167. PROFILE ON PRODUCTION OF ROSEMARY OIL

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I. SUMMARY

This profile envisages the establishment of a plant for the production of rosemary oil with a capacity of 27 tonnes per annum.

The present demand for the proposed product is estimated at 49 tonnes per annum. The demand is expected to reach at 202 tonnes by the year 2025.

The plant will create employment opportunities for 22 persons.

The total investment requirement is estimated at Birr 5.88 million, out of which Birr 3.5 million is required for plant and machinery.

The project is financially viable with an internal rate of return (IRR) of 23 % and a net present value (NPV) of Birr 3.12 million, discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Rosemary oil is distilled from dry rosemary leaves and flowering top which is cut just above the hard wood. The wood must not be introduced into the distillation still as it taints the oil. Rosemary oil contains carnosol and vrsilic acid. These components inhibit the growth of skin tumors. It is believed that the oil stimulate hair growth and improve the condition of hair, and it is thus a common ingredient of hair-care products today.

Rosemary is a good remedy for depression, nervous tension, headaches and migraines. It is also recommended to relieve from poor circulation and liver function and for menstrual irregularities.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

Rosemary (*Rosmarinus officinalis*) is a woody, perennial herb with fragrant evergreen needle-like leaves. It is a member of the mint family Lamiaceae. Forms range from upright to trailing; the upright forms can reach 1.5 m tall, rarely 2 m. The leaves are evergreen, 2-4 cm long and 2-5 mm broad, green above, and white below with dense short woolly hairs. The flowers are variable in color, being white, pink, purple, or blue.

Rosemary oil has been found to be a stimulant and mild analgesic, and has been used to treat headaches, poor circulation, and many ailments for which stimulants are prescribed It can be used as a disinfectant, as a mouth wash and to treat fever or rheumatism.

Externally the oil is used in the manufacturing of hair lotions. Rosemary oil contains carnosol and ursolic acid which have been known to inhibit the growth of skin tumors and to provide a natural anti-oxidant protection against skin cancer and photodamage.

Since the local usage of rosemary oil is negligible the market out let for the envisaged product is assumed to be export.

There is no available data that indicates total world import and export of the product. The only available information USA’s import statistics. Accordingly annual import of rosemary oil by US is shown in Table 3.1.

Table 3.1

IMPORT OF ROSEMARY OIL BY USA

Year	Import (Tonnes)
2000	89.56
2001	76.58
2002	124.57
2003	98.21
2004	148.72
2005	109.04

Source; *US Department of Commerce, Horticulture and Tropical products division, FAS/USDA.*

As can be seen for the above import of rosemary oil by the USA, it has shown a general growth. During the period 2000 – 2005 US import of rosemary oil averaged at 107.78 tonnes, with an annual average growth rate of 10%. Assuming that the demand for rosemary oil by the USA accounts for one third of the total global demand, the total global demand is estimated at 323 tonnes per annum.

Assuming that by maintaining product quality and aggressive promotion on locally produced lemon grass oil could capture 15% market share, the present demand for locally produced lemon grass oil is estimated at 49 tonnes.

2. Projected Demand

In projecting the global demand for garlic oil the average growth rate of the product's import by the USA registered during 2000 - 2005 i.e. 10 % is used. Accordingly, taking the estimated present demand as a base and applying a 10 % growth rate the projected demand for the product is shown in Table 3.2.

Table 3.2

PROJECT GLOBAL DEMAND AND ETHIOPIA'S MARKET SHARE (TONNES)

Year	Projected Global Demand	Ethiopia's Market Share
2008	355	53
2009	391	59
2010	430	64
2011	473	71
2012	520	78
2013	572	86
2014	629	94
2015	692	104
2016	762	114
2017	838	126
2018	922	138
2019	1014	152
2020	1115	167
2021	1227	184
2022	1349	202

3. Pricing and Distribution

Based on current international price of the product, a factory-gate price of the envisaged palnt is estimated at Birr 125,000 per tonne.

The envisaged plant can supply its product directly to end-users.

B. PLANT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

The production capacity of the envisaged project is 27 tonnes of rosemary oil based on 300 days and 3 shift per day.

2. Production Programme

Table 3.3 shows the production program of the project. At the initial stage of production the project may require some years to penetrate the market. Therefore, in the first and second year of production, the capacity utilization rate will be 75% and 90%, respectively. In the third year and thenafter, full capacity production shall be attained.

Table 3.3
PRODUCTION PROGRAMME

Sr. No.	Production	Production Year		
		1	2	3-10
1	Rosemary oil (tonnes)	20.25	24.3	27
2	Capacity utilization rate (%)	75	90	100

IV. MATERIAL AND INPUTS

A. RAW AND AUXILIARY MATERIALS

The fresh yield of rosemary leaves is 8 to 12 tonnes /ha, which is equivalent to 2 to 2.5 tonnes of dry leaves. Rosemary is a perennial crop and will remain in the site for 5 years or more, depending on crop performance. One harvest is made per year, with first harvest made in the year after planting.

For production of fresh and dried herb, the cut is taken before flowering. For production of the essential oil, the crop is cut at full flowering.

Oil is usually distilled from the dry material though the fresh herb can be distilled. Volatile oil content of the crop varies with environmental conditions as well as cultivar characteristics. Volatile oil contents of the fresh material range from 0.3 to 1.5%. An oil yield of 40 to 60 kg/ha can be expected.

The raw and auxiliary material requirement & cost of the project is indicated in Table 4.1.

Table 4.1

RAW AND AUXILIARY MATERIAL REQUIREMENT & COST

Sr. No.	Material	Unit	Qty	Cost ('000 Birr)
1	Rosemary leaves (dry)	Tonne	2,700	2,430
2	Tin-linned drums (200 lt capacity)	pcs	135	16.2
	Total			**2,446.2**

B. UTILITIES

Electricity, furnace oil and water are the principal utilities of the project. The annual utilities requirement and its cost are indicated in Table 4.2.

Table 4.2

ANNUAL UTILITIES REQUIREMENT & COST

Sr. No.	Utility	Unit	Qty	Cost ('000 Birr)
1	Electricity	kWh	175,000	82.95
2	Furnace oil	Lt	270,000	1,460.7
3	Water	m^3	6,000	60
	Total			**1,603.65**

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Process Description

The dry rosemary leave is placed in the distillation kettle on a grid which is located at certain distance above the level of the water which fills the bottom of the vessel. The water is vaporized indirectly by steam flowing in a pipe coil submerged by the water. The water vapor and the distilled oil coming from the evaporator vessel is recovered in a separate water cooled condenser. The mixture flowing out of the condenser is separated by decantation in a Florentine flask. The distilled water, which may contain some soluble parts of the oil, shall be sent back to the evaporator vessel to recover the soluble parts of the oil.

2. Source of Technology

The technology of rosemary oil processing can be acquired from different suppliers of steam distillation plants. For example, the following company may be requested for quotation.

Servotex Engineers
Ghodabunder Road, Opp. NT strips, Mumbay, 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 rosemary oil is indicated in Table 5.1. The cost of machinery and equipment including engineering and know-how is estimated at Birr 3,500,000 of which Birr 2,636,250 is required in foreign currency.

Table 5.1

LIST OF MACHINERY AND EQUIPMENT

Sr. No.	Description	No.
1	Evaporator	6
2	Condenser	2
3	Grinding unit	1 set
4	Florentine flask	2
5	Pumps	2
6	Cooling tower	1 set
7	Boiler	1 set
8	Submersible pump	1

2. Land, Building and Civil Work

The total land requirement of the project is estimated at 1500 m^2 out of which the built-up area is 450 m^2. The cost of building is therefore estimated at Birr 675,000. The lease value of land is about Birr 120,000 at a rate of 1 Birr per m^2 per annum for 80 years.

3. Proposed Location

Masha town of Sheka zone is selected to be the best location for the envisaged project for its proximity to raw material sources.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The list of manpower and annual labour cost is indicated in Table 6.1. The total cost of labour is estimated at Birr 250,500.

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 and technic manager	1	2,500	30,000
3	Accountant	1	2,000	24,000
4	Secretary	1	800	9,600
5	Operators	6	4,200	50,400
6	Ass. Operators	6	2,400	28,800
7	Daily labourers	4	1,200	14,400
8	Guards	2	600	7,200
	Sub-total	**22**	**16,700**	**200,400**
	Benefits (25% BS)		4,175	50,100
	Total		**20,875**	**250,500**

B. TRAINING REQUIREMENT

On-the-job training shall be carried out by the experts of machinery suppliers, and its cost is estimated at Birr 20,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the rosemary 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	5 years
Bank interest	8%
Discount cash flow	8.5%
Accounts receivable	30 days
Raw material local	30 days
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 5.88 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	120.0
2	Building and Civil Work	675.0
3	Plant Machinery and Equipment	3,500.0
4	Office Furniture and Equipment	100.0
5	Vehicle	200.0
6	Pre-production Expenditure*	446.5
7	Working Capital	845.1
	Total Investment cost	**5,886.6**
	Foreign Share	39

** N.B Pre-production expenditure includes interest during construction (Birr 296.49 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 5.16 million (see Table 7.2). The material and utility cost accounts for 78.40 per cent, while repair and maintenance take 3.39 per cent of the production cost.

Table 7.2

ANNUAL PRODUCTION COST AT FULL CAPACITY ('000 BIRR)

Items	Cost	%
Raw Material and Inputs	2,446.20	47.36
Utilities	1603.65	31.04
Maintenance and repair	175	3.39
Labour direct	120.24	2.33
Factory overheads	40.08	0.78
Administration Costs	80.16	1.55
Total Operating Costs	4,465.33	86.44
Depreciation	463.75	8.98
Cost of Finance	236.54	4.58
Total Production Cost	**5,165.62**	**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.

$$BE = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 51\ \%$$

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 5 years.

4. Internal Rate of Return and Net Present Value

Based on the cash flow statement, the calculated IRR of the project is 23 % and the net present value at 8.5% discount rate is Birr 3.12 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 2.36 million in terms of tax revenue.