

**206. PROFILE ON PRODUCTION OF APRICOT
JUICE AND SYRUP**

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I. SUMMARY

This profile envisages the establishment of a plant for the production of apricot juice and syrup with a capacity of 200,000 liters per annum.

The present demand for the proposed product is estimated at 91,926 liters per annum. The demand is expected to reach at 191,108 liters by the year 2022.

The plant will create employment opportunities for 33 persons.

The total investment requirement is estimated at Birr 5.75 million, out of which Birr 2.5 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 1.22 million discounted at 8.5%.

II. PRODUCT DESCRIPTION AND APPLICATION

Apricot juice is the unfermented juice obtained from sound, 'juicy ripe' (soft and sweet) apricot fruit. Apricot fruit has a thin outer, downy skin enclosing edible yellow flesh. Skin of the fruit often has a red blush. Apricot juice drinks contains fruit content, water, fruit aromas, sugar and, in some cases, food acids. The major consumers of the grape juice and syrup are house holds, supermarkets, hotels and restaurants, hospitals and for export.

Apricot syrup is excellent in drinks as a flavorsome additive to give an apricot zing. It can be added directly to a wide range of ingredients to enhance flavors and create a point of difference to baking.

Processing of Apricot juice should comply with Ethiopian Standard (ES 360:2001). The raw materials, additives and the processing procedures should be selected as per the Standard.

III. MARKET STUDY AND PLANT CAPACITY

A. MARKET STUDY

1. Past Supply and Present Demand

The apricot juice and syrup have a high domestic demand. Data on domestic production and imports of the products is not readily available. Therefore, the Revised Report on the 1995/96 Household Income, Consumption and Expenditure Survey is analyzed in estimating the domestic demand for the products. Table 3.1 depicts the average amount of juice consumed by different expenditure groups in urban and rural areas according to the survey finding.

Table 3.1
DOMESTIC CONSUMPTION OF JUICE

Income Group	Number of Individuals in the Group	Average Annual Consumption (ml)	Total Annual Consumption (liters)
< 600	17253	-	-
600 - 999	125904	-	-
1000-1399	432547	-	-
1400-1999	580104	-	-
2000-2599	4217465	-	-
2600-3399	6498555	-	-
3400-4199	7844772	-	-
4200-5399	10885614	-	-
5400-6599	8007978	-	-
6600-8999	8817091	-	-
9000-12599	5114961	16	1309430
12600-16199	1765555	5	44139
16200-19999	673706	15	151584
> 20000	972722	7	47663
Total	55954227		1552816

Source: CSA, Revised Report on the 1995/96 Household Income Consumption and Expenditure Survey, 2001.

As can be seen from Table 3.1, the total consumption requirement of households for juice is 1552816 liter per annum. Given a total population of 55954227 at the time the survey was conducted, the per capita consumption of juice is computed to be 0.03 liter. Assuming the regional market constitutes the viable market for the product, the present demand for juice is estimated at 459630 liters, using the population of the region for 2007. Further assuming that apricot juice and syrup can substitute for at least one fifth of the region's demand for juice, the present demand for apricot juice and syrup in the regional market is estimated at 91926 liters.

2. Demand Projection

The demand for apricot juice and syrup is expected to be influenced, among other things, by urbanization and income. Therefore, a growth rate of 5% is considered in projecting the demand for the products. The projected demand for the products is shown in Table 3.2.

Table 3.2

PROJECTED DEMAND FOR APRICOT JUICE AND SYRUP (LITERS)

Year	Projected Demand
2007	91926
2008	96522
2009	101348
2010	106416
2011	111737
2012	117323
2013	123190
2014	129349
2015	135817
2016	142607
2017	149738
2018	157225
2019	165086
2020	173340
2021	182007
2022	191108

3. Pricing and Distribution

Based on the on the current retail price of juice, the factory gate price for the envisaged plant is estimated at Birr 8 per liter.

The envisaged plant can use the existing wholesale and retail network to distribute its product.

B. PLNAT CAPACITY AND PRODUCTION PROGRAMME

1. Plant Capacity

Based on the market study, capital requirement and minimum economy of scale, the proposed annual processing capacity of the envisaged plant is 200,000 liters apricot juice and syrup per annum. A capacity of 666 liters per day is considered on the basis of single shifts of 8 hours per day and 300 working days per annum. This capacity can be increased by increasing the number of shifts per day.

2. Production Programme

The production programme is indicated in Table 3.3. At the initial stage of the production, the plant requires some years to penetrate into the market and develop skill in production. Therefore, in the first and second year of production, the capacity utilization rate will be 75% and 85%, respectively. In third year and thereafter, full capacity (100%) production shall be attained.

Table 3.3**PRODUCTION PROGRAMME**

Sr. No.	Product	Unit	Production Year		
			2008	2009	2010-2020
1.	Apricot juice ('000)	Liters	150	170	200
2.	Capacity utilization	%	75	85	100

IV. MATERIALS AND INPUTS**A. RAW & AUXILIARY MATERIALS**

According to Ethiopian Standard, ES 360:2001, fruits used for canning shall be sufficiently ripe, fresh, wholesome and sound, free from traces of spoilage, insects, parts of insects and foreign matters. The additives shall be clean and shall not be harmful to human health.

The basic raw material required by the processing plant is fresh apricot fruit. Since the quality of the juice and syrup that is produced will be determined largely by the quality of the apricot fruit used as raw material, great importance is attached to apricot fruit cultivation itself.

Auxiliary materials required by the plant are additives which are added to impart good taste and packing material. The raw and auxiliary materials requirements of the envisaged project at 100% capacity utilization are indicated in Table 4.1 below. The total cost of raw and auxiliary material is estimated at Birr 636.5 thousand.

Table 4.1

RAW & AUXILIARY MATERIALS REQUIREMENT AND COST
(AT FULL CAPACITY)

Sr. No.	Raw & Auxiliary Material	Unit	Qty.	Cost ('000 Birr)		
				FC	LC	Total
1.	Apricot Fruits	Tones	250	-	500	500
2.	Sugar	Kg	1,000	-	6.5	6.5
3.	Plastic bottles (food grade)	Pcs.	200,000	-	100	100
4.	Plastic sheet (for shrink wrapping)	Tones	2	-	30	30
Grand Total					636.5	636.5

B. UTILITIES

The major utilities of the envisaged project are electricity, furnace oil and water. The annual consumption and cost of utilities is indicated in Table 4.2. The total annual cost of utilities is estimated at Birr 233,188.

Table 4.2

ANNUAL UTILITIES REQUIREMENT AND COST

Sr. No.	Utility	Unit	Qty.	Unit Cost (Birr)	Total Cost (Birr)
1	Electricity	KWh	80,000	0.4736	37,888
2	Water	m ³	6,000	5.5	33,000
3	Furnace oil	Lt.	30,000	5.41	162,300
	Total				233,188

V. TECHNOLOGY AND ENGINEERING

A. TECHNOLOGY

1. Production Process

The most important steps involved in processing apricot juice and syrup are:

a) Selection and preparation of apricot fruits:

Damaged, bruised and Over-ripe apricot fruits have to be rejected as they produce low quality juice and syrup. After the fruits have undergone a quality inspection, they are first washed by clean water to remove soil and dirt from the fruit. Then, the apricots should be split into two and the kernels removed.

b) Extraction of juice:

Extraction of juice is started by the addition of enzymes, which break down the cell walls of the fruit and thus increase the amount of juice extracted. Then it is pressed out in large presses.

c) Straining, filtration and clarification:

To clarify the apricot juice, which is still cloudy, the juice is first centrifuged - during which process the larger particles such as broken fruit tissue, kernel and skin, and various gums, peptic substances etc settle to the bottom - and then filtered. This production step can also be supported by enzymes which break down the turbid particles before filtering starts, thus preventing the filters from blocking too quickly.

d) Preservation(for juice production only):

After the juice becomes free from suspended impurities, refrigeration and pasteurization at 75°C for about half a minute be conducted for preserving the juice extracted. Finally, the pasteurized juice shall be cooled, filled, labeled and dispatched.

e) Juice evaporation(for syrup production only):

- **Evaporation process:** This is the most critical aspect of making high quality syrup. Evaporation should be done with uniform heating. Initially coagulation starts when juice temperature increases. This scum should be removed during slow heating.
- **Judging the end point of the syrup:** As the syrup density increases, the boiling temperature rises gradually. Slow heating is required when frothing starts, as otherwise the syrup will get burned. When the desired temperature is achieved, heating should be completely stopped.
- **Cooling of finished syrup:** This is an important step followed after making the syrup because if quick cooling is not carried out, the product will have a burnt taste and the color of the syrup will become dark brown. Therefore the syrup should be cooled.

f) Packing:

- a. **Bottling:** A vacuum-based bottle filling machine has been used successfully to package the juice/syrup so that its shelf-life is increased. The juice/syrup should be filled in sterilized bottles to avoid fungus problems.
- b. **Capping:** The bottles filled with the help of the bottling machine should be capped with a crown capping machine to make them air tight.
- c. **Labeling:** Capped bottles should be labeled properly. The label should give precise information about the juice/syrup ingredients, date of preparation and producer's details. Then, packaging is performed automatically.

2. Source of Technology

The machinery and equipment required by the envisaged project can be obtained from the following companies specialized in manufacture of machinery for juice production

1. Pome juice and products,
11, Bayajapur, post-pimpal kothetal,
Satana, Nasik, Mahaashtra,
India – 423204,
Tel -91-2555-242625.

2. Vicent corporation
2810E, 5th Avenue
Tampa, FL 33605
United States
Phone: (813) 248-2650
E-mail: [Sharon@vicent corp.com](mailto:Sharon@vicentcorp.com)

B. ENGINEERING

1. Machinery and Equipment

The list of machinery and equipment of the project is indicated in Table 5.1. The total cost of machinery and equipment is estimated at Birr 2.5 million, out of which Birr 2 million is required in foreign currency.

Table 5.1**LIST OF MACHINERY AND EQUIPMENT**

Sr. No.	Item description	Qty.
1.	Receiving line and bins	Set
2.	Inspection, washing, sizing	Set
3.	Rasper	1
4.	Juice extractor	1
5.	Finisher	1
6.	Pasteurizer	1
7.	Filler and sealer	1
8.	Cooling machine	1
9.	Labeler	1
10.	Centrifuge	1
11.	Vessels (with 2 pumps)	Set
12.	Boiler	1
13.	Conveying unit	1
14.	Laboratory equipment	Set

2. Land, Building and Civil works

The total land requirement of the project is about 2000m², out of which built-up area is 1000m². The total construction cost of building assuming a construction rate of Birr 2300 per m² (made of EGA sheet roof, HCB wall, cement screed floor finish) is estimated at Birr 2.3 million. The lease value of land, at the rate of 0.1 Birr / m², and for 80 years of land holding, is Birr 20,000. The total cost of building and civil works is about Birr 2,320,000.

3. Proposed Location and Site

The envisage plant can be located in area where fresh apricot fruit can be abundantly supplied and transportation cost to deliver the product to market can be minimized. Taking

this in to consideration, Chench (found in Gamo Gofa zone) and Mareka and West Abaya woredas, which are found in Dawro zone, can be the possible locations for the project.

From the above woredas, Chench Town, the capital of Chench woreda, is selected to be the location of the proposed project.

VI. MANPOWER AND TRAINING REQUIREMENT

A. MANPOWER REQUIREMENT

The envisaged project requires 34 work forces. The list of manpower for the envisaged project is indicated in Table 6.1. The annual cost of labour including fringe benefits is estimated at Birr 361.440 thousand.

Table 6.1

MANPOWER REQUIREMENT AND ANNUAL LABOUR COST

No.	Description	Req. No.	Monthly Salary (Birr)	Annual Salary (Birr)
1.	General Manager	1	2,500	30,000
2.	Secretary	1	700	8,400
4.	Purchaser	1	900	10,800
5.	Accountant	1	900	10,800
6	Personnel	1	1,200	14,400
7.	Cashier	1	500	6,000
8.	Production Head	1	1,600	19,200
9.	chemist	1	1,200	14,400
10.	Mechanic	1	900	10,800
11.	Electrician	1	900	10,800
12.	Store keeper	1	600	7,200
13.	Driver	2	900	10,800
14.	Operators	6	3600	43,200
15.	Laborers	10	3000	36,000
16.	Guards	4	1,200	10,800
	Sub-Total	33	20,600	243,600
	Benefits (20% BS)		4,120	48,720
	Grand Total		24,720	292,320

B. TRAINING REQUIREMENT

The training of production head, quality control chemists, electrician and mechanic will take place for about two weeks by the supplier of machinery during erection. Machine operators shall be trained by in-house staff before commissioning. The cost of training is estimated at Birr 10,000.

VII. FINANCIAL ANALYSIS

The financial analysis of the apricot juice and syrup 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	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 5.75 million, of which 57 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	20
2	Building and Civil Work	2,300.00
3	Plant Machinery and Equipment	2,500.00
4	Office Furniture and Equipment	75
5	Vehicle	200
6	Pre-production Expenditure*	481.25
7	Working Capital	177.77
	Total Investment cost	5,754.0
	Foreign Share	57

* *N.B Pre-production expenditure includes interest during construction (Birr331.25 thousand) training (Birr 10 thousand) and Birr 140 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 1.98 million (see Table 7.2). The material and utility cost accounts for 43.75 per cent, while repair and maintenance take 3.77 per cent of the production cost.

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

Items	Cost	%
Raw Material and Inputs	636.50	32.02
Utilities	233.19	11.73
Maintenance and repair	75	3.77
Labour direct	146.16	7.35
Factory overheads	48.72	2.45
Administration Costs	97.44	4.90
Total Operating Costs	1,237.01	62.23
Depreciation	442.5	22.26
Cost of Finance	308.32	15.51
Total Production Cost	1,987.83	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.

$$\text{BE} = \frac{\text{Fixed Cost}}{\text{Sales} - \text{Variable Cost}} = 38 \%$$

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 1.22 million.

D. ECONOMIC BENEFITS

The project can create employment for 33 persons. In addition to supply of the domestic needs, the project will generate Birr 1.34 million in terms of tax revenue.