

**183. PROFILE ON PRODUCTION OF CARAWAY
OIL**

TABLE OF CONTENTS

	<u>PAGE</u>
I. SUMMARY	183-3
II. PRODUCT DESCRIPTION & APPLICATION	183-3
III. MARKET STUDY AND PLANT CAPACITY	183-4
A. MARKET STUDY	183-4
B. PLANT CAPACITY & PRODUCTION PROGRAMME	183-6
IV. MATERIALS AND INPUTS	183-7
A. RAW & AUXILIARY MATERIALS	183-7
B. UTILITIES	183-7
V. TECHNOLOGY & ENGINEERING	183-8
A. TECHNOLOGY	183-8
B. ENGINEERING	183-9
VI. MANPOWER & TRAINING REQUIREMENT	183-10
A. MANPOWER REQUIREMENT	183-10
B. TRAINING REQUIREMENT	183-11
VII. FINANCIAL ANALYSIS	183-11
A. TOTAL INITIAL INVESTMENT COST	183-11
B. PRODUCTION COST	183-12
C. FINANCIAL EVALUATION	183-13
D. ECONOMIC BENEFITS	183-14

I. SUMMARY

This profile envisages the establishment of a plant for the production of caraway oil with a capacity of 90 tonnes per annum.

The present demand for the proposed product is estimated at 264.42 tonnes per annum. The demand is expected to reach at 2,151 tonnes by the year 2020.

The plant will create employment opportunities for 20 persons.

The total investment requirement is estimated at Birr 6.88 million, out of which Birr 4.3 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 15 % and a net present value (NPV) of Birr 1.38 million discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

The characteristic agreeable aroma and sweet but slightly sharp taste of caraway seed is due to the presence of caraway oil (3-8%) of which corvine is the chief ketonic constituent (50-60%). Besides carvone, caraway oil contains significant amounts of d.limonene.

Caraway seed oil is chiefly employed today for flavoring sausages, meat, canned goods, perfumes, mouth wash preparation and liqueurs. In some countries, such as India, the oil is used for flavoring soaps as it seems to have antibacterial properties.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Caraway oil is an essential oil obtained from seeds and used in pharmaceuticals, perfumery and as a flavouring agent in foods and liquors. The country's demand for essential oils, which are mainly used in the preparation of liquors, non-alcoholic beverages, food, pharmaceuticals and perfumery, is met through import. In estimating the demand for caraway oil, a conservative estimate of 40% of the total imports of essential oil is considered. Table 3.1 presents the amount of imported caraway oil (i.e. 40% of total imports of essential oil) during 1997-2006. Imports of the product exhibit a rising trend. On the average, 229.93 tonnes of the product is imported during the period under reference.

Table 3.1
IMPORTS OF CARAWAY OIL (TONNES)

Years	Imports
1997	150.96
1998	165.68
1999	43.63
2000	149.50
2001	212.51
2002	229.00
2003	251.19
2004	288.76
2005	369.09
2006	439.02
Average	229.93

Assuming supply was driven by demand, the average annual supply for the period under reference, which constitutes only imports, is considered as the effective demand for the product for the year 2006. The average rate of growth of imports of the product during the reference period is computed to be 33.3%. However, a conservative estimate of 15% rate of growth is adopted in estimating the demand for the product. The present demand for the product (i.e. 2007) is, thus, estimated at 264.42 tonnes.

2. Projected Demand

As stated above, a 15% rate of growth is used in projecting the demand for caraway oil. The projected demand for the product is shown in Table 3.2.

Table 3.2
PROJECTED DEMAND FOR CARAWAY OIL (TONNES)

Year	Projected Demand
2007	264.42
2008	304.08
2009	349.70
2010	402.15
2011	462.47
2012	531.81
2013	611.62
2014	703.36
2015	808.87
2016	930.20
2017	1,069.73
2018	1,230.19
2019	1,414.71
2020	1,626.92
2021	1,870.96
2022	2,151.60

3. Pricing and Distribution

Based on the CIF price of the external trade statistics for 2006 (the latest data available), and allowing 30% for import duty and other clearing expense, the factory gate price for the envisaged plant is estimated at Birr 95,700 per ton.

The envisaged plant can supply its product directly to users. The plant can also appoint agents at selected locations.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The annual production capacity of the envisaged plant is 90 tones of caraway oil, based on 300 working days and three shift per day.

2. Production Programme

Table 3.3 shows the production program of the proposed project. The project requires some years to penetrate the market, especially at the initial stage of the production phase. Therefore, in the first and second year of production, the capacity utilization rate will be 70% and 90%, respectively. In the third year and then after, full capacity production shall be attained.

Table 3.3
PRODUCTION PROGRAMME

Sr. No.	Description	Production Year		
		1	2	3-10
1	Caraway oil (tonnes)	63	81	90
2	Capacity Utilization Rate (%)	70	90	100

IV. MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

Caraway seed and tin-plated drums are raw and auxiliary materials of the project. The annual requirement and cost these materials is indicated in Table 4.1.

Table 4.1
ANNUAL RAW AND MATERIALS REQUIREMENT
AND COST (AT FULL CAPACITY)

Sr. No.	Description	Qty.	Cost (1000 Birr)
1	Caraway seed (ton)	1,800	5400
2	Tin-plated Drum (pcs 200 lt capacity)	450	54
Total			5,454

B. UTILITIES

Utilities required by the project comprise of electricity, fuel oil and water. Table 4.2 below shows the annual utility requirement along with its cost.

Table 4.2
UTILITIES REQUIREMENT AND COST

	Utility	Unit	Qty	Cost (1000 Birr)
1	Electricity	kWh	250,00	118.5
2	Furnace oil	lt	220,000	1,190.2
3	Water	m ³	5000	50
	Total			1358.7

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

Caraway seed shall first be milled and then distilled immediately, to prevent loss of oil by evaporation. Steam distillation is the appropriate method of distillation for essential oils produced from seeds.

The steam produced in a boiler is introduced into a vessel which contains the seed and water. The powdered seed is located on the grid placed at a certain distance above the level of the water which fills the bottom of the vessel. The water is vaporizing indirectly, by steam flowing in a pipe coil submerged by the water. The water vapor plus the distilled oil coming from the evaporator vessel is recovered in a separate water cooled condenser. This mixture flowing out of the condenser is separated in Florentine flask.

The distilled water should be redistilled to recover all the dissolved oil extracted from caraway seed by distillation this process is called conurbation.

Finally, the clove oil is packed and dispatched for sales.

2. Source of Technology

The technology of caraway oil processing can be acquired from different machinery manufacturers and suppliers of steam distillation plant. The following company could be one of the candidates.

Servotex Engineers

Ghodbunder Road, Opp.NT Strips, Mumbai, India

Phone: +(91)-22-28454982

Fax: +(91)-22-28455615

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment required for the production of caraway oil is indicated in Table 5.1. The cost of machinery and equipment including engineering and know-how is estimated at Birr 4,300,000 of which Birr 3,583,000 is required in foreign currency.

Table 5.1
LIST OF MACHINERY & EQUIPMENT

Sr. No.	Description	Qty. (No.)
1	Grinding Unit	1
2	Evaporator	8
3	Condenser (Water cooled)	2
4	Pumps	3
5	Coiling tower	1
6	Submersible pump	1
7	Florentine Flask	2
8	Boiler System	1

2. Land, Building and Civil Works

The total land requirement of the project is estimated at 2000m² of which the built-up area is 500 m². The cost of building is estimated at Birr 750,000. The lease value of land is about Birr 160,000 at a rate of 1 Birr per m² per annum for 80 years.

3. Proposed Location

Gucha town is selected to be the best location of the envisaged plant for its proximity to raw material sources.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The project requires 20 work force. Table 6.1 shows the list and cost of manpower. The total annual cost of labour is estimated at Birr 247,500.

Table 6.1
MANPOWER REQUIREMENT & LABOUR COST

Sr. No.	Manpower	Req. No	Monthly Salary (Birr)	Annual Salary (Birr)
1	General Manager	1	3,000	36,000
2	Production & Technic Head	1	2,000	2400
3	Accountant	1	2,000	2400
4	Operators	9	6,300	75,600
5	Labourers	6	2,400	28,800
6	Guards	2	800	9600
Sub-total		20	16,500	198,000
Benefit (25%BS)			4,125	49,500
Total			20,625	247,500

B. TRAINING REQUIREMENT

On-the – Job training is carried out during plant erection and commissioning by the experts of machinery suppliers. The cost of training is estimated at Birr 20,000

VII. FINANCIAL ANALYSIS

The financial analysis of the caraway oil project is based on the data presented in the previous chapters and the following assumptions:-

Construction period	1 year
Source of finance	30 % equity 70 % loan
Tax holidays	3 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30days
Work in progress	2 days
Finished products	30 days
Cash in hand	5 days
Accounts payable	30 days

A. TOTAL INITIAL INVESTMENT COST

The total investment cost of the project including working capital is estimated at Birr 6.88 million, of which 39 per cent will be required in foreign currency.

The major breakdown of the total initial investment cost is shown in Table 7.1.

Table 7.1
INITIAL INVESTMENT COST

Sr. No.	Cost Items	Total Cost (‘000 Birr)
1	Land lease value	160.0
2	Building and Civil Work	500.0
3	Plant Machinery and Equipment	4,300.0
4	Office Furniture and Equipment	100.0
5	Vehicle	200.0
6	Pre-production Expenditure*	290.4
7	Working Capital	1,335.6
	Total Investment cost	6,886.0
	Foreign Share	39

* N.B Pre-production expenditure includes interest during construction (Birr 140.37 thousand) training (Birr 20 thousand) and Birr 130 thousand costs of registration, licensing and formation of the company including legal fees, commissioning expenses, etc.

B. PRODUCTION COST

The annual production cost at full operation capacity is estimated at Birr 7.78 million (see Table 7.2). The material and utility cost accounts for 87.54 per cent, while repair and maintenance take 0.96 per cent of the production cost.

Table 7.2**ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)**

Items	Cost	%
Raw Material and Inputs	5454	70.08
Utilities	1358.7	17.46
Maintenance and repair	75	0.96
Labour direct	118.8	1.53
Factory overheads	49.5	0.64
Administration Costs	79.2	1.02
Total Operating Costs	7135.20	91.69
Depreciation	535	6.87
Cost of Finance	111.98	1.44
Total Production Cost	7782.18	100

C. FINANCIAL EVALUATION**1. Profitability**

According to the projected income statement, the project will start generating profit in the first year of operation. Important ratios such as profit to total sales, net profit to equity (Return on equity) and net profit plus interest on total investment (return on total investment) show an increasing trend during the life-time of the project.

The income statement and the other indicators of profitability show that the project is viable.

2. Break-even Analysis

The break-even point of the project including cost of finance when it starts to operate at full capacity (year 3) is estimated by using income statement projection.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 60 \%$$

3. Pay Back Period

The investment cost and income statement projection are used to project the pay-back period. The project's initial investment will be fully recovered within 6 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 15 % and the net present value at 8.5% discount rate is Birr 1.38 million.

D. ECONOMIC BENEFITS

The project can create employment for 20 persons. In addition to supply of the domestic needs, the project will generate Birr 1.96 million in terms of tax revenue. The establishment of such factory will have a foreign exchange saving effect to the country by substituting the current imports.