

1 VINEGAR

1.1 Introduction

Vinegar is a liquid produced from the fermentation of ethanol in a process that yields its key ingredient, acetic acid. The acetic acid concentration ranges typically from 4 to 8 percent by volume for table vinegar [1] (typically 5%) and higher concentrations for pickling (up to 18%). Natural vinegars also contain smaller amounts of [tartaric acid](#), [citric acid](#), and other acids.

Vinegar is an important preservative and condiment and it is being produced since centuries. It is produced through the action of acetic acid bacteria on dilute solutions of ethyl alcohol derived from yeast fermentation. It is also produced from fermented cider, fruit juices or other fermented alcoholic solutions derived from barley malt, hydrolysed cereals and starches. There are many manufacturers producing synthetic vinegar but not much who produce from fruits. This note considers production of vinegar from fruits.

Slow methods are generally used with traditional vinegars and fermentation proceeds slowly over the course of weeks or months. The longer fermentation period allows for the accumulation of a nontoxic slime composed of acetic acid bacteria and soluble [cellulose](#), known as the [mother of vinegar](#). Fast methods add mother of vinegar (i.e. bacterial culture) to the source liquid and then add air using a venturi pump system or a [turbine](#) to promote oxygenation to give the fastest fermentation.

In fast production processes, vinegar may be produced in a period ranging between 20 hours and three days.

1.2 Objective

The primary objective of the model report is to facilitate the entrepreneurs in understanding the importance of setting up unit of vinegar. This model report will serve as guidance to the entrepreneurs on starting up such a new project and basic technical knowledge for setting up such a facility.

1.3 Raw Material Availability

The all-important raw material will be fruits. Many fruits are grown round the year and availability would not be a problem. Other materials like yeast, sugar, salt, chemicals and colours shall be available locally.

1.4 Market Opportunities

Vinegar is a very good preservative as well as condiment and is in vogue since long. It is used in many vegetarian and non-vegetarian and Chinese food preparations and snacks. It has got its own aroma and flavour. It is also used as a table enricher. Market for vinegar is wide spread. Its domestic use is limited but it is used in large quantities in restaurants, clubs and canteens and by the caterers. There are some established brands in the market like Chings, Weikfield etc. Their products are priced in the range of Rs. 100-110 per ltr. Hence, a new entrant has to offer a very competitive price. Price assumed in this note is Rs. 85/ltr. Production capacity of the unit does not warrant big spending on advertising. Instead retailers should be offered commission as well as special incentives. Free sampling in 10-15 ml. packs can also be thought off. Tie-up with some bulk consumers even by offering 15-20% discount can be worked out as in case of bulk and direct supplies packing cost would go down and there would be saving of selling commission as well.

1.5 Project description

1.5.1 Applications

Vinegar is produced since centuries and used as preservative and condiment. It contains around 5% acetic acid in water, varying amount of fixed fruits acids, salt, colouring materials and some other fermentation products with characteristic aroma and flavour. It is used as a table enricher in vegetarian and non-vegetarian as well as Chinese food preparations. This product is ideally suited in industrially developed states. This note considers MP as the preferred location.

1.5.2 Availability of know how and compliances

CFTRI, Mysore, has successfully developed the technical know-how. Compliances under the FPO and PFA Act are mandatory.

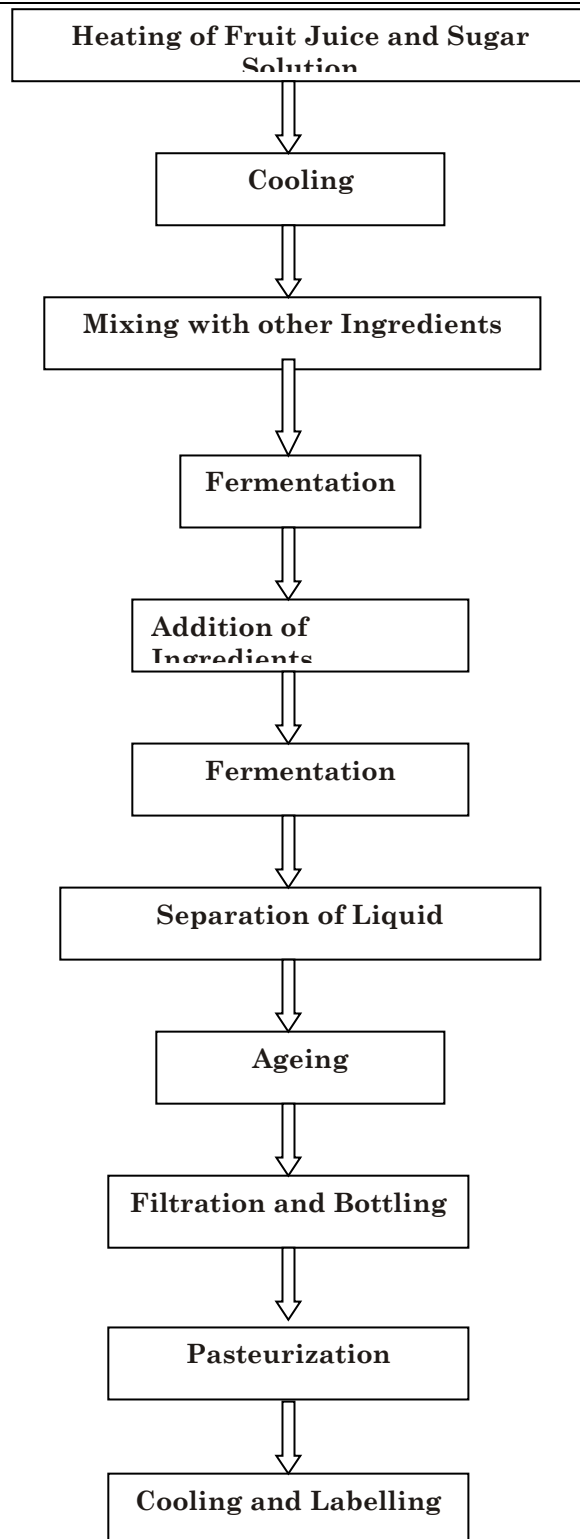
CFTRI has developed a fast process for obtaining vinegar, using a simple inexpensive vinegar generator, which can be adapted in rural areas to manufacture vinegar using the locally available raw materials like sugarcane juice/jaggery/toddy/ coconut water / pineapple waste, etc. Vinegar generator can be locally fabricated. Vinegar generators are simple to operate. They require no power supply and units can be set up easily in rural areas.

1.5.3 Capacity of the Project

The rated capacity of the unit is 48000 ltrs per annum.

1.5.4 Manufacturing process

The process of manufacture calls for thorough knowledge and expertise and it is advisable to engage the services of an expert. To start with, fruit juice and sugar solution of around 16 Brix is heated at around 180°C for a minute and then it is cooled. Then one cake of crushed yeast and phosphates, potassium salt and sugar are mixed with this liquid thoroughly and this solution is placed in clean jug or jar and its mouth is closed with a plug of cotton. These jars are placed in a dark and warm place for around 75-80 hours. Then fresh juice or sugar solution is added and the solution is kept in fermentation tanks for further fermentation which takes around 85-90 hours. Maintenance of appropriate temperature during fermentation is very crucial for good quality vinegar. On completion of fermentation, yeast and fruit pulp settle to form a compact mass at the bottom of the tank. Fermented liquid is separated from it. When the vinegar is ready, it is further stored to improve its quality. This is done in tanks or barrels which are closed. After around 4-5 days, colours etc. are blended in vinegar and it is filtered before filling it in bottles. Sealed bottles are pasteurised for about 30 minutes and then cooled, labelled and packed. The process flow chart is as under:



1.6 Project component and cost

Major components of the projects and their costs are described in the table hereunder:

PARTICULARS	Unit	Qty	Cost/unit	Total
LAND & BUILDING				7.00
Land	SqM	200	250.00	0.50
Land Development				
Land Area		200	500.00	1.00
Building				
Production Block				
Buildup Area	SqM	100	5,000.00	5.00
Contingencies		10%		0.50
PLANT & MACHINERY				4.20
Gas Fired Furnance		2	5,000.00	0.10
Fruit Juice Extractor		2	10,000.00	0.20
SS Pump		1	15,000.00	0.15
SS Fermentation tanks		6	15,000.00	0.90
Pasterisating Tank		2	10,000.00	0.20
Air-Compressor for air circulation		1	15,000.00	0.15
Alimunium blending tanks		4	7,500.00	0.30
Ageing tanks or barrels		6	10,000.00	0.60
Bottle washing ,capping and filling machine		1	70,000.00	0.70
Weighing Scale, plastic tubes and SS utensils, Lab equipments	LS	1	35,000.00	0.35
Contingencies		15%		0.55
MISCELLANEOUS FIXED ASSETS				0.40
Misc Assets	LS	1	35,000	0.35
Contingencies		15%		0.05
PRE-OPERATIVE EXPENSES				4.54
Establishment		1	344,000	3.44
Professional Charges		1	50,000	0.50
Security Deposits		1	60,000	0.60
TOTAL				16.14

The cost of the various components will depend on the location of the project. Item wise assumptions are as under:

1.7 Plant and Machinery

The main machineries are Gas Fired Furnance, Fruit Juice Extractor, SS Pump, SS Fermentation tanks, Pasteurization Tank, Air-Compressor for air circulation, blending tanks, Bottle washing ,capping and filling machine etc. The total cost of plant and machinery is Rs. 4.20 lakhs.

1.8 Building

The main production block will cost around Rs. 5.50 lakhs.

1.9 Miscellaneous Assets

A provision of Rs. 40000/- would take care of all the requirements.

1.10 Preliminary & Pre-operative Expenses

A provision of Rs. 4.54 lakhs would take care of pre-production expenses like establishment, professional charges, security deposits etc.

1.11 Working Capital Requirement

ITEMS	Year 1	Year 3	Year 5
STOCK OF RAW MATERIAL & PACKING MATERIAL	1.02	1.46	1.46
SUNDRY DEBTORS	3.02	4.32	4.32
TOTAL	4.05	5.78	5.78
MARGIN	1.01	1.45	1.45
MPBF	3.04	4.34	4.34
INTEREST ON WC	0.33	0.48	0.48

1.12 Means of Finance

EQUITY CAPITAL			35.00%	6.00
MOFPI SUBSIDY	25%	50.00	25.00%	4.29
TERM LOAN				
FINANANCIAL INSTITUTIONS		10.00%	40.00%	6.86
-Payable half yearly Installments	10	0.70		
TOTAL			100%	17.15

1.13 Cash flow statement

PARTICULARS	Year 1	Year 3	Year 5	Year 7
SOURCES OF FUNDS				
EQUITY CAPITAL	-	-	-	-
SUBSIDY				
NET PROFIT	0.61	4.82	3.86	3.01
(INTEREST ADDED BACK)				
DEPRECIATION	0.67	0.67	0.67	0.67
PRELIMINARY EXP.W/O	0.65	0.65	0.65	0.65
INCREASE IN TERM LOAN	-	-	-	-
INCREASE IN BANK BORROWINGS-WC	3.04	0.43	-	-
TOTAL	4.97	6.57	5.18	4.33

1.14 Projected balance sheet

Particulars	Year 1	Year 3	Year 5	Year 7
LIABILITIES				
EQUITY CAPITAL	6.00	6.00	6.00	6.00
RESERVES & SURPLUS	3.88	10.25	17.01	22.56
TERM LOAN	6.16	3.36	0.56	-
BANK BORROWINGS-WC	3.04	4.34	4.34	4.34
TOTAL	19.08	23.95	27.91	32.90

1.15 Profitability statement

Particulars	Year 1	Year 3	Year 5	Year 7
INCOME	30.24	43.20	43.20	43.20
EXPENDITURE	28.31	37.06	38.02	38.87
VARIABLE	15.47	21.33	21.33	21.18
FIXED	12.84	15.73	16.69	17.69
GROSS PROFIT	1.93	6.14	5.18	4.33
PROFIT BEFORE TAX	(0.41)	3.90	3.22	2.53
RETAINED PROFIT	(0.41)	3.90	3.22	2.53

1.16 Key Indicators

NET PRESENT VALUE at current Inflation (Rs. in lakhs)	23.79
INTERNAL RATE OF RETURN %	31.13
AVERAGE DSCR	2.67
BREAK EVEN POINT %	88.50
PAY BACK PERIOD (YEARS)	3.20

1.17 Man Power Requirement

PARTICULARS	NOs.
SUPERVISORY STAFF	
Production Supervisors	2
WORKERS	
Skilled Workers	4
Semi-Skilled Labour	6
TOTAL	12

1.18 Assumptions

Project & Financing			
Contingencies on Building			10%
Contingencies on Equipment			15%
Term Loan			40%
Rate of Interest on Term Loan			10%
Subsidy Considered	Subject to ceiling		25%
Expected time of Installation		Months	10
Moratorium		Months	6
CAPACITY			
Rated Capacity Per Annum	80% of Installed capacity	Liters PA	48000
Number of Operational Days	DAYS		300
Working Hours Per day	Hrs		20
CAPACITY UTILIZATION			
Year I			70%
Year II			90%
Year III			100%
SALES PRICE			
W S Price		Rs Per Liter	90
OTHER EXPENSE			
Commission			10.0%
Marketing Expenses			2.5%
POWER			
Connected Load	HP		15

DEPRICIATION AS PER COMPANY'S ACT	
BUILDING	3.34%
PLANT & MACHINERY	10.34%
MISC. FIXED ASSETS	7.07%
LAND & SITE DEVELOPMENT	1.63%
MAINTENANCE	
BUILDING	2.00%
PLANT & MACHINERY	3.00%
MISC. FIXED ASSETS	1.50%
LAND & SITE DEVELOPMENT	1.50%

1.18.1 Sources of technology

- Narang Corporation, P-25, Connaught Place, New Delhi-110001
- Faiz Ali Contractor, Bareilly, UP
- Nagpal Brothers,C-127, Phase II, Myapuri Industrial Estate, New Delhi-110064
- Jain Pacakaging Products, 33, Sarai Pipal Thala, Sabji Mandi, New Delhi-110033
- Gansons Pvt. Ltd., 207, Kakad Chambers Dr. A. B. Road, Bombay-400 018
- C.G.Dandekar Machineries, Dandekarwadi Bhiwandi-421 302, (Thane, Maharashtra)
- Gansons Pvt. Ltd., Everest, 46/C, Chowranghee Road Calcutta-700 016
- Thermax (I) P. Ltd., Chinchwada Poona-411 009

The actual cost of projects may deviate on change of any of the assumptions.