



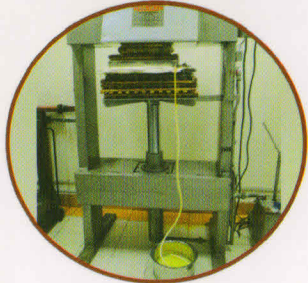
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**SMALL SCALE UNIT  
ESTABLISHMENT FOR  
READY TO SERVE (RTS)  
BEVERAGE FROM  
ACID LIME FRUITS**



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**FOREWORD**

Acid lime (*Citrus aurantifolia* Swingle) is one of the very important citrus crops grown in many states of India and it is the only citrus fruit that is used in daily consumption in one or the other form. This fruit has great potential for processing into various products. Ready-to-Serve (RTS) beverage is one such product that can be popularized in India keeping in view hot and humid climate. RTS when served as chilled beverage could be the very refreshing drink at least during 6-8 months across the country.

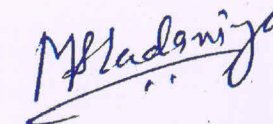


Individual entrepreneur, farmer or group of farmers can set up a small scale unit in production areas. There are several government agencies ready for providing subsidy and many banks can provide loans.

In this extension bulletin efforts are made to provide required information for setting up cottage scale or small scale unit. The entrepreneur shall abide by all rules and regulations of local bodies, ministry of food processing and FSSAI. It is definitely profitable venture if managed properly. I congratulate Dr. Dinesh Kumar for this hard work to bring out such a publication. I am sure this publication based on research conducted at CCRI, Nagpur and our

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Place: Nagpur



**(M. S. Ladaniya)**  
Director



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## SMALL SCALE UNIT ESTABLISHMENT FOR READY TO SERVE (RTS) BEVERAGE FROM ACID LIME FRUITS

### 1. Introduction

The potential of the citrus industry lies in promoting citrus within our people by maximizing the consumption of citrus. The first and the foremost step that needs to be taken is to have sufficient production of fruits on sustainable basis. Research is focused on those varieties, which can be grown in India and can be processed for juice. Thrust was given to those citrus varieties, which offer a strong potential for other agro-based and value-added industry.

### 2. Acid Lime (*Citrus Aurantifolia*) Production

Lime is one of the important fruits of commercially grown citrus fruits in India and it is widely grown in Maharashtra. It is grown in home gardens and finds widespread usage, not just as a cooking ingredient but also for its health benefits particularly in conditions like constipation, indigestion, piles, scurvy, peptic ulcers, respiratory illnesses, tonsillitis, gum problems, gout and urinary diseases. Lime is also very effective in weight loss and curing a number of skin problems. Lime fruits are locally available and pickles are very common as a food item in the diet of all. Lime fruits are used for garnishing salads and its beverages are very refreshing in tropical climate of India. Lime flowering and fruiting take place throughout the year and hence it is available as a source of income year-round for the farming community.



Acid lime Fruits



Lime and lemon producing states	Production (lakh tonnes)	Production (%)
Andhra Pradesh	5.83	21
Gujarat	4.49	16
Telangana	3.32	12
Maharashtra	3.06	11
Karnataka	2.68	9
Madhya Pradesh	2.37	8
Assam	1.04	4
Bihar	1.29	4
Jharkhand	0.88	3
Chattisgarh	0.79	3
Others	2.61	9

source NHB (2013-2014)

### 3. Ready-to-Serve Drink (RTS) Production Process

Acid lime is one of the most popular citrus fruit having attractive bright colour, appealing taste and flavour. These fruits are considered to be the rich source of ascorbic acid, pectin, citric acid, and minerals like calcium and phosphorous. There is a great potential to use this fruit in value added products such as diet drinks. The Ready to Serve (RTS) beverages from limes are probably the most recognized and globally accepted fruit drinks. This drink is widely accepted in India as "Nimboo pani" due to its very refreshing properties when served cool.

#### 3.1 Applications

Ready to serve beverages (RTS) are sweetened juice of fruits containing some pulp. They contain at least 5-6% (by volume) of fruit juice and are consumed directly. Since preservatives are added in adequate quantities, the shelf life of RTS is fairly longer at low temperature.



Cut fruits for Juice Extraction



Juice extraction by Hydraulic Press

### 3.2 Availability of technology and compliances

CCRI, Nagpur, has successfully developed the technical know-how. Compliance with FSSAI is necessary.

### 3.3 Basis and Presumptions

- The unit proposes to work at least 300 days per annum on single shift of 8 hrs (9 AM to 5PM)
- The unit can achieve its full capacity utilization during the 2nd year of operation.
- The wages for skilled workers is taken as per prevailing rates in this type of industry.
- Interest rate for total capital investment is calculated @ 12% per annum.
- The entrepreneur is expected to raise 20-25% of the capital as margin money
- Subsidy/ financial assistance for the project (Please Refer Section 11)
  - Capacity of the Plant - 2000 lit /day (RTS)(Approx. 2 tonnes /day finished product RTS)
  - Capacity utilization - 80 %
  - Space Requirement - 400 m<sup>2</sup>
  - Land/ building rent - 2000/month (It is assumed that shed of 400 m<sup>2</sup> is available hence cost of shed is not included)
  - Recovery of Juice@ 48-50 %
  - Life Span of machines -10 yrs
  - Electricity charges - Rs. 5 / KWH ( Unit)
  - Repair/ Maintenance @ 10% of cost of machine
  - Depreciation @ 10% of the present cost of machineries



Bottle Washer



### 3.4 Protocol for preparation of ready to serve drinks (RTS)

Wash fruits thoroughly, let them dry, cut in to 4 pieces



Extract the juice using hydraulic press juice extractor



Mix water and sugar and bring to boil  
Until it becomes syrup



Add pasteurized juice and water to the cooled syrup



Add Potassium metabisulphite (KMS)



Mix thoroughly



Bottling



Labeling



Packaging and storage

RTS drinks can be prepared from Acid lime using 6% acid lime fruit juice. Fruits are washed thoroughly and dried. The juice of acid lime juice can be extracted using hydraulic press juice extractor. Extracted juice is filtered and pasteurized (90°C, 30 sec), followed by sudden cooling to room temperature. Water and sugar mixed together and boiled until it becomes syrup of desired strength. The amount of juice and water is calculated and added with cooled syrup and the TSS of RTS is maintained at 14°Brix. As a class II preservative (100 ppm of Potassium meta-bi-sulphite, KMS) is added to it and mixed thoroughly, RTS is filled and sealed in 250 ml PET bottles.

### 3.5 Manpower Requirements

Particulars	Nos.	Total Monthly Salary (Rs.)
Factory Manager, Rs. 21000/ month	1	21000/-
Office Asst cum storekeeper, Rs. 12000/- month	1	12000/-
Skilled Workers, Rs.400/- day	2	24000/-
Semi -skilled Workers, Rs. 300/- day	5	45000/-
Unskilled workers, Rs.200/- day	4	24000/-
Salesman, Rs.12000/- month	2	24000/-
<b>Total</b>		<b>1,50,000/-</b>

The monthly man power charges could be Rs. 1,50,000/-

### 3.6 Plant and Machinery

It is desirable to install production capacity of approximately 600 tonnes per year considering around 300 days and single shift per day. Following equipments is required:

Machinery is for small scale unit (500 kg to 1000 kg per hour capacity)

Item	Quantity	Cost(Rs.)
Fruit Washing container	4 Nos	25000
Hydraulic press cum Juice Extractors	2	150000
Filtration system	1	150000
Steam Jacketed Kettles-30 ltrs Capacity	1	100000
Stirrer	1	20000
Baby Boiler 30 kg capacity	1	150000
Bottle Washing and Filling Machine	2	500000
Flash pasteuriser, pasteurization tank	1 each	500000
Water filtration (RO & UV) system, 200 lit/hr	1	100000
Labelling machine	1	35000
Capping machine	3	50000
Testing Equipments & miscellaneous assets (utensils, table, chair etc.)		1,00,000
Mixing tank (100 lit.)	3	50000
Electronic weighing balance (100 kg & 2 kg)	2	30000
<b>Total</b>		<b>19,60,000</b>





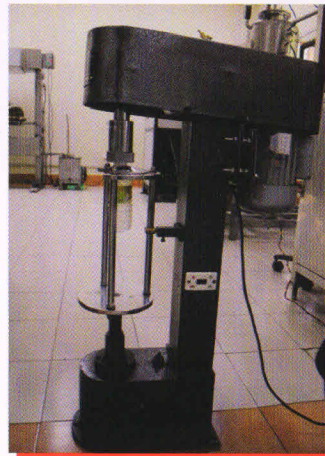
RTS Bottle Ready for Labelling



Ready for Marketing

### 3.7 Manufacturing Process

The process is not very complicated. Good quality ripe fruits are sorted, washed and cleaned. Then juice is extracted from fruits and it is filtered to remove seeds and fibers. Then juice is processed and sterilized, sugar syrup, preservatives etc. are added and this mixture is stirred till uniform solution is formed. In the final process, bottling and packing is done. The process flow chart is given above.



Bottle Capping Machine

### 4. Demand and Supply

Acid lime fruits are popular amongst all age groups. Fruits are available during summer and winter season (a period of 6-8 months). Hence, RTS are becoming popular. They are sold at many places like provision and departmental stores, cold drink centres, restaurants, etc. and since they have a longer shelf life, consumers prefer them. Yet another feature is that they are very easy to make.

### 5. Marketing Strategy

With changing life styles and increase in disposable incomes, this product is gaining more and more popularity. Fruit concentrate based beverages of some conventional and selected fruits are available in the market but it is worth trying acid lime fruits grown in Maharashtra and many other states as their tastes are palatable to local population. This would also provide an edge over synthetic products.

### 6. Pollution Control

There is no major pollution problem associated with this industry except for disposal of waste which should be managed appropriately. The entrepreneurs are advised to take "No Objection Certificate" from the State Pollution Control Board.

### 7. Energy Conservation

The fuel for the steam generation in the boiler is Diesel or LPG depending upon the type of boiler. Proper care should be taken while utilizing the fuel for the steam production. There should be no leakage of steam in the pipe lines and adequate insulation should be provided.

### 8. Miscellaneous Assets

Miscellaneous items (Furniture, fixtures, storage racks, exhaust fans, SS utensils)

### 9. Water

A good quality chlorinated potable water supply of roughly 3000lit./day is required, which needs to be further filtered/purified. For floor washing and sanitation purpose, water requirement is roughly 4000 lit./day.



## 10. Working Capital ( 2000 lit (RTS)/day and per year)

### 10A. Raw Material

Product	Quantity/ day	Annual Requirement	Rate	Cost(Rs.)
1. Cost of Raw Material (Acid Lime Fruits)	300 kg	90000kg	Rs. 15/kg	13,50,000
2. Sugar	280 kg	84000kg	Rs. 30/kg	25,20,000/-
3. Flavor/Preservative, etc	200 g	60 kg	Rs. 1500/kg	90,000/-
		<b>Total</b>		<b>39,60,000/-</b>

### 10B. Packaging and Bottling

a <b>Final product</b>	2000 lit	600000		Raw material
Cost per bottle (250 ml)		lit		cost/unit
(Excluding packagingcost)	8000 units	2400000 units	-----	Rs. 1.65
b. <b>Packaging and bottling Cost</b>				
Empty bottle	8000	2400000units	3.5/bottle	8400000/-
Labelling	8000	2400000units	3.5/bottle	8400000/-
				16800000/-

### 10C. Salary and utility

a) Manpower (Ref.3.5)		300 days		15,00,000/-
b) Electricity	40 kwh	12000	5/unit	60,000/-
c) LPG/Fuel	-	120 cylinder	600/-	72,000/-
d) Rent of buildings/ Lands	-	12 months	2000/month	24,000/-
e) Repair/Maintenance	-	12 months	2000/month	24,000/-
f) Transportation	-	-	2000/month	24,000/-
g) Miscellaneous	-	-	-	12,000/-
			<b>Total Cost</b>	<b>17,16,000/-</b>

### 10D. Annual production of beverages(RTS)

#### Total recurring expenses per annum (Rs.)

10 A	Raw Material, etc	39,60,000/-
10 B	Packaging/bottling, etc	1,68,00,000/-
10 C	Salary/ Utilities, etc	17,16,000/-
	<b>Total</b>	<b>2,24,76,000/-</b>

### 10E. Total Capital Investment (Rs.)

Fixed Capital -	19,60,000/-
Working Capital For 3 months-	56,19,000/-
<b>Total capital investment</b>	<b>75,79,000/-</b>

### 10F. Cost of Production (per annum)

a) Total recurring Cost/year	2,24,76,000/-
b) Depreciation on machine and Equipment	1,96,000/-
c) Interest on Capital Investment	2,35,200/-
<b>Total</b>	<b>2,29,07,200/- (i.e. Rs.9.54/- per bottle), Rounded to Rs. 9.5/- per bottle</b>

### 10G. Annual Production of RTS

Quantity/day	Total Quantity/ year	Sale price (Rs.)/ unit	Return(Rs.)
8000 units	2400000 units	15	3,60,00,000/-
			Net Profit/year 1,30,92,800/-

### 10H. Benefit Cost Ratio

3,60,00,000 / 2,29,07,200	1.57
(Return per annum)/ (Cost of production per annum)	

**\*Present rates and prices were considered for presumptions and calculations**









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