PAPAYA PROTEINASE ENZYME

1. INTRODUCTION

Papain is a sulfhydryl protease. It is a protein-dissolving proteolytic enzyme found and can be extracted from the unripe papaya. As it can easily be found in milky fluid known as latex produced by the papayas (Carice Papaya), the enzyme is also known under the name of 'papaya proteinase'. Papain belongs to the cysteine proteinase family. Originally from southern Mexico, but now it is cultivated in most tropical countries. In India papaya is majorly grown north-east region, in the 7 sister states, Gujarat, Karnataka, UP, AP and so on.It has been used in traditional medicine for thousands of years because of its many health benefits which include treating wounds and cuts, stings and burns and internal illnesses.

2. PRODUCT AND ITS APPLICATIONS

Papain enzyme results in high value-addition. Some progressive papaya grower should undertake this venture asa measure of forward integration.Dry powder made from the latex of raw papaya is commonly known as crude papain. Papain is reported to have anti-fungal, anti-bacterial, and anti-inflammatory properties.

2.1 Applications

Therefore papain is of great biological importance as it's used as a debris-removing agent during injuries with no harmful effect on tissues; used for chemo mechanical dental caries removal; useful for drug design; in food manufacturing processes, as a protein digestant. 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.

2.2 Availability of technical know-how and compliances

CFTRI, Mysore, has developed the technical know-how. Compliance with FPO is necessary.

3. DESIRED QUALIFICATION OF PROMOTER

Graduate from Life Sciences or allied disciples. Having knowledge about marketing or possess marketing network.

4. INDUSTRY OUTLOOK AND TRENDS

Papain is used in many industries. Some of the end users are breweries, pharmaceuticals, food, lather, detergents, meat and fish processing etc. with such large endure segments having high growth potential outlook, industry outlook is extremely favourable, export growth outlook is also very good. The high and low capacity creation at present, outlook for new invention is good

5. MARKET POTENTIAL AND MARKETING ISSUES, IF ANY

Papain is used in many industries such as breweries, pharmaceuticals, food, leather, detergents, meat and fish processing for a variety of processes. Therefore, the end use segments are many in signifying that papain has high export demand. Since there are good prospects for papain market, the papaya production and extraction of papain can be a high source of income even for small farmers.

6. RAW MATERIALS REQUIREMENT

The papaya is available almost round the year. In the year 2015-16 the total production ofpapaya was 5667 MT on an area of 132 Ha.

7. MANUFACTURING PROCESS

White milky latex of green and fully grown papaya fruits is collected in the early morning bymaking 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 met bisulphate 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 kgsof BPC grade papain. CFTRI, Mysore, has developed the technical know-how for the product. The process includes:

- Collection of Latex
- Cleaning and Sieving
- Mixing and Drying
- Packing

7.1 Capacity of the Project

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

8. MANPOWER REQUIREMENT

PARTICULARS		NO.
SUPERVISORY STAFF		
	General Manager	1
ADMINISTRATIVE STAFF		
	Marketing manager	1
	Accountant	1
	Office clerks / Marketing assistant	3
WORKERS		
	Production supervisors	3
	Manager - qc	1
	Main supervisor	1
	Skilled workers	8
	Labour	12

9. IMPLEMENTATION SCHEDULE

The expected time of procurement and installation, complete assembly, and commissioning of the machinery is estimated to be 10 months from the date of securing and arranging finance and identifying building.

10. COST OF PROJECT

PARTICULARS	Unit	Qty.	Total (lakhs)
LAND & BUILDING			99.00
Land	SqM	2,200	5.50
Land Development			
Land Area		2,200	11.00
Building			
Production Block			
Buildup Area	SqM	1,500	75.00
Contingencies		10%	7.50
PLANT & MACHINERY			120.00
Plant & machinery	LS	1	100.00
Contingencies		20%	20.00
MISCELLANEOUS			30.00
Misc. Assets	LS	1	25.00
Contingencies		20%	5.00
PRE-OPERATIVE			29.10
Establishment		1	21.40
Professional Charges		1	0.50
Security Deposits		1	7.20
TOTAL			**278.10**

11. MEANS OF FINANCE

Means of Finance

Particulars	Rs. (lakhs)
Promoter's contribution	83.43
Bank Finance	194.67
TOTAL	**278.10**

12. WORKING CAPITAL CALCULATION

Particulars	Year 1
Stock of raw material & packing material	15.46
Sundry debtors	54.00
TOTAL	**69.46**
MARGIN	17.36
MPBF	52.09
INTEREST ON WC	5.73

13. LIST OF MACHINERY REQUIRED AND THEIR MANUFACTURERS

Particulars	Qty.
Aluminium and SS trays, Weighing Scales &Measuring cans, knives, sieves, etc.	-
5 HP Pump-set with hose pipe	2
Vacuum Shield Drier	1
De-humidifier	1
Hammer Mill	1
Blender	1
Laboratory Equipments	-
Packing Machine	1

Following is an illustrative and indicative list of machinery suppliers.

- Jyoti Industries , Bangalore.
- Punjab Engineering Works, Kolkata
- S.S Engineering, New Delhi
- Container Industries, Mumbai

14. PROFITABILITY CALCULATIONS

(Rs. Lakh)

Sr. No.	Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
1	Income	441	504	567	567	567
2	Expenditure	395.605	452.12	508.635	508.635	508.635
3	Gross profit	45.395	51.88	58.365	58.365	58.365
4	Depreciation	16.1427	16.1427	16.1427	16.1427	16.1427
5	Amount before interest and tax	29.2523	35.7373	42.2223	42.2223	42.2223
6	Interest on term loan	21.41	18.35	15.3	12.24	9.18
7	Profit before tax	7.8423	17.3873	26.9223	29.9823	33.0423
8	Income tax (30%)	2.35269	5.21619	8.07669	8.99469	9.91269
9	Profit after tax	5.48961	12.17111	18.84561	20.98761	23.12961

Underlying assumptions for probability calculation are:-

Sales price is taken at Rs. 630 per kg. Whereas price of raw material is taken at Rs. 170 per kg. Assuming 30% yield. Cost of power is assumed at Rs. 8 per unit and interest on long term is calculated at 11%.

15. BREAKEVEN ANALYSIS

The Break-Even point as percentage of targeted sales working is as given below-

Sr. No.	Particulars	Rs. In lakhs
1	Net present value (rs. In lakhs)	398.12
2	Internal rate of return %	26.83
3	Average dscr	2.21
4	Break-even point %	75.47
5	Payback period (years)	4.29

16. STATUTORY/GOVERNMENT APPROVALS

FPO licence and approval from Food & Drug Administration will be necessary. In addition to this, other MSME related registration/ regulatory approvals will have to be obtained.Entrepreneur may contact State Pollution Control Board where ever it is applicable.

17. BACKWARD & FORWARD LINKAGES

There are no specific backward – forward linkages opportunities offering techno – economic advantages or synergies at start – up stage.

18. TRAINING CENTRE AND COURSES:

CFTRI, Mysore has developed technology and also offers relevant technical training. Udyamimitraportal (link : www.udyamimitra.in) can also be accessed for handholding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates all over India.

Disclaimer:

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and

contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.