

# FRUIT PROCESSING



## 1.0 INTRODUCTION

Fruits are an important source of energy for human-beings but they are perishable items. Hence since many years various products are made from juice of fruits so that they can be consumed during off season as well. Products like jam, jelly, squash etc. are made from fruits since long. With the advent of technology and preservatives, shelf life of such products has gone up and they can be preserved for many months with proper packing. The proposed location of this activity could be many centres in India as number of tropical fruits are grown in the country. However, this note deals with a project in Manipur as several fruits like pineapples, oranges, lemons, peaches etc. are cultivated in large quantities. Hence, it is suggested to undertake fruit processing activity.

## 2.0 PRODUCTS

### 2.1 Applications

Fruits are perishable in nature and for their preservation, they need to be processed to make juices, squashes, jams, nectars etc. However, this note is restricted to making of orange and pineapple juice and squash.

### 2.2 Availability of know-how and Compliances

Strict compliances with the provisions under the FPO and PFA Act are mandatory. CFTRI, Mysore, has successfully developed the technical know-how.

## 3.0 MARKET POTENTIAL

### Demand and Supply

Fruits are liked by people of all age groups but they are available only during specific season. Due to high water or juice contents, they are perishable. Certain fruits require very careful

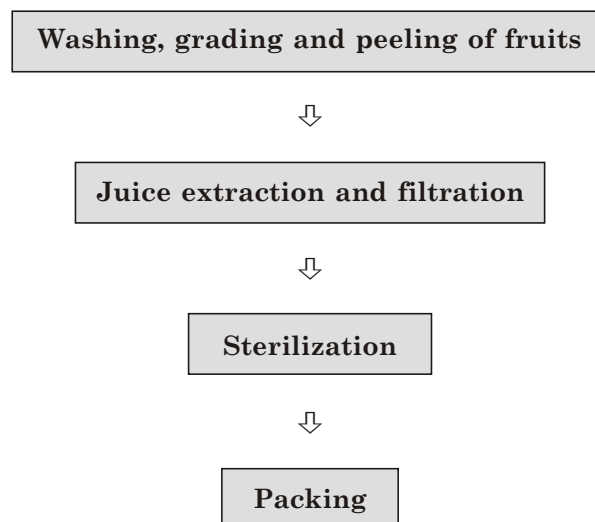
and consequently costly transportation. Hence, many down-the-line products like squash, fruit-juice concentrates, jam, nectars etc. are made from fruits with preservative which increases their shelf-life substantially. Market for such products has witnessed a quantum jump during last few years and with growing urbanisation, increase in disposable incomes and changing life styles, demand for them is steadily going up.

### **Marketing Strategy**

There are some established brands available in the market but they are costly and hence people would prefer low cost, good quality products. It is possible to introduce competitive pricing for a small scale unit due to its inherent features. Proper care has to be taken in creating and maintaining adequate network.

## **4.0 MANUFACTURING PROCESS**

The manufacturing process for making fruit juice and squash is standardised and not very complicated or time consuming. CFTRI, Mysore, has successfully developed this technology. In the first process, fully ripe and matured fruits are washed, cleaned, graded and then peeled. Thereafter juice is extracted from fruits and then it is filtered to remove seeds, fibres etc. This juice is then processed, sterilised and bottled after adding preservatives. In case of squash, syrup of sugar along with preservatives are added to juice and this mixture is stirred till uniform solution is formed and then it is bottled. As regards oranges, recovery of juice is substantial and weight and process loss is 10%. But in case of pineapple, wastages are around 50%. Process loss of 5-6% is compensated by addition of sugar syrup. The process flow chart is as under:



## **5.0 CAPITAL INPUTS**

### **5.1 Land and Building**

Total requirement of built-up area shall be around 150 sq.mtrs. and hence land measuring about 300 sq.mtrs. will be adequate. The built-up area is adequate to have production, storage and packing facilities. Cost of land is estimated to be Rs. 90,000/- whereas that of civil work Rs.3,75,000/-.FPO provisions about layout of factory building must be adhered to.

## 5.2 Plant and Machinery

In view of size of the market and to ensure economic viability of the project, rated production capacity of 150 tonnes per year with 2 shift working and 300 working days is advisable. To install this capacity following machines shall be required:

Item	Qty.	Price (Rs.)
Fruit Washing Tanks	2	10,000
Juice Extractors	2	85,000
Steam Jacketed Kettles- 60 Ltrs. Capacity	2	40,000
Stirrer	1	15,000
Baby Boiler- 100 kgs/Hr	1	60,000
Bottle Washing and Filling Machine	1	75,000
Testing Equipments like Refracto Meter, Salinometer, Pipette, Burette etc.	--	30,000
	<b>Total</b>	<b>3,15,000</b>

## 5.3 Miscellaneous Assets

Many other assets like stainless steel utensils, plastic tubs, exhaust fans, storage racks, furniture & fixtures, etc. shall be needed. A provision of Rs.50,000/- is made for the same.

## 5.4 Utilities

Power requirement will be 40 HP whereas per day water requirement would be 2000 litres for washing of fruits and potable and sanitation purposes. Hard coke of around 25 tonnes will be required annually for boiler.

## 5.5 Raw Material

The all-important raw material will be fresh, ripe and matured oranges and pineapples. North-East states including Manipur are famous for horticulture products. The highest fruit crop of Manipur is pineapple with production of more than 70,000 tonnes whereas that of oranges it is about 4500 tonnes. Thus, availability of few hundred tons will not pose any problems. Other items like sugar, salt, additives and preservatives etc. shall be available locally. Packing materials like food grade plastic or glass bottles, labels, corrugated boxes, BOPP tape etc. shall be required for which prior arrangement is advisable.

## 6.0 MANPOWER REQUIREMENTS

Particulars	Nos.	Monthly Salary (Rs.)	Total Monthly Salary (Rs.)
Skilled Workers	4	1,800	7,200
Semi-skilled Workers	2	1,500	3,000
Helpers	4	1,000	4,000
Salesman	1	2,000	2,000
		<b>Total</b>	<b>16,200</b>

## 7.0 TENTATIVE IMPLEMENTATION SCHEDULE

Activity	Period (in months)
Application and sanction of loan	2
Site selection and commencement of civil work	1
Completion of civil work and placement of orders for machinery	4
Erection, installation and trial runs	1

## 8.0 DETAILS OF THE PROPOSED PROJECT

### 8.1 Land and Building

Particulars	Area (Sq.Mtrs)	Cost (Rs.)
Land	300	90,000
Building	150	3,75,000
	<b>Total</b>	<b>4,65,000</b>

### 8.2 Machinery

Production capacity of 150 tons can be installed with investment under this head to the extent of Rs.3.15 lacs as discussed earlier.

### 8.3 Miscellaneous Assets

A provision of Rs. 50,000/- is adequate to have support assets as explained earlier.

### 8.4 Preliminary & Pre-operative Expenses

There are certain expenses which are incurred prior to the commencement of production such as registration, establishment and other administrative expenses, interest during implementation and so on. A provision of Rs.50,000/- is made towards them.

### 8.5 Working Capital Requirement

Against installed production capacity of 150 tonnes per year, actual capacity utilisation in the first year is expected to be 65%. At this level of activity, the working capital needs will be as under:

(Rs. in lacs)

Particulars	Period	Margin	Total	Bank	Promoters
Stock of Packing Materials	1 Month	30%	0.40	0.28	0.12
Stock of Finished Goods	½ Month	25%	0.80	0.60	0.20
Receivables	½ Month	25%	1.50	1.15	0.35
Working Expenses	1 Month	100%	0.45	--	0.45
		<b>Total</b>	<b>3.15</b>	<b>2.03</b>	<b>1.12</b>

**8.6 Cost of the Project and Means of Financing** (Rs. in lacs)

<b>Item</b>	<b>Amount</b>
Land and Building	4.65
Plant and Machinery	3.15
Miscellaneous Assets	0.50
P&P Expenses	0.50
Contingencies @ 10% on Land & Building and Plant & Machinery	0.80
Working Capital Margin	1.12
<b>Total</b>	<b>10.72</b>
<b>Means of Finance</b>	
Promoters' Contribution	3.22
Term Loan from Bank/FI	7.50
<b>Total</b>	<b>10.72</b>
Debt Equity Ratio	2.33 : 1
Promoters' Contribution	30%

Financial assistance in the form of grant is available from the Ministry of Food Processing Industries, Govt. of India, towards expenditure on technical civil works and plant and machinery for eligible projects subject to certain terms and conditions.

**9.0 PROFITABILITY CALCULATIONS**

**9.1 Production Capacity and Build-up**

The rated production capacity of the plant will be 150 tonnes per year. But actual utilisation is restricted to 65% in the first year and 75% thereafter.

**9.2 Sales Revenue at 100%**

(Rs. in lacs)

<b>Product</b>	<b>Qty. (Tonnes)</b>	<b>Selling Price (Rs/Ton)</b>	<b>Sales</b>
Orange Juice	35	32,000	11.20
Orange Squash	40	40,000	16.00
Pineapple Juice	35	32,000	11.20
Pineapple Squash	40	40,000	16.00
		<b>Total</b>	<b>54.40</b>

### 9.3 Raw Materials Required at 100%

(Rs. in lacs)

Product	Qty. (Tonnes)	Price/Ton (Rs)	Value
Oranges	80	13,000	10.40
Pineapples	150	8,000	12.00
Sugar	-	-	2.04
Additives, Preservatives, Flavours, etc.	--	--	1.20
Packing Materials @ Rs.5000/Ton	--	--	7.50
		<b>Total</b>	<b>33.14</b>

### 9.4 Utilities

Utilities like power, water and hard coke would cost around Rs.1,00,000/- at 100% activity level.

### 9.5 Selling Expenses

There will be competition from some established national brands and local brands as well. Hence, a provision @ 15% of sales income has been made towards selling commission, free sampling and publicity in local media.

### 9.6 Interest

Interest on working capital assistance from bank is calculated @ 14% per annum. Interest on term loan of Rs. 7.50 lacs is calculated @ 12% per annum considering repayment of loan in 5 years including a moratorium period of 1 year.

### 9.7 Depreciation

It is computed on WDV basis @ 10% on building and 20% on machinery and miscellaneous assets.

## 10.0 PROJECTED PROFITABILITY

(Rs. in lacs)

No.	Particulars	1st Year	2nd Year
<b>A</b>	<b>Installed Capacity</b>	<b>-- 150 Tonnes --</b>	
	Capacity Utilisation	65%	75%
	Sales Realisation	35.36	40.80
<b>B</b>	<b>Cost of Production</b>		
	Raw Materials	16.66	19.23
	Packing Material	4.87	5.63
	Utilities	0.65	0.75
	Salaries	1.94	2.15
	Stores & Spares	0.24	0.30
	Repairs & Maintenance	0.36	0.42
	Selling and Distribution @ 15%	5.30	6.12
	Administrative Expenses	0.42	0.50
	<b>Total</b>	<b>30.44</b>	<b>35.10</b>
<b>C</b>	<b>Profit before Interest &amp; Depreciation</b>	<b>4.92</b>	<b>5.70</b>
	Interest on Term Loan	0.98	0.63
	Interest on Working Capital	0.28	0.32
	Depreciation	1.11	0.92
	Net Profit	2.55	3.83
	Income-tax @ 20%	0.51	0.80
	Profit after Tax	2.04	3.03
	Cash Accruals	3.15	3.95
	Repayment of Term Loan	--	1.75

## 11.0 BREAK-EVEN ANALYSIS

(Rs. in lacs)

No	Particulars	Amount	
[A]	Sales		<b>35.36</b>
[B]	Variable Costs		
	Raw Materials & Packing Materials	21.53	
	Utilities (65%)	0.42	
	Salaries (65%)	1.26	
	Stores & Spares	0.24	
	Selling Expenses (75%)	3.98	
	Admn Expenses (50%)	0.21	
	Interest on Working Capital	0.28	<b>27.92</b>
[C]	Contribution [A] - [B]		<b>7.44</b>
[D]	Fixed Cost		<b>4.89</b>
[E]	Break-Even Point [D ÷ C]		<b>65%</b>

## 12.0 [A] LEVERAGES

### Financial Leverage

$$= \text{EBIT/EBT}$$

$$= 3.81 \div 2.55$$

$$= 1.49$$

### Operating Leverage

$$= \text{Contribution/EBT}$$

$$= 7.44 \div 2.55$$

$$= 2.92$$

### Degree of Total Leverage

$$= \text{FL/OL}$$

$$= 1.49 \div 2.92$$

$$= 0.51$$

## [B] Debt Service Coverage Ratio (DSCR)

(Rs. in lacs)

Particulars	1st Yr	2nd Yr	3rd Yr	4th Yr	5th Yr
Cash Accruals	3.15	3.95	4.23	4.51	4.83
Interest on TL	0.98	0.63	0.39	0.24	0.14
<b>Total [A]</b>	<b>4.13</b>	<b>4.58</b>	<b>4.62</b>	<b>4.75</b>	<b>4.97</b>
Interest on TL	0.98	0.63	0.39	0.24	0.14
Repayment of TL	--	1.75	1.75	1.75	1.75
<b>Total [B]</b>	<b>0.98</b>	<b>2.38</b>	<b>2.14</b>	<b>1.99</b>	<b>1.89</b>
<b>DSCR [A] ÷ [B]</b>	<b>4.21</b>	<b>1.92</b>	<b>2.16</b>	<b>2.39</b>	<b>2.63</b>
<b>Average DSCR</b>	----- <b>2.66</b> -----				



**[C] Internal Rate of Return (IRR)**

Cost of the project is Rs. 10.72 lacs.

(Rs. in lacs)

<b>Year</b>	<b>Cash Accruals</b>	<b>16%</b>	<b>18%</b>	<b>20%</b>	<b>24%</b>
1	3.15	2.72	2.67	2.62	2.54
2	3.05	2.27	2.19	2.12	1.98
3	4.23	2.71	2.58	2.45	2.22
4	4.51	2.49	2.33	2.17	1.91
5	4.83	2.30	2.11	1.94	1.65
	<b>19.77</b>	<b>12.49</b>	<b>11.88</b>	<b>11.30</b>	<b>10.30</b>

The IRR is around 22%.

**Some of the equipment and packing machinery suppliers are**

1. Auric Techno Services Pvt. Ltd. C-101, Shreenath Hermitage, Baner Road, Pune- 411008.  
Tel No. 25898072/25899113 Fax No. 25899113
2. PRS Technologies Pvt. Ltd. D-26, NDSE Part II New Delhi-110049.  
Tel No. 26252176/77, Fax : 2540789
3. SS Engg. B-25, Khanpur Ext. New Delhi-110062. Tel No. 26081475
4. Divecha Glass Industries, 249, Balrajeshwar Road, LBS Marg, Mulund (W), Mumbai-400080
5. DK Barry and Compnay Pvt. Ltd. 11/35, West Punjab Baug, New Delhi-110026.  
Tel No. 25160363