

PAPAIN EXTRACTION



1.0 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 tenderises meat and can act as a clarifying agent in many food industry processes. It is a common ingredient in brewery and meat processing. Although synthetic substitutes are available at lower cost, the demand for papain is still strong as a food ingredient since it is perceived as a natural product.

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

This project profile is for setting up of a BPC grade papain production unit with installed processing capacity of 20 tonnes per annum of raw/ unripe papaya.

2.0 MARKET POTENTIAL

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.

3.0 PROCESS DETAILS

White milky latex of green and fully grown papaya fruits are 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 55 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.

4.0 COST OF THE PROJECT

The estimated project cost is given below.

Particulars	Amount (Rs lacs)
Land & Site Development	-
Building & Civil Works	5.61
Machinery & Equipment	6.10
Misc. Fixed Assets	2.00
Preliminary & Pre-operative Expenses	0.86
Contingencies & Escalation @ 3%	0.41
Working Capital Margin	1.33
TOTAL	16.31

4.1 Land & Site Development: No cost has been considered for land & site development. It is assumed that the project will be set up in own land.

4.2 Building & Civil Works: Details of building & civil works are given below.

Particulars	Area (Sqm)	Rate (Rs)	Amount (Rs)
Workshed (Open shed, CGI sheet roof, Concrete floor)	60	3500	210000
Store cum office (Brick wall, CGI sheet roof, Concrete floor)	60	5000	300000
Sub-total			510000
Add: Electrification, water supply, etc @ 10%			51000
TOTAL			561000
Say (Rs. in lacs)			5.61

4.3 Machinery & Equipment: Details of machinery & equipment are given below.

Particulars	Qty	Rate (Rs)	Amount (Rs)
5 HP Pump-set with hose pipe	2	20000	40000
Vacuum Shield Drier	1	160000	160000
De-humidifier	1	60000	60000
Hammer Mill	1	100000	100000
Blender	1	70000	70000
Packing Machine	1	50000	50000
Weighing scales, testing equipment etc.	LS	LS	50000
Sub-total			530000
Add: Transportation, taxes, etc @ 15%			79500
TOTAL			609500
Say (Rs. in lacs)			6.10

4.4 Misc. Fixed Assets: Details of miscellaneous fixed assets are given below.

Particulars	Qty	Rate (Rs)	Amount (Rs)
Power connection (30 HP)	1	100000	100000
Water supply system (STW boring, 3 HP pump set, storage, pipes & fittings)	1	80000	80000
Furniture & fixtures	LS	LS	10000
Miscellaneous items	LS	LS	10000
TOTAL			200000
Say (Rs. in lacs)			2.00

4.5 Preliminary & Pre-operative Expenses: Details of preliminary & pre-operative expenses are given below.

Particulars	Amount (Rs lacs)
Travelling expenses	0.30
Professional & other fees	0.20
Interest during implementation	0.26
Miscellaneous expenses	0.10
TOTAL	0.86

4.6 Contingencies & Escalation: Contingencies & escalation has been assumed at 3% of the cost of building & civil works, machinery & equipments and miscellaneous fixed assets.

4.7 Working Capital: Details of working capital are given below.

	Period (Days)	Amount (Rs lacs)		
		Year 1	Year 2	Year 3
Raw Materials & Consumables	30	0.07	0.09	0.10
Power	30	0.08	0.09	0.11
Salary	30	0.47	0.48	0.48
Finished Goods	15	0.32	0.34	0.36
Receivables	15	0.39	0.46	0.54
Total		1.33	1.46	1.59
Working Capital Margin in Year 1 (100%)	1.33			

5.0 MEANS OF FINANCE

The means of finance for the project is estimated as below.

Particulars	Percent	Amount (Rs lacs)
<u>EQUITY</u>		
A. Equity from Promoters	40%	6.53
B. Subsidy from Central/State Govt.	-	
<u>DEBT</u>		
Term Loan from Banks/FIs	60%	9.79
TOTAL	100%	16.31

6.0 PROFITABILITY STATEMENT

(Rs. in lacs)

Particulars	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7
<u>A. INCOME</u>							
Installed capacity (MT)	5	5	5	5	5	5	5
Capacity utilisation	50%	60%	70%	70%	70%	70%	70%
Production at CU	3	3	4	4	4	4	4
Price (Rs/tonne)	375000	375000	375000	375000	375000	375000	375000
Income from sales	9.38	11.25	13.13	13.13	13.13	13.13	13.13
<u>B. OPERATING EXPENSES</u>							
Raw Materials & Consumables	0.90	1.08	1.26	1.26	1.26	1.26	1.26
Power	0.94	1.13	1.32	1.32	1.32	1.32	1.32
Salary	5.76	5.79	5.82	5.85	5.88	5.91	5.93
Repair & Maintenance	0.14	0.16	0.20	0.24	0.28	0.34	0.41
Selling Expenses	0.09	0.11	0.13	0.13	0.13	0.13	0.13

Miscellaneous Expenses	0.05	0.06	0.07	0.07	0.07	0.07	0.07
Total Operating Expenses	7.88	8.33	8.79	8.86	8.93	9.02	9.12
Less: Working expenses capitalised	1.33	0.00	0.00	0.00	0.00	0.00	0.00
Operating profit	2.83	2.92	4.34	4.27	4.19	4.11	4.01
C. FINANCIAL EXPENSES							
Depreciation	0.64	0.64	0.64	0.64	0.64	0.64	0.64
Interest on Term Loan	0.78	0.69	0.57	0.44	0.32	0.19	0.07
Net Profit	1.41	1.59	3.13	3.19	3.24	3.28	3.30
Net cash accruals	2.05	2.23	3.77	3.82	3.87	3.91	3.94
Principal Repayment	0.39	1.57	1.57	1.57	1.57	1.57	1.57

6.1 Production Capacity: Annual production of papain at installed capacity is estimated as below.

Rated processing capacity/annum (tonnes of raw materials)	20
Yield of papain	25%
Production of papain per annum at installed capacity (tonnes)	5

6.2 Raw Materials & Consumables: Expenses on raw materials & consumables at installed capacity is estimated as below.

Particulars	Unit	Quantity	Rate (Rs)	Amount (Rs)
Raw/unripe papaya	Tonnes	20	5000	100000
Plastic containers (20 kg capacity)	Nos	1000	50	50000
			Sun-total	150000
Add: Additives, etc @ 20%				30000
Expenses on raw materials & consumables at installed capacity (Rs)				180000

6.3 Power: Expenses on power at installed capacity is estimated as below.

Connected load (kw)	22
Avg. load factor	70%
Hrs/day	8
Days/annum	300
Annual power consumption (kwh)	37598
Rate per unit (Rs)	5.00
Expenses on power at installed capacity (Rs)	187992

6.4 Salary: Expenses on salary in the 1st year is estimated as given below. It is assumed that salary expenses will increase @ 0.5% every subsequent year.

Particulars of Employees	Numbers	Salary/Month (Rs)	Cost/annum (Rs)
Manager	1	8000	96000
Machine operators/skilled workers	4	6000	288000
Helpers	2	3000	72000
Casual labour	5	2000	120000
Expenses on salary in the 1st year (Rs)			576000

6.5 Repair & Maintenance: Expenses on repair & maintenance in the 1st year is estimated as given below. It is assumed that expenses on repair & maintenance will increase @ 20% every subsequent year.

Particulars	Cost (Rs)	Rate	Amount (Rs lacs)
Building & Civil Works	5.61	1%	0.06
Machinery & Equipment	6.10	1%	0.06
Misc. Fixed Assets	2.00	1%	0.02
Expenses on repair & maintenance in year 1			0.14

6.6 Selling Expenses: Selling expenses has been assumed at 1% of sales.

6.7 Miscellaneous Expenses: Miscellaneous expenses have been assumed at 0.5% of sales.

6.8 Depreciation: Depreciation has been calculated by straight line method. The details of calculation are given below.

Description	Cost (Rs)	Rate	Amount/ annum (Rs lacs)
Building & Civil Works	5.61	3.34%	0.19
Machinery & Equipment	6.10	5.28%	0.32
Misc. Fixed Assets	2.00	6.33%	0.13
TOTAL			0.64

6.9 Interest on Term Loan & Principal Repayment: Interest rate has been assumed at 8%. Duration of Loan repayment has been considered for a period of 7 years including moratorium period of 9 months with equal monthly instalments. The details of calculation are given below.

(Rs in lacs)

Month	Year	1	2	3	4	5	6	7
Month 1	Opening balance	9.79	9.40	7.83	6.26	4.70	3.13	1.57
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest (8%)	0.07	0.06	0.05	0.04	0.03	0.02	0.01
	Closing balance	9.79	9.27	7.70	6.13	4.57	3.00	1.44
Month 2	Opening balance	9.79	9.27	7.70	6.13	4.57	3.00	1.44
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.04	0.03	0.02	0.01
	Closing balance	9.79	9.14	7.57	6.00	4.44	2.87	1.31
Month 3	Opening balance	9.79	9.14	7.57	6.00	4.44	2.87	1.31
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.04	0.03	0.02	0.01
	Closing balance	9.79	9.00	7.44	5.87	4.31	2.74	1.17
Month 4	Opening balance	9.79	9.00	7.44	5.87	4.31	2.74	1.17
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.04	0.03	0.02	0.01
	Closing balance	9.79	8.87	7.31	5.74	4.18	2.61	1.04
Month 5	Opening balance	9.79	8.87	7.31	5.74	4.18	2.61	1.04
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.04	0.03	0.02	0.01
	Closing balance	9.79	8.74	7.18	5.61	4.05	2.48	0.91
Month 6	Opening balance	9.79	8.74	7.18	5.61	4.05	2.48	0.91
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.04	0.03	0.02	0.01
	Closing balance	9.79	8.61	7.05	5.48	3.92	2.35	0.78
Month 7	Opening balance	9.79	8.61	7.05	5.48	3.92	2.35	0.78
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.04	0.03	0.02	0.01
	Closing balance	9.79	8.48	6.92	5.35	3.78	2.22	0.65
Month 8	Opening balance	9.79	8.48	6.92	5.35	3.78	2.22	0.65
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.04	0.03	0.01	0.00
	Closing balance	9.79	8.35	6.79	5.22	3.65	2.09	0.52
Month 9	Opening balance	9.79	8.35	6.79	5.22	3.65	2.09	0.52
	Repayment	0.00	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.07	0.06	0.05	0.03	0.02	0.01	0.00
	Closing balance	9.79	8.22	6.66	5.09	3.52	1.96	0.39
Month 10	Opening balance	9.79	8.22	6.66	5.09	3.52	1.96	0.39
	Repayment	0.13	0.13	0.13	0.13	0.13	0.13	0.13

	Interest	0.07	0.05	0.04	0.03	0.02	0.01	0.00
	Closing balance	9.66	8.09	6.53	4.96	3.39	1.83	0.26
Month 11	Opening balance	9.66	8.09	6.53	4.96	3.39	1.83	0.26
	Repayment	0.13	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.06	0.05	0.04	0.03	0.02	0.01	0.00
	Closing balance	9.53	7.96	6.39	4.83	3.26	1.70	0.13
Month 12	Opening balance	9.53	7.96	6.39	4.83	3.26	1.70	0.13
	Repayment	0.13	0.13	0.13	0.13	0.13	0.13	0.13
	Interest	0.06	0.05	0.04	0.03	0.02	0.01	0.00
	Closing balance	9.40	7.83	6.26	4.70	3.13	1.57	0.00
Principal Repayment		0.39	1.57	1.57	1.57	1.57	1.57	1.57
Interest		0.78	0.69	0.57	0.44	0.32	0.19	0.07

7.0 DEBT SERVICE COVERAGE RATIO (DSCR)

(Rs. in lacs)

Year	1	2	3	4	5	6	7	Total
Profit After Tax (Net Profit)	1.41	1.59	3.13	3.19	3.24	3.28	3.30	
Depreciation	0.64	0.64	0.64	0.64	0.64	0.64	0.64	
Interest	0.78	0.69	0.57	0.44	0.32	0.19	0.07	
Total	2.83	2.92	4.34	4.27	4.19	4.11	4.01	26.66
Interest	0.78	0.69	0.57	0.44	0.32	0.19	0.07	
Loan repayment	0.39	1.57	1.57	1.57	1.57	1.57	1.57	
Total	1.17	2.26	2.13	2.01	1.88	1.76	1.63	12.85
DSCR	2.42	1.29	2.03	2.12	2.22	2.33	2.45	

Average DSCR = 2.07

8.0 BREAK EVEN POINT (BEP)

(Rs. in lacs)

Year	1	2	3
A. Net sales (Rs. lakh)	9.38	11.25	13.13
B. Variable cost			
Raw Materials & Consumables	0.90	1.08	1.26
Power	0.94	1.13	1.32
Selling Expenses	0.09	0.11	0.13
Miscellaneous Expenses	0.05	0.06	0.07
Total variable cost	1.98	2.38	2.77
C. Contribution (A-B)	7.39	8.87	10.35
D. Fixed & Semi-fixed Costs			
Salary	5.76	5.79	5.82
Repair & maintenance	0.14	0.16	0.20
Interest on Term Loan	0.78	0.69	0.57
Depreciation	0.64	0.64	0.64
Total fixed cost	7.31	7.28	7.22
E. BREAK EVEN POINT	98.91%	82.08%	69.75%
F. BEP at operating capacity	49.45%	49.25%	48.82%
G. Cash BEP	45.15%	44.95%	44.52%

9.0 INTERNAL RATE OF RETURN (IRR)

(Rs. in lacs)

Year	0	1	2	3	4	5	6	7
CASH OUTFLOW								
Capital Expenditure	14.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Working Capital	0.00	1.33	0.13	0.13	0.00	0.00	0.00	0.00
Total (A)	14.12	1.33	0.13	0.13	0.00	0.00	0.00	0.00
CASH INFLOW								
Profit After Tax		1.41	1.59	3.13	3.19	3.24	3.28	3.30
Add: Depreciation		0.64	0.64	0.64	0.64	0.64	0.64	0.64
Add: Interest		0.78	0.69	0.57	0.44	0.32	0.19	0.07
Add: Salvage Value								
Total (B)	0.00	2.83	2.92	4.34	4.27	4.19	4.11	4.01
NET FLOW (B-A)	-14.12	1.50	2.79	4.21	4.27	4.19	4.11	4.01

IRR = 15%

MACHINERY SUPPLIERS

- (a) Spectec Technoprojects Private Limited
CB-254, Off. No. 1, 1st Floor, Ring Road, Naraina, Delhi - 110 028, Delhi, India
- (b) Premur Impex Limited
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