi requires comparatively low temperature. Seasonal variation in temperature is favourable for proper fruiting. A dry climate, free from rains for about 2 months before flowering induces flower bud differentiation, blossom and consequently give high production. In Chotanagpur, the fog free dry winter, mild sub-tropical summer and intermittent pre-monsoon showers during April-May have been observed to be highly favourable for blossoming, better aril development and improvement in fruit quality. The sub-tropical to mild temperate climate in the foothills and valleys of the Himalayas are also suitable for Litchi cultivation. Depending upon the temperature rise after winter the time of flowering and maturity is determined. No fruiting has

been recorded when Litchi has been grown in tropical conditions. However, on hills in southern states flowering is observed and harvesting commences in November-December.

In India, Litchi is grown successfully on a wide range of soil types, which include sandy loams, laterite, alluvial sand, and calcareous soil, but the best Litchi orchards are seen in alluvial sandy loam soils with good drainage and access to the water table. The performance of orchards is very poor on clay soil with poor drainage. Litchi grown in sandy soils have a root system network, while trees grown in clay soil have very poor root distribution. The pH of soils in North Bihar ranges from 7.5 to 8, while in Jharkhand Litchi grows well at a pH of 6 to 6.5. It grows well even in calcareous soil with 30 percent free lime content. However, in acidic soil of Jharkhand mycorrhizal activity is minimal which affects fruit yield and quality (Pandey and Mishra, 1975). The taxonomy, morphology and mycotrophic habit of mycorrhiza association with Litchi was described by Pandey and Misra (1975) and their work also confirmed that Litchi requires mycorrhiza to grow and produce better quality of fruits. Thus, it is often suggested that new orchards should be grown with the introduction of soil from old orchards.

The tree is propagated by seed and by air layering, in which a branch is made to produce roots while still attached to the parent plant. When moved to a permanent orchard, Litchi plants are set 7.5–10.5 metres (24.5–34.5 feet) apart. They require very little pruning and no unusual attention, though they should have abundant moisture around the roots most of the time. The trees come into production at three to five years of age.

### **Post-harvest management:-**

There are some fruit handling management after harvesting to avoid post-harvest losses. Following are Post-harvesting handling practices:

- Fruits are graded according to their size and color. All the diseased, deformed, bruised and unripe fruits are sorted out.
- Litchis require a temperature of 7 to 8°C and humidity of 85-90% such that they can be stored for 4 – 8 weeks.

- Do not leave harvested fruit out in the hot sun;
- Do not pick cold, wet fruit. When wet turgid fruit is handled the oil glands can be ruptured. The released oil burns the fruit surface (oleocellosis) and also stimulates fungal spores to germinate. The burn Marks can take 2-3 days to develop;
- Wear cotton gloves when harvesting. This reduces puncture marks from Fingernails and jewellery;
- Use picking bags. This reduces damage as a result of abrasion on
- Wooden or metal picking bins and allows fruit to be gently lowered into
- Bulk harvesting bins;
- Do not leave stems on fruit or damage buttons by “plugging”;
- Use clean, smooth harvesting bins;
- Make sure packing line equipment is cleaned regularly. This reduces dirt and wax buildup which can cause fruit abrasion;
- Reduce packing line abrasion by using foam, rubber and smooth belts to Cushion fruit;
- Remove old and rotten fruit regularly from the packing shed and surrounds;
- Treat harvested fruit with a registered fungicide within 24hrs of harvest;

The general practice is to wash the harvested fruits with chlorine and coat them with a shine wax so that the fruits look fresh. They are dried at a temperature of 50-55°C after coating. If the fruits have to be transported over longer distances, then they are packed in wooden boxes else baskets made of bamboo and mulberry are used for packing Litchis. The boxes or baskets have to be ventilated and the fruits should be wrapped in tissue paper or newspaper for protection.

## **1.6 PROCESSING & VALUE ADDITION:-**

Fruit beverages and drinks are one of the popular categories of beverages that are consumed across the globe. The fruit beverages and drinks are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to most



of the synthetic and aerated drinks. In recent past the consumption of fruit based beverages and drinks has increased at a fast rate. Fruit Beverages or pulp used for the preparation of these products are subjected to minimal processing operations like filtration, clarification and pasteurization. The fruit Beverages or pulp, are mixed with ingredients like sugar, acid, stabilizers, micronutrients and preservative to develop beverages and drinks. The principle groups of fruit beverages are as follows:

- Ready-to-Serve (RTS) pre-packaged Beverages
- Fruit Beverages and Nectars
- Dilutable beverages

Beverages are essential for growth, development as well for carrying out various physiological processes that are critical for living a healthy life. In adult individuals 70 percent of body weight, 73 percent of lean muscle, 25 percent of adipose tissues, 22 percent of bone and 80 percent of blood consists of water. Consumption of beverages help in maintaining the water content in body and prevent dehydration.

The water assists in digestion, assimilation and excretion of foods. It also helps in removing the toxic substances produced in body as a result of metabolisms such as urea, uric acid, ammonia etc. through kidney. Water in beverages help in regulating the temperature of body through the process of sweating. Beverages specially the fruit and vegetable based ones are source of micronutrients (vitamins and minerals) and antioxidants (carotenoids, flavonoids).

The ready-to-serve beverages as per FSSAI specifications should contain at least 10% fruit content and not less than 10 % TSS besides 0.3% acid maximum as citric acid. The levels of permitted preservatives include 70 ppm (maximum) for sulphur dioxide and 120 ppm (maximum) for benzoic acid. The total plate count and yeast and mold counts should not exceed, to 50.0 cfu/ml and 2.0 cfu/ml, respectively. The Coliform counts should be nil in 100 ml beverage samples. Since these beverages are consumed as such without dilution, hence are

termed as Ready-to-serve beverage. The majority of packaged fruit beverages belong to this category.

Wide range of fruits including mango, citrus fruits, berries, litchi, guava, pineapple, grapes etc. are preferred for Beverages beverages. Required amount of sugar, acid, stabilizer, colouring and flavouring ingredients are added in Beverages or pulp along with water and the mixture is blending properly, filtered if desired. The Beverages mix is pasteurized (80-90°C) in bottle (20-30 min), continuous Beverages pasteurizer (few seconds to one minute) and cooled immediately. Nowadays, UHT processing of Beverages beverages is quite popular because of longer shelf-life and less loss of nutrients during processing.

The amount of fruit Beverages or pulp may vary according to fruit and cost effectiveness. The presence of oxygen in headspace often leads to oxidation resulting in off-flavour and loss of nutritive value, hence anti-oxidants such as ascorbic acid is often added in Beverages beverages. Besides it, colour and flavour ingredients which are stable to heat and oxygen are preferred.

RTS and Beverages products represent a very important segment of the total processed fruit industry. Beverages products are being marketed as refrigerated, shelf-stable, and frozen, in a variety of packages with increased emphasis on functionality, health attributes, new flavours or blends, and in some cases fortified with vitamins and minerals. High-quality Beverages operations are dependent upon a source of high-quality raw material. Most fruit Beverages are excellent sources of vitamin C, several are good sources of carotene and many contain moderate amounts of pyridoxine, inositol, folic acid and biotin. Fruit Beverages is regarded as source of energy due to their rich carbohydrate content. The organic acids present in the fruit Beverages plays a significant role in the maintenance of the acid-base balance in the body.

The process starts with sound fruit, freshly harvested from the field or taken from refrigerated or frozen storage. Thorough washing is usually necessary to remove dirt and foreign objects and may be followed by a sanitation step to decrease the load of contaminants.

Sorting to remove decayed and mold contaminated fruit is necessary to make sure that the final Beverages will not have a high microbial load, undesirable flavours, or mycotoxin contamination. For most fruits, preparation steps such as pitting and grinding is required prior to Beverages extraction. Heating and addition of enzymes might also be included before the mash is transferred to the extraction stage. Beverages extraction can be performed by pressing or by enzymatic treatment followed by decanting. The extracted Beverages will then be treated according to the characteristics of the final product.

For cloudy Beverages, further clarification might not be necessary or may involve a coarse filtration or a controlled centrifugation to remove large insoluble particles. For clear Beverages, complete de-pectinization by addition of enzymes, fine filtration, or high speed centrifugation is required to achieve visual clarity. The next step is usually a heat treatment or equivalent non-thermal process to achieve a safe and stable Beverages and final packaging if single-strength Beverages is being produced.

For a concentrate, the Beverages is fed to an evaporator to remove water until the desired concentration level is obtained. Other processes used for water removal include reverse osmosis and freeze concentration, which are best suited for heat-sensitive Beverages. The concentrate is then ready for final processing, packaging, and storage.

## **2. MODEL LITCHI BEVERAGES PROCESSING UNDER FME SCHEME**

### **2.1 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 thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc.

The ideal locations for establishment of exclusive Litchi Beverages processing unit are in the production clusters of Litchi growing states/Areas such as Bihar, Tripura, West Bengal, Uttar Pradesh, Punjab, Haryana and Uttarakhand where adequate quantities of surplus raw materials can be available for processing.

### **2.2 INSTALLED CAPACITY OF THE LITCHI BEVERAGES PROCESSING UNIT**

The maximum installed capacity of the Litchi Beverages manufacturing unit in the present model project is proposed as 150 tonnes/annum or 500 kg/day Litchi Beverages. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day. The 1<sup>st</sup> year is assumed to be construction/expansion period of the project; and in the 2<sup>nd</sup> year 70 percent capacity, 3<sup>rd</sup> year 80 percent capacity and 4<sup>th</sup> year onwards 90 percent capacity utilization is assumed in this model project.

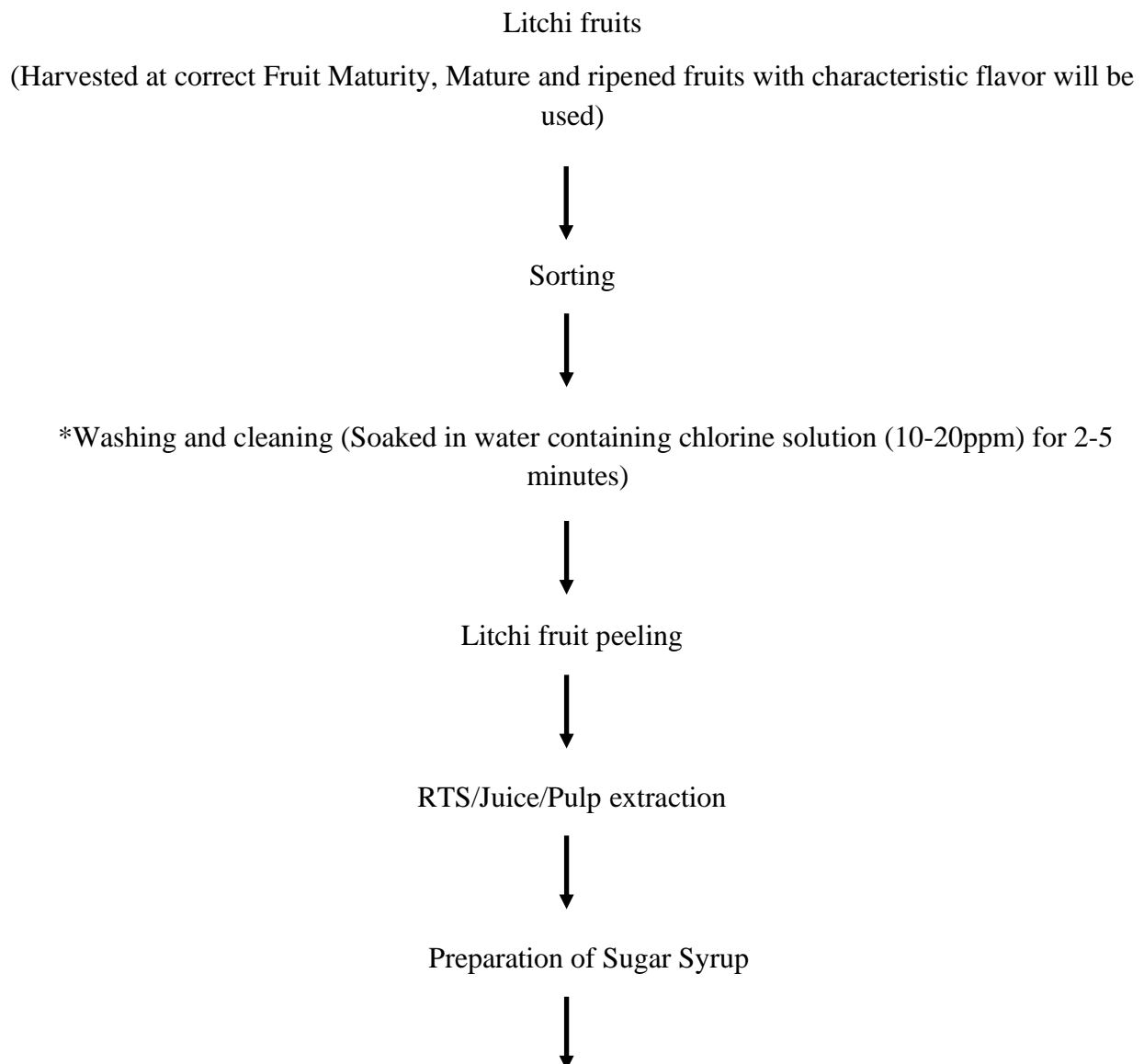
### **2.3 RAW MATERIAL REQUIREMENTS FOR THE UNIT**

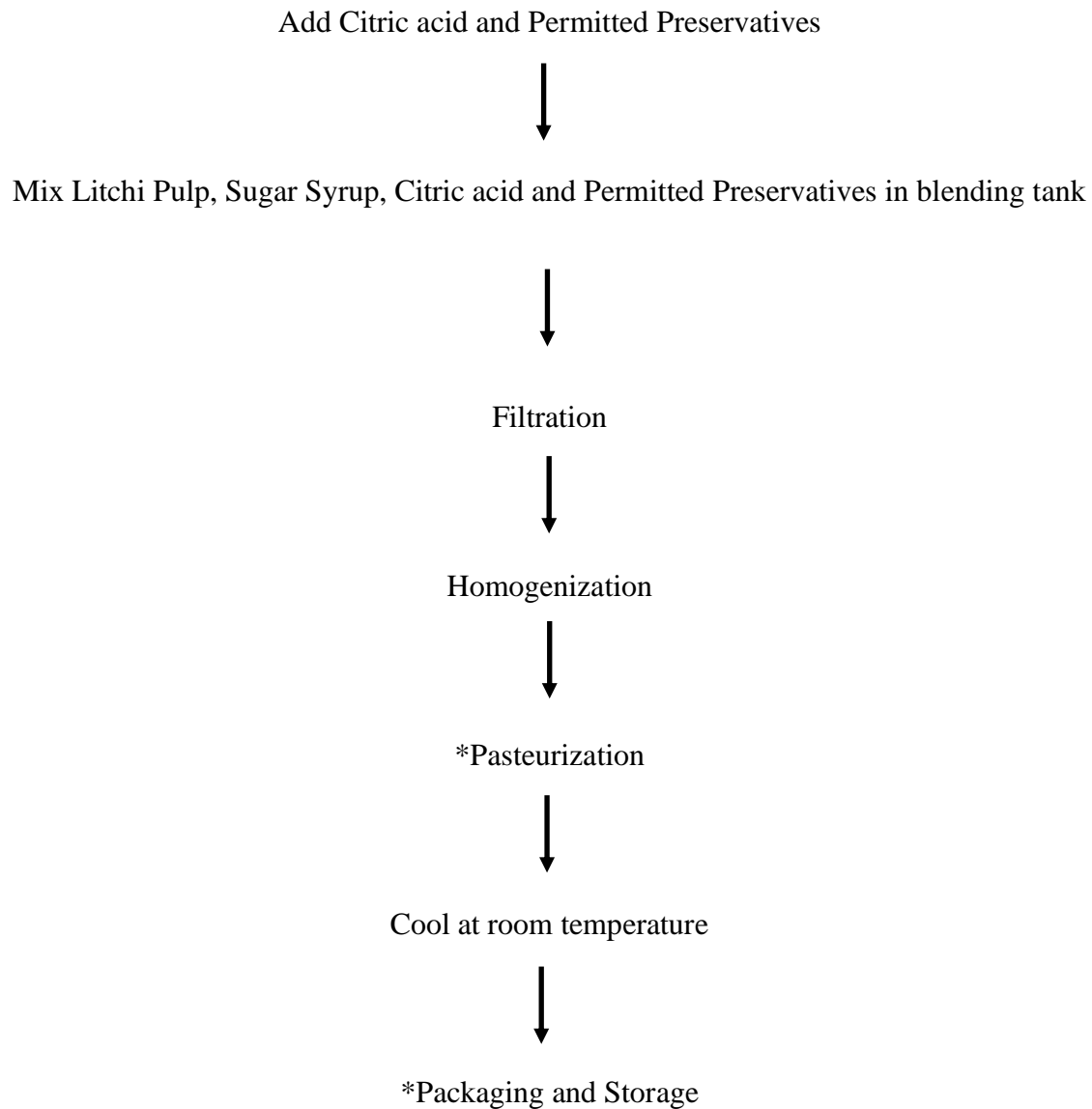
A sustainable food processing unit must ensure maximum capacity utilization and thus requires an operation of minimum 280-300 days per year to get reasonable profit. Therefore, ensuring uninterrupted raw materials supply requires maintenance of adequate raw material inventory. The processor must have linkage with producer organizations preferably FPCs through legal contract to get adequate quantity and quality of raw materials which

otherwise get spoiled. In the Litchi Beverages manufacturing project, the unit requires 350 kg/day, 400 kg/day and 450 kg/day Litchi fruit at 70, 80 and 90 percent capacity utilization, respectively. The Mature Litchi must be plucked from plant; and then stored below 6°C temperature.

## 2.4 MANUFACTURING PROCESS OF THE LITCHI BEVERAGES

The typical Procedure for manufacturing of Litchi Beverages is as below:





\*Established Critical Control point

Litchi Beverages is a complex product. A good understanding of the basic nature and properties of Litchi Beverages is therefore needed for processing and packaging Litchi Beverages. In fact, such knowledge is indispensable for ensuring that high product quality is maintained during Beverages processing. The quality of Litchi fruit is important for the characteristics of the final Litchi Beverages product. Litchis are natural products and therefore

vary significantly in flavor and color according to the variety of Litchi, the time of season when harvested and the region of the world where they are grown.

Receiving of Litchi fruits: Fruit goes through inspection lines for removal of bruised or damaged fruits.

Washing and cleaning: The fruits are graded and soaked in water containing chlorine solution (10-20ppm) for 2-5 minutes, scrubbed by revolving brushes, rinsed with clean water, and inspected again to remove the damaged ones.

Litchi fruit peeling: Peel litchi fruit using the peeling machine. Alternatively, Fruit can be peeled manually.

RTS/Juice/Pulp extractor: Beverages/Juice/Pulp is extracted by pressing of Litchis in juice extractor or twin pulper to get juice. These extractors produce Beverages free of peel extractives.

Filtration: Clarification is done to separate Beverages by removing pulp. Extracted fruit Beverages contains varying amount of suspended solids – broken fruit tissue, skin. After Juice extraction, the juice is clarified and separated from the pulp. The mechanical separation of sieving is used as the final process.

Pasteurization: Pasteurization deactivates the enzymes present in the Beverages and makes the Beverages microbiologically stable. It is carried out using tubular or plate heat exchangers. Beverages are more sensitive to microbial contamination and also dissolved oxygen causes vitamin-c deterioration during storage. Hence pasteurization is a major concern in Beverages processing to enhance the shelf life of Beverages. In pasteurization tank Litchi Beverages is preheated at 74°C and then pasteurized to kill bacteria. Two main aims of pasteurization of Beverages are

- 1) To deactivate enzymes
- 2) To make the Beverages microbiologically safe.

Packaging: Different types of packaging including cans, bottles, cartons, drums and barrels made up of glass, metals, plastic, or laminates are used for the packaging of Litchi juice.

## 2.5 MARKET DEMAND AND SUPPLY FOR LITCHI READY TO SERVE

Litchi Fruits and peel were processed into various value added products like Litchi Squash, Litchi Crush, Litchi marmalade, Litchi sherbets, Litchi syrup, Litchi cordial, Litchi candied fruit slices, Canned litchi Fruit, Litchi jelly, Litchi jam, Fermented beverages from Litchi, Litchi nuts, Litchi salad and Litchi soufflé. Due to sensitivity to chilling injury and limited shelf life of Litchi fruit, it becomes important to process it in the form of Beverages to reduce the surplus in the market in its peak season of production. Litchi is a highly perishable fruit. Fresh handling and marketing is difficult without cool chain logistics, with huge losses being incurred in the postharvest supply chain. Value-addition through processing offers tremendous potential for reducing these losses and proper utilization of harvested produce. More importantly, litchi processing promises development of enterprises as successful business models. While the level of processing of horticultural crops is less in India, litchi processing is about 10% meaning that the fruit has a proven sector for businesses to succeed. Beverages based on litchi are refreshing and flavorful, much preferred among consumers. Unlike other industrial sectors where huge capital investment is required, fruit processing can be successfully done even on home or domestic scale that requires very less investment.

Preservation of fruit in the form of Beverages has turn out to be the business activity of great significance and countries with rich fruit resources with short harvesting season are emphasizing more for establishes storage to keep up quality of fruits, enhance shelf life and preserve fruit Beverages for availability in off-season. Fruit beverages and drinks are one of the popular categories of beverages that are consumed across the globe. The fruit beverages and drinks are easily digestible, highly refreshing, thirst quenching, appetizing and nutritionally far superior to most of the synthetic and aerated drinks. In recent past the consumption of fruit based beverages and drinks has increased at a fast rate.



## 2.6 MARKETING STRATEGY FOR LITCHI BEVERAGES

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 Litchi fruit based products.

## 2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Litchi Beverages 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 fruit processing unit by adding new juice manufacturing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneurs.

- 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. Litchi cost considered @ Rs.175/-per kg.
  2. 1 kg Litchi will produce 50% recovery.
  3. 1 Batch size is approximately 100 kg.
  4. No. of hours per day are approximately 8-10 hours.
  5. Batch yield is 95%

Detailed Project Assumptions			
Parameter	Assumption		
Capacity of the Straw berry crush Unit	150	MT/annum	
Utilization of capacity	1st Year Implemetation, 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	175		
Average sale prices per Kg	100	Rs/kg	
Pulp extraction	55		
LITCHI BEVERAGES	1 Kg Litchi RTS from 0.27 kg Litchi		

## 2.8 FIXED CAPITAL INVESTMENT

**Capital investment of Rs. 5.18 lakhs required.**

### 2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Capacity	Quantity	Price (Rs. In Lacs)
1	Cold store sq. meter	1500 Kg	1	4
2	Fruit washer	100 kg/hr	1	1.5
3	Litchi peeling Machine	100 kg/hr	1	0.8
4	Twin Pulper	100 kg/hr	1	1.2
5	Feed Pump	Suitable	1	0.25
6	Sugar Syrup Preparation tank	100 Liters	1	1
7	Mixing/Blending tank	100 Liters	1	0.8
8	Filter press	100 Liters	1	0.7
9	Homogenizer	100 Liters/hr	1	2.3
10	Pasteurizer (PHE)	100 Liters/hr	1	1.6
11	Filling & Capping	500 BPM	1	2.7
12	Weighing balance	Suitable	1	0.06
13	Accessories	Lot	1	0.5
	<b>TOTAL</b>			<b>17.41</b>

## 2.8.2 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. 0.9 lac total
2. Plastic tray capacity	
3. Electrical fittings	

### Pre-operative expenses

Pre-operative Expenses	
Legal expenses, Start-up expenses, Establishment cost, consultancy fees, trials and others.	0.9 LAC
Total preoperative expenses	0.9 LAC

Contingency cost to be added as approx. 1.2 Lac.

So total startup cost at own land & Premise may be somewhat similar to 26.64 lacs. This is according to survey done at X location India. This may vary on location, situation and design change over.

## 2.9 WORKING CAPITAL REQUIREMENTS

### Working Capital Requirement (Rs. in Lakh)

		55%	65%	75%	90%	100%
Particulars	Period	Year 2	Year 3	Year 4	Year 5	Year 6
Raw material stock	7 days	1.90	2.25	3.07	5.02	9.12
Work in progress	15 days	3.80	4.50	6.13	10.03	18.24
Packing material	15 days	0.90	1.06	1.45	2.37	4.32
Finished goods' stock	15 days	5.49	6.49	8.85	14.48	23.70
Receivables	30 days	10.98	12.98	17.70	28.97	52.67
Working expenses	30 days	1.03	1.22	1.66	2.72	4.95
Total current assets		24.12	28.50	38.86	63.60	112.99
Trade creditors		0.00	0.00	0.00	1.00	2.00
Working capital gap		24.12	28.50	38.86	62.60	110.99
Margin money (25%)		6.03	7.13	9.72	15.65	27.75
Bank finance		18.09	21.38	29.15	46.95	83.25

## 2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

### Project Cost and Means of Finance

#### Particulars

Particulars	Amount in Lakhs
i. Land and building (20 x 32 x 12 ft - LxBxH)	5.18
ii. Plant and machinery	17.41
iii. Utilities & Fittings	0.8
iv. Other Fixed assets	0.9
v. Pre-operative expenses	0.90
vi. Contingencies	1.20
vii. Working capital margin	6.03
Total project cost (i to vii)	32.42
Means Of finance	

i. Subsidy	11.35
ii. Promoters Contribution	5.84
iii. Term Loan (@10%)	15.24

## 2.11 MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annualy
Supervisor (can be the owner)	1	18000	18000	216000
Technician	1	14000	14000	168000
Semi-skilled	2	7600	15200	182400
Helper	1	5500	5500	66000
Sales man	1	8000	8000	96000
			60700	728400

## 2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

		150	MT				
	Particulars	1st Year	2nd Year	3rd Year	4 th Year	5th year	6th year
A	Total Installed Capacity (MT)	41 MT Litchi/Annum	82.5	97.5	112.5	135	150
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	<b>Expenditure (Rs. in Lakh)</b>	0					
	Litchi (Av. Price @ Rs. 175/Kg )	0.00	38.98	46.07	53.16	63.79	70.88
	Sugar @ Rs. 35/kg	0.00	4.33	5.12	5.91	7.09	7.88
	Other materials (Rs. 100/kg)	0.00	0.01	0.01	0.01	0.01	0.02
	Packaging materials (Rs 12 per Kg)	0.00	9.90	11.70	13.50	16.20	18.00
	Utilities (Electricity, Fuel)	0.00	1.83	2.16	2.49	2.99	3.32
	Salaries (1st yr only manager's salary)	2.16	7.28	7.28	7.28	7.28	7.28
	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
	<b>Total Expenditure</b>	<b>2.96</b>	<b>65.63</b>	<b>75.74</b>	<b>85.85</b>	<b>100.86</b>	<b>110.87</b>
C	<b>Total Sales Revenue (Rs. in Lakh)</b>	<b>0.00</b>	<b>82.50</b>	<b>97.50</b>	<b>112.50</b>	<b>135.00</b>	<b>150.00</b>
	Sale of Litchi Beverage (Av. Sale Price @ Rs.100/kg)	0.00	82.50	97.50	112.50	135.00	150.00
D	<b>PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows</b>	<b>-2.96</b>	<b>16.87</b>	<b>21.76</b>	<b>26.65</b>	<b>34.14</b>	<b>39.13</b>
	Depreciation on civil works @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20
	Depreciation on machinery @ 10% per annum	1.74	1.57	1.41	1.27	1.14	1.03
	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05
	Interest on term loan @ 12%	1.58	0.53	0.58	0.64	0.71	0.79
	Interest on working capital @ 12%	0.00	2.17	2.17	2.17	2.17	2.17
E	Profit after depreciation and Interest (Rs. in Lakh)	<b>-6.66</b>	<b>14.43</b>	<b>19.45</b>	<b>24.44</b>	<b>32.01</b>	<b>37.07</b>
F	Tax (assumed 30%) (Rs. in Lakh)	<b>0.00</b>	<b>4.33</b>	<b>5.83</b>	<b>7.33</b>	<b>9.60</b>	<b>11.12</b>
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	<b>-6.66</b>	<b>10.10</b>	<b>13.61</b>	<b>17.11</b>	<b>22.41</b>	<b>25.95</b>
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.58	1.53	1.47	1.40	1.33	1.25
I	Coverage available (Rs. in Lakh)	1.58	1.53	1.47	1.40	1.33	1.25

J	Total Debt Outgo (Rs. in Lakh)	0.53	0.58	0.64	0.71	0.79	0.87
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)	-4.54	12.01	15.34	18.68	23.83	27.23
M	Payback Period	2.5Years					
	(on Rs. 32.42 Lakhs initial investment)						

## 2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	15,23,685.97	2,11,364.47	1,58,463.34	52,901.13	14,70,784.84
2	14,70,784.84	2,11,364.47	1,52,961.62	58,402.85	14,12,381.99
3	14,12,381.99	2,11,364.47	1,46,887.73	64,476.75	13,47,905.25
4	13,47,905.25	2,11,364.47	1,40,182.15	71,182.33	12,76,722.92
5	12,76,722.92	2,11,364.47	1,32,779.18	78,585.29	11,98,137.63
6	11,98,137.63	2,11,364.47	1,24,606.31	86,758.16	11,11,379.47
7	11,11,379.47	2,11,364.47	1,15,583.46	95,781.01	10,15,598.46
8	10,15,598.46	2,11,364.47	1,05,622.24	1,05,742.23	9,09,856.23
9	9,09,856.23	2,11,364.47	94,625.05	1,16,739.43	7,93,116.80
10	7,93,116.80	2,11,364.47	82,484.15	1,28,880.33	6,64,236.48
11	6,64,236.48	2,11,364.47	69,080.59	1,42,283.88	5,21,952.60
12	5,21,952.60	2,11,364.47	54,283.07	1,57,081.40	3,64,871.20
13	3,64,871.20	2,11,364.47	37,946.60	1,73,417.87	1,91,453.33
14	1,91,453.33	2,11,364.47	19,911.15	1,91,453.33	-
		29,59,102.62	14,35,416.65	15,23,685.97	(15,23,685.97)

## 2.14 ASSET'S DEPRECIATION

### Assets' Depreciation

Assets' Depreciation (Down Value Method)							Amounts in Lakhs	
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Civil works	5.18	4.92	4.67	4.44	4.22	4.01	3.81	3.62
Depreciation	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciated value	4.92	4.67	4.44	4.22	4.01	3.81	3.62	3.44
Plant & Machinery	17.41	15.67	14.10	12.69	11.42	10.28	9.25	8.33
Depreciation	1.74	1.57	1.41	1.27	1.14	1.03	0.93	0.83
Depreciated value	15.67	14.10	12.69	11.42	10.28	9.25	8.33	7.49
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	23.39	21.27	19.36	17.62	16.06	14.64	13.36	12.20
Depreciation	2.12	1.91	1.73	1.56	1.42	1.28	1.16	1.05
Depreciated value	21.27	19.36	17.62	16.06	14.64	13.36	12.20	11.15



## 2.15 FINANCIAL ASSESSMENT OF THE PROJECT

### Financial Assessment of the Project

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

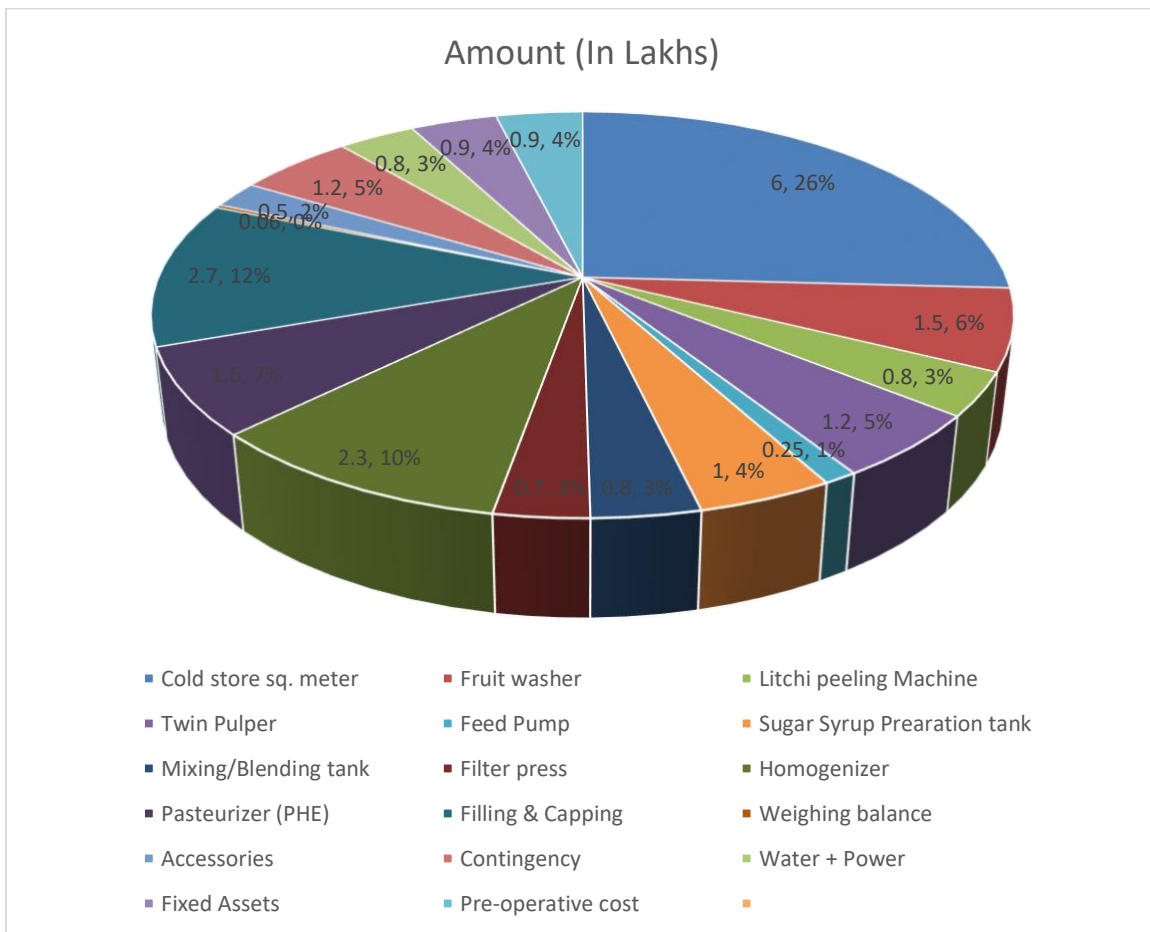
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year	
Capital cost (Rs. in Lakh)	32.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.96	65.63	75.74	85.85	100.86	110.87	110.87	110.87	
Total cost (Rs. in Lakh)	35.38	65.63	75.74	85.85	100.86	110.87	110.87	110.87	696.05
Benefit (Rs. in Lakh)	0.00	82.50	97.50	112.50	135.00	150.00	150.00	150.00	
Total Depreciated value of all assets (Rs. in Lakh)								11.15	
Total benefits (Rs. in Lakh)	0.00	82.50	97.50	112.50	135.00	150.00	150.00	161.15	888.65
Benefit-Cost Ratio (BCR): (Highly Profitable project)	<b>1.28</b>								
Net Present Worth (NPW):	192.59								

## 2.16 BREAK EVEN ANALYSIS

Break even analysis indicates costs-volume profit relations in the short run. This is the level at which, the firm is in no loss no profit situation.

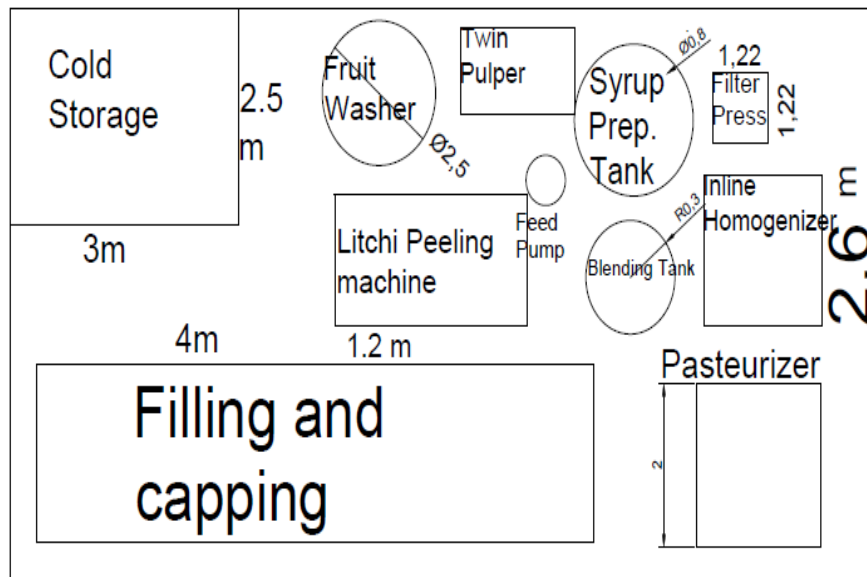
Sr. No.	Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
	Production MT/Annum		82.50	97.50	112.50	135.00	150.00	150.00	150.00
<b>A</b>	<b>Fixed Cost (Rs. in Lakh)</b>								
	Permanent staff salaries	7.28	7.28	7.28	7.28	7.28	7.28	7.28	7.28
	Depreciation on building @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
	Depreciation on machinery @ 10% per annum	1.74	1.57	1.41	1.27	1.14	1.03	0.93	0.83
	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	1.58	1.53	1.47	1.40	1.33	1.25	1.16	1.06
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
	<b>Total Fixed Cost (Rs. in Lakh)</b>	<b>11.29</b>	<b>11.03</b>	<b>10.78</b>	<b>10.55</b>	<b>10.33</b>	<b>10.11</b>	<b>9.90</b>	<b>9.69</b>
<b>B</b>	<b>Sales Revenue (Rs. in Lakh)</b>	<b>0.00</b>	<b>82.50</b>	<b>97.50</b>	<b>112.50</b>	<b>135.00</b>	<b>150.00</b>	<b>150.00</b>	<b>150.00</b>
<b>C</b>	<b>Variable Cost (Rs. in Lakh)</b>								
	Litchi (Av. Price @ Rs.175/Kg)	0.00	38.98	46.07	53.16	63.79	70.88	70.88	70.88
	Sugar @ 35 per kg	0.00	4.33	5.12	5.91	7.09	7.88	7.88	7.88
	Other ingredients	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02
	Packaging materials	0.00	9.90	11.70	13.50	16.20	18.00	18.00	18.00
	Casual staff salaries	0.00	5.78	5.78	5.78	5.78	5.78	5.78	5.78
	Utilities (Electricity, Fuel)	0.00	1.83	2.16	2.49	2.99	3.32	3.32	3.32
	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	2.17	2.17	2.17	2.17	2.17	2.17	2.17
	<b>Total Variable Cost (Rs. in Lakh)</b>	<b>0.50</b>	<b>65.70</b>	<b>75.81</b>	<b>85.92</b>	<b>100.93</b>	<b>110.94</b>	<b>110.94</b>	<b>110.94</b>
<b>D</b>	<b>Break Even Point (BEP)</b>								
	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)	-	9.90	9.75	9.00	10.80	10.50	10.50	9.00

## 2.17 PIE CHART FOR BETTER UNDERSTANDING OF EXPENSES OF EACH HEAD:



## 2.18 TYPICAL LITCHI BEVERAGES MANUFACTURING UNIT LAYOUT

10.2 m



9.1 m

## 2.19 MACHINERY SUPPLIERS

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

1. Bajaj Process pack Limited, Noida, India 0
2. Shriyan Enterprises. Mumbai, India

### **3. LIMITATIONS OF MODEL DPR & GUIDELINES FOR ENTREPRENEURS**

#### **3.1 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.

#### **3.2 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.



**Contact Us**

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