

## 1 PAPAIN

### 1.1 Introduction

Papain is a proteolytic enzyme from the cysteine proteinase family. It is manufactured from the latex of raw papaya fruits as papaya is very rich in papain. A milky fluid known as latex containing papain oozes out of the green papaya. The greener the fruit, more active is the papain.

Papain enzyme results in high value-addition. Hence this product can be manufactured in Madhya Pradesh. Ideally, some progressive papaya grower should undertake this venture as a measure of forward integration.

### 1.2 Objective

The primary objective of the model report is to facilitate the entrepreneurs in understanding the importance of setting up unit of papain. This model report will serve as guidance to the entrepreneurs on starting up such a new project and basic technical knowledge for setting up such a facility.

### 1.3 Raw Material Availability

The papaya is available almost round the year. In the year 2002-03 the total production of papaya was 43973 Mt on an area of 897 Ha.

### 1.4 Market Opportunities

Papain is used in many industries for variety of reasons. Some of the end-users are breweries, pharmaceuticals, food, leather, detergents, meat and fish processing etc. Thus, the end use segments are many. Most of these industries are growing. Good quality papain has export demand as well. In spite of very good domestic as well as export demand, papain manufacturing has not yet picked up in the North-East and hence there are good prospects for new entrants.

### 1.5 Project description

#### Applications

Dry powder made from the latex of raw papaya is commonly known as crude papain. Dried papain is stored in powder or flakes form. They are diluted with lactose powder to get BPC grade papain. There is a market for raw as well as BPC grade papain. This note considers production of BPC grade papain.

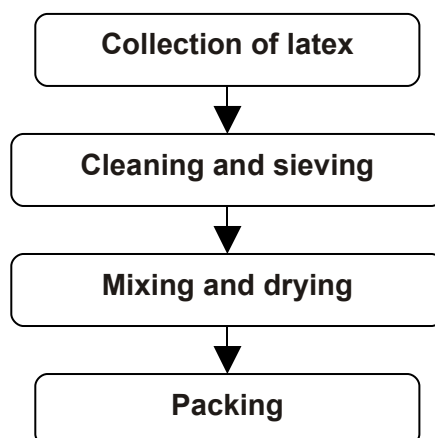
## Capacity of the Project

The total capacity of the project is 90 MT per annum.

## Manufacturing process

White milky latex of green and fully grown papaya fruits is collected in the early morning by making deep longitudinal cuts by stainless steel or wooden sharp knives. Latex is collected in stainless steel trays while latex coagulated in the surface of the fruits is scrapped and collected in the trays. A fruit is tapped about 6 times in the course of 16 days. This latex is passed through 50 mesh sieves to remove dirt and then it is mixed with potassium metabisulphate and spread on trays and dried in a vacuum shield drier at a temperature of about 55O C for 4-5 hours. The dried product is packed in air-tight containers and stored in a cool, dry place. It should be kept in flake form as powdering decreases the stability of the product during storage. Dried flakes are powdered and diluted with lactose powder to get BPC grade papain. Plastic containers should be used to pack crude papain flakes or powder as metal containers would result in loss of enzyme activity. Transportation is also very critical as papain has to be kept below 20O C temperature or else its shelf life is reduced.

With proper storage and handling, its shelf life is 5-6 months. Recovery of BPC grade papain is in the range of 25% to 30%. In other words, 100 kgs. of good quality latex is required to produce 25-30 kgs. of BPC grade papain. CFTRI, Mysore, has developed the technical knowhow for the product. The process flow chart is as under:



## 1.6 Project component and cost

Major components of the projects and their costs are described in the table hereunder:

## 1.7 Land and Building

PARTICULARS	Unit	Qty	Cost/unit	Total
<b>LAND &amp; BUILDING</b>				<b>99.00</b>
Land	SqM	2,200	250.00	5.50
<b>Land Development</b>				
Land Area		2,200	500.00	11.00
<b>Building</b>				
<b>Production Block</b>				
Buildup Area	SqM	1,500	5,000.00	75.00
Contingencies		10%		7.50
<b>PLANT &amp; MACHINERY</b>				<b>120.00</b>
Plant & machinery	LS	1	10,000,000.00	100.00
Contingencies		20%		20.00
<b>MISCELLANEOUS FIXED ASSETS</b>				<b>30.00</b>
Misc Assets	LS	1	2,500,000	25.00
Contingencies		20%		5.00
<b>PRE-OPERATIVE EXPENSES</b>				<b>29.10</b>
Establishment		1	2,140,000	21.40
Professional Charges		1	50,000	0.50
Security Deposits		1	720,000	7.20
<b>TOTAL</b>				<b>278.10</b>

## 1.8 Plant and Machinery

The total cost of the plant and machinery is Rs. 120 Lakhs.

## 1.9 Building

The main production block will cost around Rs. 82.50 lakhs.

## 1.10 Miscellaneous Assets

A provision of Rs. 30 lakhs would take care of all the requirements.

## 1.11 Preliminary & Pre-operative Expenses

A provision of Rs. 29.10 lakhs would take care of pre-production expenses like establishment, professional charges, security deposits etc.

## 1.12 Working capital assessment

ITEMS	Year 1	Year 3	Year 5
STOCK OF RAW MATERIAL & PACKING MATERIAL	15.46	25.76	25.76
SUNDRY DEBTORS	54.00	90.00	90.00
<b>TOTAL</b>	<b>69.46</b>	<b>115.76</b>	<b>115.76</b>
<b>MARGIN</b>	17.36	28.94	28.94
<b>MPBF</b>	52.09	86.82	86.82
<b>INTEREST ON WC</b>	5.73	9.55	9.55

### 1.13 Means of finance

<b>EQUITY CAPITAL</b>			33.08%	<b>97.73</b>
<b>MOFPI SUBSIDY</b>	25%	50.00	16.92%	<b>50.00</b>
<b>TERM LOAN</b>				
FINANANCIAL INSTITUTIONS		10.00%	50.00%	<b>147.73</b>
-Payable half yearly Installments	10	14.80		
<b>TOTAL</b>			100%	<b>295.46</b>

### 1.14 Cash flow statement

<b>PARTICULARS</b>	<b>Year 1</b>	<b>Year 3</b>	<b>Year 5</b>	<b>Year 7</b>
<b>SOURCES OF FUNDS</b>				
EQUITY CAPITAL	-	-	-	-
SUBSIDY				
NET PROFIT	17.20	78.36	72.62	67.57
(INTEREST ADDED BACK)				
DEPRECIATION	17.55	17.55	17.55	17.55
PRELIMINARY EXP.W/O	4.16	4.16	4.16	4.16
INCREASE IN TERM LOAN	-	-	-	-
INCREASE IN BANK BORROWINGS-WC	52.09	21.70	-	-
<b>TOTAL</b>	<b>91.00</b>	<b>121.77</b>	<b>94.33</b>	<b>89.28</b>

### 1.15 Projected balance sheet

<b>PARTICULARS</b>	<b>Year 1</b>	<b>Year 3</b>	<b>Year 5</b>	<b>Year 7</b>
<b>LIABILITIES</b>				
EQUITY CAPITAL	97.73	97.73	97.73	97.73
RESERVES & SURPLUS	46.69	123.56	241.76	359.65
TERM LOAN	132.93	73.73	14.53	-
BANK BORROWINGS-WC	<b>52.09</b>	<b>86.82</b>	<b>86.82</b>	86.82
<b>TOTAL</b>	<b>329.45</b>	<b>381.85</b>	<b>440.84</b>	<b>544.21</b>

### 1.16 Projected profit and loss account

<b>Particulars</b>	<b>Year 1</b>	<b>Year 3</b>	<b>Year 5</b>	<b>Year 7</b>
<b>INCOME</b>	378.00	630.00	630.00	630.00
<b>EXPENDITURE</b>	339.09	529.93	535.67	540.72
<b>VARIABLE</b>	242.66	393.48	393.48	393.48
<b>FIXED</b>	96.43	136.45	142.19	147.24
<b>GROSS PROFIT</b>	38.91	100.07	94.33	89.28
<b>PROFIT BEFORE TAX</b>	(3.31)	59.21	59.40	58.02
<b>RETAINED PROFIT</b>	(3.31)	59.21	59.40	58.02

### 1.17 Key indicators

NET PRESENT VALUE at current Inflation (Rs. in lakhs)	<b>398.12</b>
INTERNAL RATE OF RETURN %	<b>26.83</b>
AVERAGE DSCR	<b>2.21</b>
BREAK EVEN POINT %	<b>75.47</b>
PAY BACK PERIOD ( YEARS)	<b>4.29</b>

### 1.18 Manpower Requirement

PARTICULARS		NO.
<b>SUPERVISORY STAFF</b>		
	GENERAL MANAGER	1
<b>ADMINISTRATIVE STAFF</b>		
	MARKETING MANAGER	1
	ACCOUNTANT	1
	OFFICE CLERKS / MKTG ASSISTANT	3
<b>WORKERS</b>		
	PRODUCTION SUPERVISORS	3
	MANAGER - QC	1
	MAINT SUPERVISOR	1
	SKILLED WORKERS	8
	LABOUR	12

### 1.19 Assumptions

<b>Project &amp; Financing</b>			
Contingencies on Building			10%
Contingencies on Equipment			20%
Term Loan			50%
Rate of Interest on Term Loan			10%
Subsidy Considered	Subject to ceiling		25%
Expected time of Installation		Months	10
Moratorium		Months	6
<b>CAPACITY</b>			
Rated Capacity Per Annum	80% of Installed capacity	TPA	90
Number of Operational Days	DAYS		210
Working Hours Per day	Hrs		20
<b>CAPACITY UTILIZATION</b>			
Year I			60%
Year II			75%
Year III			100%
<b>SALES PRICE</b>			
W S Price			700000
<b>OTHER EXPENSE</b>			
Commission			10.0%
Marketing Expenses			2.5%
<b>POWER</b>			
Connected Load	HP		180
<b>DEPRICIATION AS PER COMPANY'S ACT</b>			
BUILDING			3.34%
PLANT & MACHINERY			10.34%
MISC. FIXED ASSETS			7.07%
LAND & SITE DEVELOPMENT			1.63%
<b>MAINTENANCE</b>			
BUILDING			1.00%
PLANT & MACHINERY			3.00%
MISC. FIXED ASSETS			2.00%
LAND & SITE DEVELOPMENT			1.00%

**Sources of Technology / Machinery**

- ❖ **M/s Armstrong Smith Ltd.,1, Sir PSM Road**  
Bombay
  
- ❖ **M/s B. Sen Barry & Co.**  
65/11 Rohtak Road, New Delhi
  
- ❖ **M/s Raylon Metal Works, J.B. Nagar, Andheri**  
Bombay

**The actual cost of projects may deviate on change of any of the assumptions.**