



# GINGER & GARLIC PROCESSING

## 1.0 INTRODUCTION

Ginger & garlic are important commercial crops cultivated throughout the country with major production in the states of Gujarat, Orissa, Maharashtra, Himachal Pradesh, Kerala, Haryana, Madhya Pradesh & Uttar Pradesh. Garlic is mainly used as a condiment in food preparations and is also used as carminative and gastric stimulant in many medicinal preparations. Processing of ginger is undertaken to dehydrate it and for preparing ginger candy. Ginger & garlic-based products have wide applications in food processing as well as many other industries. A proper market survey has to be conducted to find out demand potential for each industry segment.

## 2.0 PRODUCT

### 2.1 Applications

Many products can be manufactured from ginger and garlic like dehydrated ginger or garlic, ginger candy, garlic powder, ginger oil and oleoresins and so on. This note considers dehydration of ginger and garlic and manufacture of ginger candy. This activity can be taken up in many parts of the country including the North-East region. However, this note considers UP as the preferred location in view of good market prospects.

### 2.2 Availability of know-how and Compliances

CFTRI, Mysore, has successfully developed the technical know-how. Compliance under PFA Act is mandatory.

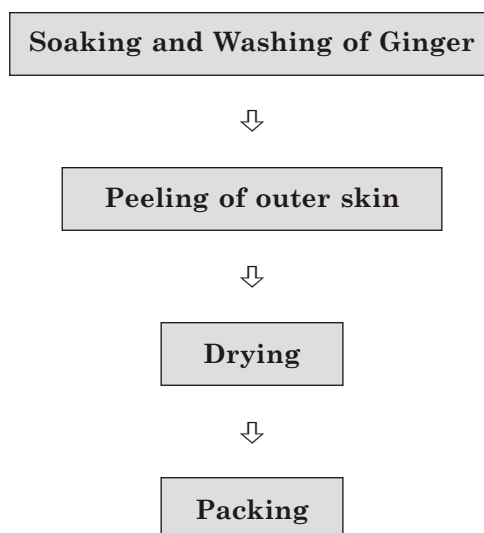
## 3.0 MARKET POTENTIAL

Ginger and garlic are important commercial crops with versatile applications. As a condiment, ginger is used for flavouring many food products like tomato sauce or ketchup,

salad dressings, meat sausages, gravies, pickles, curry dishes and so on. It is also used in many medicines as it helps digestion and absorption of food and has antiseptic properties. Ginger and garlic-based products have very wide ranging applications in many industries like food processing, pharmaceutical, soft drinks, meat canning, confectionary, tobacco processing, soap making and so on. It is, therefore, necessary to assess market for the contemplated products before finalising the production capacity. There are good export prospects as well.

#### 4.0 MANUFACTURING PROCESS

In case of dehydration of garlic, cloves are separated manually and then dehydration is done in a drier at about 55-60° C temperature. As regards ginger, fresh ginger is soaked in water and washed and then outer skin is peeled of in a barrel drum. Skin peeling facilitates removal of moisture. Drying is done in the electrically-heated thermostatic-controlled drier. Drier is combined with steam heating arrangement. Drying temperature is in the range of 55-60° C. Ginger for producing candy has to be rich in flavour and juice and fibreless and tender. After washing and peeling, ginger is cut in required sizes and boiled with small quantity of citric acid for about an hour under a pressure of 10 psig or for 6 hours under atmospheric pressure to improve its colour. Then the mixture is boiled with 30% sugar solution for 15 minutes and kept overnight. Same operation is repeated everyday till the sugar content is 60 brix and then small quantity of citric acid is added and the solution is boiled and kept till sugar penetrates in ginger. Finally, it is boiled for about 5 minutes and the sugar solution is drained out and pieces of ginger are rolled in ground sugar, dried and packed. The process flow chart is as under:



#### 5.0 CAPITAL INPUTS

##### 5.1 Land and Building

Land measuring around 250 sq.mtrs. with built-up area of 150 sq.mtrs. shall be required. Land may cost Rs.75,000/- whereas cost of construction is assumed to be Rs.3.75 lacs.

## 5.2 Machinery

Requirement of machinery would depend upon the proposed production capacity. For dehydration or drying capacity of 60 tonnes per year and ginger candy capacity of 15 tonnes annually, following machines shall be needed:

Item	Qty.	Price (Rs.)
MS drier with thermostatic control and arrangement for steam heating with all accessories and electricals	1	3,00,000
Skin peeling barrel drum with accessories	1	20,000
Baby boiler	1	70,000
SS steam jacketted kettle	1	50,000
SS utensils, weighing scales, aluminium trays, plastic tubs, laboratory equipments etc.	--	60,000
	<b>Total</b>	<b>5,00,000</b>

## 5.3 Miscellaneous Assets

Other assets like furniture and fixtures, storage racks, working tables, exhaust fans would cost about Rs.60,000/-.

## 5.4 Utilities

Power requirement shall be 60 HP whereas per day water requirement shall be 2000 ltrs.

## 5.5 Raw and Packing Materials

Garlic & ginger shall be the main items apart from sugar. Since quantities required for each item will not be much there will not be procurement problem. Polythene bags of good quality and labels will be required for packing.

## 6.0 MANPOWER REQUIREMENTS

Particulars	Nos.	Monthly Salary (Rs.)	Total Monthly Salary (Rs.)
Skilled Workers	2	2,500	5,000
Semi-skilled Workers	2	1,750	3,500
Helpers	3	1,250	3,750
Salesman	1	2,500	2,500
		<b>Total</b>	<b>14,750</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	250	75,000
Building	150	3,75,000
	<b>Total</b>	<b>4,50,000</b>

### 8.2 Machinery

Total cost of machinery is estimated to be Rs. 5.00 lacs as explained earlier.

### 8.3 Miscellaneous Assets

Total cost of other assets would be Rs. 60,000/- as stated before.

### 8.4 Preliminary & Pre-operative Expenses

Pre-production expenses like registration, establishment, administrative and travelling expenses, market survey, trial runs, interest during implementation etc. would cost Rs. 80,000/-.

### 8.5 Working Capital Requirements

The major requirement will be stocks of finished goods and receivables as can be seen from the estimates of first year.

(Rs. in lacs)

Particulars	Period	Margin	Total	Bank	Promoters
Stock of Finished Goods	1 Month	25%	2.00	1.50	0.50
Receivables	1 Month	25%	2.50	1.90	0.60
Working Expenses	1 Month	100%	0.40	--	0.40
		<b>Total</b>	<b>4.90</b>	<b>3.40</b>	<b>1.50</b>

## 8.6 Cost of the Project & Means of Financing

(Rs. in lacs)

Item	Amount
Land and Building	4.50
Machinery	5.00
Miscellaneous Assets	0.60
P&P Expenses	0.80
Contingencies @ 10% on Land and Building & Plant & Machinery	0.95
Working Capital Margin	1.50
<b>Total</b>	<b>13.35</b>
<b>Means of Finance</b>	
Promoters' Contribution	3.90
Term Loan from Bank/FI	9.45
<b>Total</b>	<b>13.35</b>
Debt Equity Ratio	2.20 : 1
Promoters' Contribution	29%

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 & Build-up

Actual capacity utilisation in the first year is assumed to be 60% and thereafter it is limited to 75%.

### 9.2 Sales Revenue at 100%

(Rs. in lacs)

Product	Qty. (Tonnes)	Price/Ton (Rs.)	Sales Value
Dehydrated Ginger	40	60,000	24.00
Ginger Candy	15	60,000	9.00
Dehydrated Garlic	20	85,000	17.00
		<b>Total</b>	<b>50.00</b>

### 9.3 Raw and Packing Materials Required at 100%

(Rs. in lacs)

Product	Qty. (Tonnes)	Price/Ton (Rs.)	Sales Value
Green Ginger	90	15,000	13.50
Garlic	60	27,000	16.20
Sugar	15	18,000	2.70
Citric Acid	--	--	0.36
Packing Materials	--	--	2.40
		<b>Total</b>	<b>35.16</b>

### 9.4 Utilities

Annual expenditure at 100% is estimated to be Rs. 1.00 lac.

### 9.5 Interest

Interest on term loan of Rs. 9.45 lacs is calculated @ 12% per annum considering full repayment in 5 years including a moratorium period of 1 year whereas on working capital from bank it is computed @ 14% per annum.

### 9.6 Depreciation

It is computed on WDV basis @ 10% on building and 15% 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>	---- 75 Tonnes ----	
	Capacity Utilisation	60%	75%
	Sales Realisation	30.00	37.50
<b>B</b>	<b>Cost of Production</b>		
	Raw and Packing Materials	21.10	26.37
	Utilities	0.60	0.75
	Salaries	1.77	2.00
	Stores and Spares	0.24	0.30
	Repairs & Maintenance	0.36	0.42
	Selling & Admn. Expenses @ 6%	1.80	2.25
	<b>Total</b>	<b>25.87</b>	<b>32.09</b>
<b>C</b>	<b>Profit before Interest &amp; Depreciation</b>	<b>4.13</b>	<b>5.41</b>
	Interest on Term Loan	1.03	0.83
	Interest on Working Capital	0.48	0.60
	Depreciation	1.22	1.05
	Profit before Tax	1.40	2.93
	Income-tax @ 20%	0.28	0.58
	Profit after Tax	1.12	2.35
	Cash Accruals	2.34	3.40
	Repayment of Term Loan	--	2.15

## 11.0 BREAK-EVEN ANALYSIS

(Rs. in lacs)

No	Particulars	Amount	
<b>[A]</b>	<b>Sales</b>		<b>37.50</b>
<b>[B]</b>	<b>Variable Costs</b>		
	Raw and Packing Materials	26.37	
	Utilities (70%)	0.53	
	Salaries (70%)	1.40	
	Stores & Spares	0.30	
	Selling & Admn. Expenses (60%)	1.12	
	Interest on WC	0.60	<b>30.32</b>
<b>[C]</b>	<b>Contribution [A] - [B]</b>		<b>7.18</b>
<b>[D]</b>	<b>Fixed Cost</b>		<b>4.25</b>
<b>[E]</b>	<b>Break-Even Point [D] ÷ [C]</b>		<b>59%</b>

**12.0 [A] LEVERAGES**

**Financial Leverage**

= EBIT/EBT

= 2.91 ÷ 1.40

= 2.08

**Operating Leverage**

= Contribution/EBT

= 5.44 ÷ 1.40

= 3.89

**Degree of Total Leverage**

= FL/OL

= 2.08 ÷ 3.89

= 0.53

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

(Rs. in lacs)

Particulars	1st Yr	2nd Yr	3rd Yr	4th Yr	5th Yr
Cash Accruals	2.34	3.40	3.90	4.56	5.03
Interest on TL	1.03	0.83	0.58	0.33	0.12
<b>Total [A]</b>	<b>3.37</b>	<b>4.23</b>	<b>4.48</b>	<b>4.89</b>	<b>5.15</b>
Interest on TL	1.03	0.83	0.58	0.33	0.12
Repayment of TL	--	2.40	2.40	2.40	2.25
<b>Total [B]</b>	<b>1.03</b>	<b>3.23</b>	<b>2.98</b>	<b>2.73</b>	<b>2.37</b>
<b>DSCR [A] ÷ [B]</b>	<b>3.27</b>	<b>1.42</b>	<b>1.64</b>	<b>1.97</b>	<b>2.27</b>
<b>Average DSCR</b>	----- 2.11 -----				



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

Cost of the project is Rs. 13.35 lacs.

(Rs. in lacs)

Year	Cash Accruals	16%	18%	20%
1	2.34	2.02	1.98	1.95
2	3.40	2.53	2.44	2.36
3	3.90	2.50	2.38	2.26
4	4.56	2.52	2.35	2.20
5	5.03	2.39	2.20	2.02
6	5.61	2.30	2.08	1.88
	<b>24.84</b>	<b>14.26</b>	<b>13.43</b>	<b>12.67</b>

The IRR is around 18%

**Some of the machinery suppliers are**

1. B.Sen Barry & Co, Karol Bagh, New Delhi
2. Master Mechanical Works Pvt Ltd,75, Link Rd., Lajpat NagarIII, New Delhi-110024
3. Gardeners Corporation, 158, Golf Links, New Delhi-110003.
4. SP Engg Corp., Fazalgunj, Kanpur.