

MODEL DETAILED PROJECT REPORT

ON

SECONDAY PROCESSING PROJECT FOR ORANGES

(READY TO SERVE BEVERAGES(RTS))



PREPARED BY

MAHARASHTRA STATE AGRICULTURAL MARKETING BOARD,
PUNE -411037

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HIGHLIGHTS OF THE PROJECT

1. GENERAL

Name and address	
Project Site	
Name and designation of authorized signatory	
Constitution	
Nature of Industry	Secondary Processing Project for Oranges- (RTS)
Capacity Utilization	100 Percent from 5th year onward
Raw material	Oranges & other citrus fruits etc.

2. PROJECT COST & MEANS OF FINANCE

Project Cost

Sr.No.	Particulars	Amount (Rs. In Lakh)
1	Land	Available
2	Land development	3.00
3	Building & other civil works	49.88
4	Plant and Machinery	79.47
5	Miscellaneous fixed asset	12.90
6	Preli. And Preoperative Expenses	6.30
7	Contingencies	1.65
8	Margin money for Working capital	5.00
	TOTAL	158.20

Means of Finance

Sr.No.	Source	Amount (Rs. In Lakh)
1	Member contribution(15%)	23.73
2	Term Loan(50.07%)	55.47
3	State Government grant/subsidy(49.93%)	79.00
	TOTAL	158.20

C. PROJECT PROFILE (FINANCE)

Particulars	Unit	First Year	Fifth Year
Estimated net WC requirement	Rs Lakh	20.00	20.00
Estimated annual sales realization		518.40	864.00
Profit After Tax (PAT)		37.19	76.33
Employment potential (Factory + Admin.Staff)	29 No.		
Debt service coverage ratio (DSCR)	Average DSCR		7.87
	Maximum DSCR		10.54
	Minimum DSCR		4.26
Payback period	2 years 11 month		
Internal rate of return (IRR)	35.50%		
Expected period of implementation from the date of sanction of loan	10 Months		

CHAPTER -1

INTRODUCTION

Mandarin is a group name for a class of oranges with thin, loose peel. These are treated as members of a distinct species, *Citrus reticulata* Blanco. The name "tangerine" could be applied as an alternate name to the whole group, but in the trade, it is usually confined to the types with red-orange skin. Mandarins include a diverse group of citrus fruits that are characterized by bright coloured peel and pulp, excellent flavor, easy-to-peel rind and segments that separate easily



The exact location of origin of Mandarin fruits is not clearly identified. It is believed that Mandarins is a native of southeastern Asia and the Philippines. The spread of Mandarins from Asia to Europe was slow. First, it was taken to North Africa and then probably by the fall of the Roman Empire, it entered the South of Europe, where it flourished in the Middle Ages. It is also believed that Mandarins were brought to America by the Spaniards (Columbus took seeds of citrus fruits with him in his second trip) and then by the Portuguese in their exploration trips of the New World, around year 1500. In Asia, it is most abundantly grown in Japan, southern China, and India.

Mandarin is very important fruit crop, second only to banana. It is usually consumed in raw form or in fruit salads as well as juice. The fruit consists of three layers.

- 1)The outer yellow/orange peel is with oil glands which exude the essential oils, producing the typical orange odor.
- 2)The whitish thread like mesocarp.
- 3)The endocarp consisting of 8 - 10 segments filled with juice sacs (vesicles).

Mandarins are rich in Ascorbic acid (13 – 54 mg per 100 g of edible portion) and Calcium (25 – 46 mg per 100 g of edible portion). They are a great source of Vitamin C. One orange actually has all the Vitamin C that one needs for the day. The water content in the fruit is nearly 80 per cent to 90 per cent of edible portion. The chemical composition of the Mandarin is as under.

Table No. 1
Chemical Composition of Mandarin
 (Per 100 g of edible portion)

Moisture	82.6-90.2 g
Protein	0.61-0.215 g
Fat	0.05-0.32 g
Fiber	0.3-0.7 g
Ash	0.29-0.54 g
Calcium	25.0-46.8 mg
Phosphorus	11.7-23.4 mg
Iron	0.17-0.62 mg
Carotene	0.013-0.175 mg
Thiamine	0.048-0.128 mg
Riboflavin	0.014-0.041 mg
Niacin	0.199-0.38 mg
Ascorbic Acid	13.3-54.4 mg

Source: Morton, J. 1987. Mandarin, Fruits of warm climates. Julia F. Morton, Miami, FL.

1.0 Comparative composition of Mandarins of different places:

The composition of Mandarins may differ, depending upon the place of growing, A comparative statement of composition of mature Mandarins, grown at different places, is given in table No. 2

Table No. 2. Composition of mature Mandarin

Composition	Nagpur Mandarins		Coorg Mandarins		Kinnow	
	Mrig bahar	Ambia bahar	Main crop	Monsoon crop	Outer fruit	Inner fruit
Average weight of fruit (g.)	100	125	101	97	145	189
Peel (g.)	27	20	2.62	2.67	0.46	0.45
Juice(g)	45	55	49.5	54.0	38.6	40.2
Pomace (g.)	28	25	-	-	42.0	39.3
TSS (^o Brix)	11-14	8-10	11.5	10.0	9.5	9.0
Acidity (as anhydrous citric acid) (%)	0.3	0.5	0.87	1.1	0.77	0.64
Essential oil (%) (v/w)	2.2	3.1	-	-	-	-
Pectin (%) (fresh wt. basis)	4.5	3.5	-	-	-	-
Ascorbic acid (mg/100 ml juice)	35.0	33.6	40.2	41.6	18.8	18.7

Source: Mandarin in India- CFTRI, Mysore

1.1 MORE THAN VITAMIN C:

Citrus is most commonly thought of as a good source of vitamin C. However, fruits also contain an impressive list of other essential nutrients, including both glycaemic and non-glycaemic carbohydrate (sugars and fibre), potassium, folate, calcium, thiamin, niacin, vitamin B₆, phosphorus, magnesium, copper, riboflavin, pantothenic acid and a variety of phytochemicals. Citrus contains no fat or sodium. The average energy value of fresh citrus is also low, which can be very important for consumers concerned about putting on excess body weight. A medium orange contains 60 to 80 kcal, a grapefruit 90 kcal and a tablespoon (15 ml) of lemon juice only 4 kcal (Whitney and Rolfes, 1999).

Table no 3.
Nutritional facts about citrus fruit

	Orange	Grapefruit	Tangerine
Weight (<i>g</i>)	131	236	84
Energy (<i>kcal</i>)	62	78	37
Fibre content (<i>g</i>)	3.1	2.5	1.7
Ascorbic acid (<i>mg</i>)	70	79	26
Folate (<i>mcg</i>)	40	24	17
Potassium (<i>mg</i>)	237	350	132

Source: Guthrie and Picciano, 1995.

1.2 Economic Importance:

Mandarins are rich in vitamin A, B, C and phosphorus, which are consumed fresh or in the form of juice, jam, squash and syrup. It is one of the main source of peel oil and citric acid

S.No.	State	2021-22		2020-21		2019-20	
		Production	% share	Production	% share	Production	% share
1	A.P.	693.87	19.73	688.70	19.41	688.70	18.68
2	Gujarat	625.83	17.80	625.83	17.64	636.02	17.25
3	Maharashtra	346.32	9.85	358.70	10.11	415.02	11.26
4	Karnataka	340.39	9.68	330.47	9.31	360.19	9.77
5	M.P.	302.77	8.61	324.70	9.15	340.35	9.23
6	Orissa	288.03	8.19	288.03	8.12	267.83	7.26
7	Assam	157.32	4.47	156.87	4.42	243.48	6.60
8	Telangana	150.55	4.28	150.72	4.25	155.08	4.21
9	Bihar	114.96	3.27	114.96	3.24	115.31	3.13
10	West Bengal	94.92	2.70	102.22	2.88	94.78	2.57
	Total	3114.96		3141.20		3316.76	

CHAPTER 2

PRODUCTION OF ORANGES

Table 1 Indian Production of MANDARIN(M.ORANG,KINNOW,ORANGE) (000 Tons)

S.No.	State	2021-22		2020-21		2019-20	
		Production	% share	Production	% share	Production	% share
1	M.P.	2060.55	32.89	2208.18	35.50	2169.76	35.36
2	Punjab	1177.54	18.80	1177.54	18.93	1329.00	21.66
3	M.S.	987.47	15.76	940.65	15.12	899.60	14.66
4	Rajasthan	653.90	10.44	618.95	9.95	562.47	9.17
5	Haryana	602.37	9.62	517.83	8.33	484.40	7.89
6	Assam	209.34	3.34	185.02	2.97	203.80	3.32
7	Karnataka	185.55	2.96	180.15	2.90	107.54	1.75
8	Arunachal Pradesh	67.74	1.08	67.74	1.09	67.74	1.10
9	Mizoram	54.17	0.86	54.17	0.87	54.17	0.88
10	Manipur	47.53	0.76	47.53	0.76	44.28	0.72
	Total	6046.16		5997.77		5922.76	

Source- National Horticulture Board(NHB)

Table 2 . Indian Production of SWEET ORANGE (MALTA , MOSAMBI) (000 Tonnes)

S.No	State	2021-22		2020-21			
		Producti on	% share	Producti on	% share	Productio n	% share
1	A.P	2700.57	69.35	2663.28	66.78	2663.28	65.92
2	Maharashtra	515.19	13.23	611.54	15.33	659.65	16.33
3	Telangana	511.65	13.14	517.03	12.96	510.04	12.62
4	M.P.	91.35	2.35	120.74	3.03	113.80	2.82
5	Punjab	24.18	0.62	24.18	0.61	26.92	0.67
6	Karnataka	14.89	0.38	14.45	0.36	14.94	0.37
7	Jammu & Kashmir	6.15	0.16	6.15	0.15	11.66	0.29
8	Mizoram	4.94	0.13	4.94	0.12	10.87	0.27
9	Bihar	4.68	0.12	4.68	0.12	6.18	0.15
10	Rajasthan	4.50	0.12	4.12	0.10	4.94	0.12
	Total	3878.10		3971.11		4022.28	

Source- National Horticulture Board(NHB)

Table 3. Indian Production of Lime/ Lemon (000 Tonnes)

S.No.	State	2021-22		2020-21		2019-20	
		Production	% share	Production	% share	Production	% share
1	A.P.	693.87	19.73	688.70	19.41	688.70	18.68
2	Gujarat	625.83	17.80	625.83	17.64	636.02	17.25
3	Maharashtra	346.32	9.85	358.70	10.11	415.02	11.26
4	Karnataka	340.39	9.68	330.47	9.31	360.19	9.77
5	M.P.	302.77	8.61	324.70	9.15	340.35	9.23
6	Orissa	288.03	8.19	288.03	8.12	267.83	7.26
7	Assam	157.32	4.47	156.87	4.42	243.48	6.60
8	Telangana	150.55	4.28	150.72	4.25	155.08	4.21
9	Bihar	114.96	3.27	114.96	3.24	115.31	3.13
10	West Bengal	94.92	2.70	102.22	2.88	94.78	2.57
	Total	3114.96		3141.20		3316.76	

Source- National Horticulture Board (NHB)

Table 4. Orange Cultivation in Vidarbha in year 2021

S.No.	District	Total land under Cultivation(Ha)	Land under Orange (Ha)	% land under Oranges	Irrigated land under Oranges, Ha
1	Amravati	761513	74,575	69.75	74,575
2	Nagpur	540107	20,442	19.12	20,316
3	Wardha	389772.4	3677.37	3.42	3338.39
4	Buldhana	750457	4011	3.75	4011
5	Yavatmal	863707	1725	1.61	1725
6	Akola	420037	1686	1.57	1535
7	Washim	407056	659	0.61	659
8	Chandrapur	470834.21	73.84	0.06	58.63
9	Bhandara	182249.17	36.42	0.03	31.90
10	Gondia	167267	12	0.01	01
11	Gadchiroli	205892.30	4.63	0.004	0.00
	Total	5158892.08	106906.26	100%	106250.92

(District Socio-Economic Survey –All Vidarbha District -2021)

CHAPTER 3

POSTHARVEST MANAGEMENT

Post-harvest management is the technology of handling of an agricultural produce after harvest to prolong the shelf life, freshness and an attractive appearance. Nearly, 20-25 per cent of fruits are wasted due to faulty Post-harvest management during harvesting, packaging, storage, grading and transportation etc. Proper scientific post-harvest management can minimize these losses. Like post-harvest management, the proper pre-harvest steps such as use of proper harvesting tools and assessment of maturity also improve the shelf life of the fruits and reduce the post-harvest losses to a great extent.

3.1 Pre-harvest factors influencing the post-harvest management:

Once the fruits are harvested, then the overall quality of fresh fruits can hardly be improved. The final market value of the produce depends upon the grower's ability to apply best available pre-harvest technology and subsequent harvesting and then post-harvest technology.

The pre-harvest technology, like use of fertilizers, pest control, growth regulators, climatic conditions like wet and windy weather and tree conditions, influences the fruit potentiality for storage by modifying physiology, chemical composition and morphology of fruits. In pre-harvest treatment, if the spray (10 ppm) of Gibberellic acid is done at colour break stage, it delays colour development, maintain firmness, thereby allows to extend harvesting period. Similarly, the use of potassium fertilizers extends the shelf life of the fruits.

3.2 Maturity – (Harvest maturity and Physiological maturity):

3.2.1 Harvest maturity:

A critical time for producers is the assessment of right maturity, as to when to harvest a crop. Normally, any type of fresh produce is ready for harvest when it has developed all ideal conditions for consumption. This condition is usually referred to a harvest maturity. Harvest maturity of horticultural produce depends mostly on the purpose and distance of market for which they are harvested. The deciding factors of harvest maturity are appearance (colour, size, and shape), texture, glossiness, hardness, pulpiness, smell (aroma or odour), and tastes (sweetness, sourness, bitterness).

3.2.2 Physiological maturity:

In physiological sense, however, maturity refers to attainment of final stage of biological function by a plant part or plant as a whole. Thus the physiological maturity differs from harvest maturity

The maturity of harvested fruits has an important role on shelf life, quality and market price. Hence, certain standards of maturity must be kept in mind while harvesting the fruits. However, the most commonly used measures to access maturity for harvesting the Mandarin is peel colour. Fruits are considered mature, if they have a yellow orange colour on 25% or

more of the fruit surface. Fruit quality for harvesting depends upon SS (soluble solids contents, sugar) and acidity of the juice. The juice should have a SS of 8.5% or higher. SS content is determined by squeezing a few drops of juice on a hand-held refractometer.

3.3 Harvesting:

Mandarins are mostly hand plucked, using ladders rested on bamboo support, to prevent the tearing of branches bearing fruits. The quality of the produce is greatly affected by the damages/injuries during the harvesting. Therefore, great care should be taken during harvesting/plucking the fruits.

The plucking of fruits should not be carried out during wet weather or early morning when fruits are turgid and can easily be bruised, leading to decay during subsequent handling. Mandarin fruit tend to "plug" when snapped from the tree, i.e., a piece of the peel from the fruit remains attached to the stalk. It is preferable to use clippers to clip the fruit from the tree to avoid damage. The other cause of deterioration in the fruit quality is harvesting of immature or over mature fruits. Similarly, fruits are spoiled when they are harvested by pulling the fruit, causing rupturing of the peel of loose skin of the fruits. Harvested fruits need careful handling, till they reach the consumers.

3.3.1 Harvesting stage:

Generally, the Mandarins are harvested in 32-36 weeks after the fruit is set. In Coorg district, the fruits are harvested in 36-38 weeks; otherwise there is every possibility of shriveling of fruits and heavy drops. The colour of the rind also indicates the time of harvesting of the fruits. The criteria, depending on colour of rind for assessing the fruit maturity in some of the states are as under.

<u>Place</u>	<u>Colour of rind</u>
i) West Bengal	
High altitude	Greenish tinge
Low altitude	Orange yellow
ii) Arunachal Pradesh	Colour changes from green to orange
iii) Haryana	colour changes from green to dark yellow
iv) Meghalaya	colour changes from green to deep orange
v) Punjab	Yellow
vi) Madhya Pradesh	Colour changes from green to orange
vii) Maharashtra	Colour changes from green to orange

3.3.2 Harvesting technique:

Suitable application of harvesting technique is very important to prevent the losses during post-harvest handling. Fruits should be clipped in such a way that the button remains intact with the fruits. Sometimes, longer stalk portion of the clipped fruits left during harvesting, pierces into other fruits and causes injuries in them that paves the way for attack of wound pathogen. Therefore, while clipping the stalk should be cut close to the fruit, so as to preclude it from puncturing the rind of other fruit during harvest and handling.

3.3.3 Precautions during harvesting:

Harvesting is considered to be the most important factor, governing the post-harvest management. Therefore, following precaution should be taken during harvesting.

- i) Harvesting should be done by using appropriate instruments like clippers or by carefully twisting and pulling the fruit from the tree.
- ii) The harvesting under wet conditions should be avoided, since wet fruits are more susceptible to microbial growth and soil particles may cling to wet crops, exposing them to soil-borne rot organisms.
- iii) Harvesting of fruits is best done in the late morning, because in the early morning the oil glands of the fruits are full and cause immediate discolouration.
- iv) Care should be taken at the time of plucking the fruit that the button remains attached to the fruit.
- v) Stalk left on the fruit should be cut off close to fruit because they can puncture other fruit, causing injury and fruit spoilage.
- vi) The tree should never be shaken to harvest the fruits. Do not allow the fruit to fall on the soil, as the impact leads to mechanical injury, that makes fruit more prone to decay.
- vii) After harvesting, fruits should never be left in direct sunlight and must be kept in the shade
- viii) To avoid contact with the soil, the harvested fruits should be carefully put into padded field crates, well-ventilated plastic containers, or picking bags.
- ix) Picking bags made with a quick-opening bottom, should be either strapped around the waist or put over the shoulder of the picker.
- x) Picking bags should be so designed to empty from the bottom so that fruits can roll out of the sack onto the bottom of a larger field container or atop fruits already present.

The state-wise season of harvesting and method of harvesting of Mandarin is given in Table No. 1

Table No. 1**Season and method of harvesting**

Sl. No.	State	Start of season	End of season	Method of harvesting
1	2	3	4	5
1	Assam	October	February	Use of clippers and twisting
2	Haryana	November	March	Hand plucking
3	Karnataka Summer Monsoon	December June	February August	Twisting angularly or using a pair of clippers
4	Madhya Pradesh I II	January November	February December	Hand plucking
5	Maharashtra I II	October February	January end Mid May	Hand plucking
6	Meghalaya	November	February	Hand plucking
7	Mizoram	November	January	Hand plucking
8	Nagaland	November	January	Traditional hand plucking
9	Punjab	November	March	Hand plucking, cutting with scissors
10	Rajasthan	January	April	Hand plucking
11	Tamil Nadu Kodai Hills Main season Off season Shevray Hills Main season Off season Nilgiris Main season Off season	November 15 July November 15 July November July	January 15 September January 15 September February September	Hand plucking
12	Tripura II	November December	January February	Hand plucking
13	West Bengal	November	January	Hand plucking

Source: DMI survey

It is evident from the table No 1, that in the states like Karnataka, Madhya Pradesh, Maharashtra, Tamil Nadu and Tripura, the harvesting of Mandarin is undertaken twice a year. In Karnataka, the season of harvesting is December to February (summer crop), and June to August (Monsoon) crop. While in Madhya Pradesh, both the harvesting seasons are of very short duration i.e., November to December (I season) and January to February (II season). In

Maharashtra, the first harvesting commences in October and lasts till the end of January/February (Ambia season), the period of second harvesting is from February to mid May (Mrug Bahar). Similarly, in Tamil Nadu, the main season commences in November and lasts up to January / February, the period of second season namely 'off season' is from July to September. In Tripura the duration of first season is from November to January and second season is from December to February.

In rest of the Mandarin producing states, the harvesting of fruits is done only once in a year, as in Assam (October to February), Haryana and Punjab (November to march), Meghalaya (November to February), Mizoram (November to January), Nagaland and West Bengal (November to January) and Rajasthan (January to April).

Regarding method of harvesting, the traditional method i.e., hand plucking method is generally used in all the Mandarin growing states. In this traditional method, the fruits are twisted angularly and plucked. In the states like Assam and Karnataka, the clippers are also used for plucking of the fruits.

3.1 Post Harvest operations:

The adoption of best post-harvest management technique can extend shelf-life and quality of the fruits. Curing and washing, degreening, grading, packaging, storage, transportation and marketing etc., are the main post harvest operations.

3.1.1 Curing and washing:

During the curing, field heat of the fruit is brought down, this helps in stabilizing the metabolic process. The fruits are spread on the floor in orchard's yard, having the cushion of paddy straw for nearly 24 hrs and then washed to remove the dirt. By washing the original colour and luster of the fruits is also recovered.

The application of food grade wax, kaolin or similar coating, can also be used to enhance the appearance and minimize water loss. To prevent the fungal growth, proper fungicide in prescribed quantity is used while giving wax treatment.

The post packing treatment like fumigation and gamma-ray irradiation are generally practiced for high priced fruits.

3.1.2 Degreening:

Degreening constitutes conversion of chlorophyll of the peel without influencing the internal quality of the fruit.

In de-greening, the yellow-orange fruits with green spots could be de-greened in 48 hours at 26-28 °C and 90-95 RH at nearly 5 ppm ethylene concentration.

3.1.3 Grading:

Grading is one of the most important procedures to be followed in post harvest handling, as it determines the quality, shelf life and price of the fruit. During grading, the produce is sorted according to the fixed grade standard, taking into consideration various quality factors to make a homogenous lot.

Post-harvest grading of Mandarin is rarely practiced at the producer's level. At the most, the fruits are sorted out, based on physical characteristics like weight, size, colour, shape and degree of damage on fruits. This type of grading is done by hand in small operations.

In pack houses handling large volume of the produce, semi- automatic grading machines are also used, wherein the fruits are passed down on a slow moving conveyor. This semi automatically grading is very efficient with respect to time, space and quantity. The N.R.C.C., Nagpur has developed a machine for mechanical sorting, washing, waxing and sizing operations.

Some times, hand-held rings called “Fruit Sizer” of different diameters are used to check the different size categories and help in packing of same size fruits in the one container.

It is a common experience, the traders generally place best quality fruits at the top of containers, but this practice neither helps the growers nor traders. Therefore, the grading of fruits as per accepted quality standards helps farmers, marketing functionaries, processors, traders and consumers in efficient marketing.

Table- Grading Parameters used for grading of Mandarins in Mharashtra State

Sl. No.	State	Agency	Parameters used for grading	Quantity graded (%)
1	Maharashtra	Producers	Size and colour	-
		Wholesalers	Size and colour	80-85
		Commission agents	Size and colour	80
		Exporters	Size and colour	100

It is common practice in almost all the Mandarin producing states that the producers sell the orchards to the preharvest contractors before commencement of the harvesting season. These merchants harvest the fruits and carry them to different markets without undertaking any grading, for sale. In the markets, the grading is generally done on the basis of colour, shape and size.

3.3.3.1 Advantages of Grading and standardization:

1. Grading is beneficial to the farmers, traders as well as to the consumers, as it provides common standard to all.
2. Grading of the produce before sale enables farmers to get better price for their produce.
3. Grading assists the producers and other intermediaries in preparing fresh produce for market with appropriate labeling.
4. Grading helps the consumers to get standard quality produce at fair price.

5. It facilitates the consumer to compare the prices of different qualities of a produce in the market.
6. It assures the quality of the produce and also reduces the cost of the marketing and transportation.
7. Produce of similar grade can be stored in bulk.
8. Market values are better understood.
9. Commodities can be bought and sold without inspection, through e-trading.
10. Grading provides an authentic and scientific basis in promoting and managing the marketing system.
11. It serves as a realistic and common basis for market intelligence and reporting.
12. It facilitates the settlement of quality disputes between buyers and sellers.

Grading at producers' level:

Though there is no grading of Mandarin at producers level, but there is an increasing recognition to the fact that producers need to be assisted in grading their produce before sale so that they may get better price. For securing adequate returns to the producer/seller, the scheme of "Grading at Producers' Level" was introduced in 1962-63 by Directorate of Marketing and Inspection. The main objective of this scheme is to subject the produce to simple test and assign a grade before it is offered for sale. After grading, the producers get prices commensurate with the quality of the produce.

3.3.4 Packaging:

The packaging of fruits is required for efficient handling and marketing, better eye appeal and better shelf life by reducing mechanical damage and water loss. The proper packaging protects the fruits from pilferage, dirt, physiological and pathological deterioration during further handling. Efficient packaging of horticultural produce in uniform size reduces the need for repeated weighing and can facilitate handling, stacking, loading, unloading, better storage, long transportation, transshipment and marketing.

The use of traditional baskets, sacks, boxes and trays to carry the produce to the market is very much common, as a packaging material. These are locally fabricated, low cost and made out of cane and bamboo, dried grass, palm leaves and teak leaves. Though, they serve the purpose of carrying fresh produce to short distances, they cannot be used for long distance transportation. Large quantities of produce need better packaging to minimize the losses and achieve

the most economical use of conveyance. During the packing, the immature, overripe, damaged and diseased fruits should be sorted out, only sound fruits should be packed.

While selecting and opting out for specific packaging material for a particular produce, precaution should be taken to prevent transit hazards caused by the packaging material. Nature of such damages is cut or punctures, shock/impact, compression, vibration, heat damage, chilling or freezing damage and chemical contamination.

The different types of packaging material that can be used for packing fresh horticultural produce comprises of

1. Natural materials (traditional containers made of cane and bamboo, straw, and palm leaves etc.
2. Wooden boxes,
3. Corrugated fiber board boxes,
4. Molded plastics sacks or bags made out of natural or synthetic fibers (e.g. jute, sisal, polypropylene polyethylene) and
5. Paper or plastic films.

Recyclable boxes molded from Higher Density Polythene (HDP) are widely used for transporting of produce. These can be specially designed and fabricated to meet the specific requirements of transport. They are strong, rigid, smooth, easily cleaned and stacked to conserve space. Paper or plastic films is often used for lining of packing boxes in order to reduce transportation loss and prevent friction damage. Plastic-film bags or wraps are widely used in marketing of fruit, especially in consumer size packs. Packaging operations may be done manually or mechanically using various methods viz; loose-fill jumble packing, multilayer pattern pack with size grading, multilayer size graded pack using separator trays and single layer pack for high value produce.

3.3.4.1 Type of packaging:

There are two types of packaging i.e. i) Conventional packages and ii) Modern packages.

In conventional packages, wooden boxes, bamboo boxes and jute gunny bags are used.

In modern packaging card board boxes, plastic crates, poly bags, wire bags, C.A.P. (Controlled Atmospheric Packaging) is generally used. C.A.P. allows certain gaseous components from atmosphere to replace the ones released by the produce or checks the gaseous exchange around fruit pack and thus enhances the shelf life.

It is seen that for the local markets, the Mandarins are packed in sacks, bags, bamboo baskets and wooden boxes. Sometimes, the Mandarins are also packed in telescopic cardboard boxes. The corrugated boxes, which are cost effective due to its reusability, are also being used as packaging material while transporting the fruits.

For export of Nagpur Mandarins usually 2 pieces, telescopic, corrugated fiberboard boxes of three ply or five ply are used. The size of the box may vary according to the requirement of the importing country. Normally a box size of 49.5 x

29.5 x 17.5 cm having 10 kg capacity is recommended. The boxes must have 5% area punched as holes for ventilation. To immobilize the movement of fruits inside the box, three ply wax treated dividers having ventilation holes are used.

During the survey it is found that there are no standard parameters of any pack and may differ from place to place. Usually, the fruits are placed in layers one above the other, with a straw padding in-between.

The state-wise packaging material used, mode of packaging and their capacity, are furnished in table No 3.

Sl. No	State	Agency	Mode of packaging	
			Type	Capacity (kg.)
1	2	3	4	5
1	Assam	All functionaries	No packing	Loose
2	Haryana	Producers	No packing	Loose
		Wholesalers	Plastic crates	18-20
		Commission agents	Corrugated boxes	8-10
		Cooperatives		
		Processor	No packing	Loose
		Exporters	Wooden boxes	8-10
		Retailers	No packing	Loose
3	Karnataka	Producers	No packing	Loose
		Commission agents	Corrugated fiber board	24 fruits per pack
		Cooperatives		
4	Madhya Pradesh	Wholesalers	Basket	20-25 Kg.
		Commission agents	Basket	20-25 Kg.
		Cooperatives	Box	10-15 Kg.
		Producers	No packing	Loose
5	Maharashtra	Wholesalers	Wooden box and Plastic crates	20-25 Kg.
		Exporters	Carton box	10-15 Kg
		Retailers	Loose	Loose
6	Meghalaya	Producers	Bamboo baskets	30 Kg
		Wholesalers	Bamboo baskets	30 Kg
		Retailers	Bamboo baskets	8 Kg
7	Mizoram	Producers	Gunny bags	30 Kg
		Wholesalers	Gunny bags	50 Kg
8	Nagaland	All functionaries	No packing	Loose
		Producers	No packing	Loose

9	Punjab	Wholesalers	Plastic crates	18-20
		Commission agents	Corrugated boxes	8-10
		Cooperatives	Wooden boxes	25-27
		Processor	Plastic crates	10-15
		Exporters	Corrugated boxes	8-10
		Retailers	Jute bags	8-10
10	Rajasthan	Producers	Crates	20-22 Kg.
		Wholesalers	Wooden box	20-22 Kg.
		Commission agents	Wooden box	20-22 Kg.
		Cooperatives	Wooden box	20-22 Kg.
		Retailers	Loose	Loose
11	Tamil Nadu	Producers	Carton boxes, Bamboo baskets, Plastic crates boxes	5-10 Kg. 5-15 Kg. 20 Kg.
		Commission agents	Plastic crates/ boxes	10-20 Kg.
		Wholesalers	Plastic crates/ boxes Cartons, Loose	10-20 Kg. 10-15 Kg.
		Retailers	Plastic crates/ boxes, Bamboo baskets	10-20 Kg. 10-15 Kg.
12	Tripura	Producers	Bamboo baskets	100 Nos.
		Wholesalers	Bamboo baskets	100 Nos.
13	West Bengal	Producers	Bamboo baskets, Gunny bags, Polythene bags	15-20 Kg.
		Wholesalers	Wooden boxes	100-110 Nos.
		Commission Agents	Wooden boxes	100-110 Nos.

Source: DMI survey

The producers generally sell the orchards to pre-harvest contractors. The producers, who do not sell the produce to pre-harvest contractors, transport Mandarins in loose to the nearby markets. The packaging material like Bamboo baskets, Gunny bags, Poly woven bags Plastic crates, Cartons and Corrugated fiber board boxes etc. and sometimes wooden boxes are used in carrying the produce to the markets by the wholesalers and commission agents.

3.3.4.2 Parameters of packaging material:

The size, type and capacity of the packaging material depend mostly upon the locally available raw material, distance of the markets and type of transport to be used. Generally, the packing material of different size made of bamboo boxes, corrugated fiber boxes, telescopic boxes, wooden boxes and plastic crates are used for packing of Mandarins.

The information regarding capacity of the packages, approximate weight per package used, number of layers and count of Mandarins kept in the packages, material used as packaging cushion etc, are given in table No 4.

Table No 4.

Parameters of Packaging material

Sl. No	State	Market	Type of packaging	Capacity of packaging			Shape	Packaging meant for
				Weight (Kg.)	Count (No.)	No. of layers		
1	2	3	4	5	6	7	8	9
1	Maharashtra	Achalpur	Wooden boxes	21-24	150 -250	4	Rectangular	Interstate / long distance
		Chandur Bazar	Wooden boxes Plastic crates	20-28 20	100-210 120 - 165	5-6 3 - 4	Rectangular Rectangular	and export Local and small distances
		Warud	Wooden boxes	20 - 25	150 - 225	4 - 5	Rectangular	Interstate / long distance
		Narkhed, Katol	Plastic crates, Wooden boxes	20 - 25	150 - 225	4 - 5	Rectangular	Interstate / long distance
		Nagpur	Carton boxes	10 - 15	45 - 50	4 - 5	Rectangular	Interstate and export

Source- DMI Survey

3.3.4.3 Qualities of packaging material:

Since, a package as a container offers accommodation to the contents for storage and transportation, therefore the packages must have the following basic qualities.

- i) It must protect quality and quantity.
- ii) It must prevent spoilage during transit and storage.
- iii) Labeling of package must indicate about quality, variety, date of packing, traceability, weight and price etc.
- iv) It must be convenient in handling operations.
- v) It must be convenient to stack.

- vi) It must be cheap, clean, hygienic and attractive.
- vii) It must be biodegradable
- viii) It must be free from adverse chemicals.
- ix) It should be reusable.
- x) It should immobilize the fruits placed inside.
- xi) Quality and hygienic cushioning material must be used to protect fruits from impact, injury and compression.
- xii) It should offer good ambient conditions to the fruits congenial for storage and transportation.
- xiii) It should meet optimum requirements of ventilation vis-à-vis temperature and relative humidity management.

3.3.4.4 Packaging material suggested by Market Planning and Design Center:

Market Planning & Design Centre of Directorate and Inspection has suggested the corrugated paper boxes for the packaging of Mandarins. It has the following advantages.

- 1) These packages can be arranged in the truck with minimal residual space.
- 2) The unit capacity is comfortable, compared with conventional wooden box.
- 3) The counts of each package can very well be presented in terms of unit dozen or multiple thereof, which will facilitate price negotiations and auction.
- 4) The weight of each package in terms of gross weight and net weight will be less than that of the conventional wooden box and hence the package is likely to be safe from various surges in the transit.
- 5) The handling cost at loading point will be comparable with the conventional wooden boxes.

- 6) The unit cost of transportation will be reduced, because of more space generated for the cargo in the load.

3.3.4.5 Precautions to be taken before packaging:

- i) Mandarins should be plucked at appropriate maturity, keeping in view the time span of the market.
- ii) Mandarins should be sorted and graded as per accepted quality standards, before packing. Only sound fruits should be packed.
- iii) Before packing, post-harvest treatment with wax and fungicides should be resorted to as a prophylactic measure against pathogenic invasion in transit.
- iv) For prevention of bruising/abrasion injuries, paper liners, pads, trays or tissue wraps may be used. As an alternative, cushioning with easily available paddy straw keeps the packing cost minimum. It will maintain a level of R.H. because of moisture absorbing tendency of the paddy straw and keep the temperature down.
- v) Careful placement of Mandarins in the cartons is necessary to avoid bruising. The use of telescopic boxes can overcome this problem very well.
- vi) For securing packages, use of adhesive tape (3 to 4 cm) may be used. The packages can also be secured with thin rope of coconut fiber, or polythene sutli, as an alternative.

3.3.4.6 Precautions during packing:

During packing, fruits should never be packed loosely in order to avoid shaking of fruits which leads to friction among fruits surface and thereby causing damage. In wooden boxes or cartons, filling should be done with little pressure so that during transit period when the volume of the fruits gets reduce due to dehydration and adjustment of space due to jerks in transit, the pack structure does not get loose.

It is also observed that during the packaging, sharp edges of the packing material damage the fruits. Therefore, care should be taken so

that they do not come out of the containers, resulting in bruising, puncturing and damaging the fruits.

Similarly, there should not be too much ventilation which can affect the quality of fruits due to shrinkage, loss in weight, colour, etc.

3.3.5 Cool Chain:

Cool chain is essential during the transport of quality Mandarins all the way from the farm to the customer. This helps in maintaining the temperature inside the box at the same low level as in the cold storage.

The various stages of the cool chain are:

1. Pre- cooling and cold store at the farm.
2. Refrigerated truck from farm to the airport
3. Cold store at the airport.
4. Building up of the pallet in a cold store at the airport.
5. Loading the aircrafts directly from the cold store in a short time.
6. Cargo aircraft maintains cold store temperature in transit.
7. Off-loading direct into a cold store in the receiving country.
8. Refrigerated truck to the air cooled departmental stores.

3.3.6 Preparation for the Market:

During the survey, it was observed that producers do not carry out any special preparation for bringing Mandarins to the markets. At the most, Mandarins are washed and cleaned before carrying them to the markets. Moreover no chemical treatment is given for ripening of the fruits, as is done in case of other fruits like banana and mangoes.

3.4 Post -Harvest Losses:

3.4.1 Nature and Causes of Post-Harvest Losses:

Post-harvest losses of horticultural produce may occur due to a

variety of reasons. Some of the common reasons for post-harvest losses are as under.

- (i) Mechanical injury;
- (ii) Injuries due to thermal shock;
- (iii) Disease and pest attack;
- (iv) Microbial attack; and
- (v) Physio-biochemical reasons.

Fresh fruits are inherently perishable. During the process of distribution and marketing, substantial losses are recorded which range from a slight loss of quality to total spoilage. Post harvest losses may occur at any point in the marketing process, from the initial harvesting, grading, packaging, transportation from the field to storage, storage to assembly point, during storage and distribution to the final consumer.

A large number of intermediaries play an important role in the system between farmer and the retailer like local retailer, transporter, wholesalers and distributor, etc, and at every step significant waste is noticed.

3.4.1.1 Shrink-wrapping:

This is a relatively new technique in which heat shrinkable poly film is used to wrap the individual fruit and over wrapping of trays. Polyethylene is the best for using it as wrapping, as it is least expensive and extend the shelf life by three weeks.

3.4.2 Storage:

The production of the fruit is seasonal, but its demand remains for a longer period. Therefore, storage is very essential for extending the consumption period of fruits, as well as for regulating their supply to the markets. The principal aim of storage is to ensure better returns to the growers.

The storage of Mandarins, at different markets, is given in table No.5

Table No 5. Storage of mandarins

Sl. No	State	Agency	Type of storage (ambient/cold storage)	Period of storage	Method of storage
1	Assam	Producers/All functionaries	Simple storage	N.A.	Loose
2	Haryana	Producers	Not in practice	-	-
		Wholesalers / Commission agents	Cold storage	30-60 days	In plastic crates
3	Karnataka	Producers/All functionaries	Simple storage	5-10 days	Corrugated boxes, Bamboo boxes, Loose
4	Madhya Pradesh	Producers/All functionaries	Simple storage	N.A.	Corrugated boxes, Bamboo boxes, Loose
5	Maharashtra	Producers/All functionaries	Simple storage	2-3	Wooden boxes, Plastic crates, Loose
		Processors	Cold storage	3-5	In boxes
6	Meghalaya	Producers	Simple storage	2-3 days	Gunny bags, bamboo baskets
		Wholesalers	Simple storage	2-3 days	
		Retailers	Simple storage	5-8 days	
7	Mizoram	Producers	Simple storage	2-3 days	Bamboo baskets
		Wholesalers	Simple storage	2-3 days	Gunny bags, bamboo baskets
		Retailers	Simple storage	4-7 days	Loose
8	Nagaland	Producers/All functionaries	Simple storage	2-3 days	Loose
9	Punjab	Wholesalers / Commission agents, Retailers	Cold storage	30-45 days 3-5 days	Plastic crates
10	Rajasthan	Producers/All functionaries	Simple storage	N.A.	Loose

11	Tamil Nadu	Wholesalers/	Cold Storage	4 -5- months	5,10 & 15 Kg.
12	Tripura	Retailers	Simple storage	5-20 days	Loose
13	West Bengal	All functionaries	No storage	N.A.	N.A.

Source: DMI survey

From the table No 5, it is revealed that the Mandarins are also kept in cold storage in states like Haryana, Maharashtra, Punjab and Tamil Nadu. In other states, the Mandarins are kept in ambient storage. In Haryana and Punjab, plastic crates are used for storing the Mandarins. In Maharashtra and Tamil Nadu, wooden boxes and plastic crates are in use for storing of the fruits. In North Eastern states, bamboo baskets, gunny bags are used for storing the fruit.

CHAPTER -4

MANUFACTURING OF ORANGE PRODUCTS

(Nectar, Squash, RTS, Jam & Marmalade)

Number of value added products may be prepared from orange fruits like nectar, squash, Ready to Serve beverages(RTS), jam, marmalade etc. The manufacturing process and flow sheet is described herewith.

1) Nectar:

Definition:

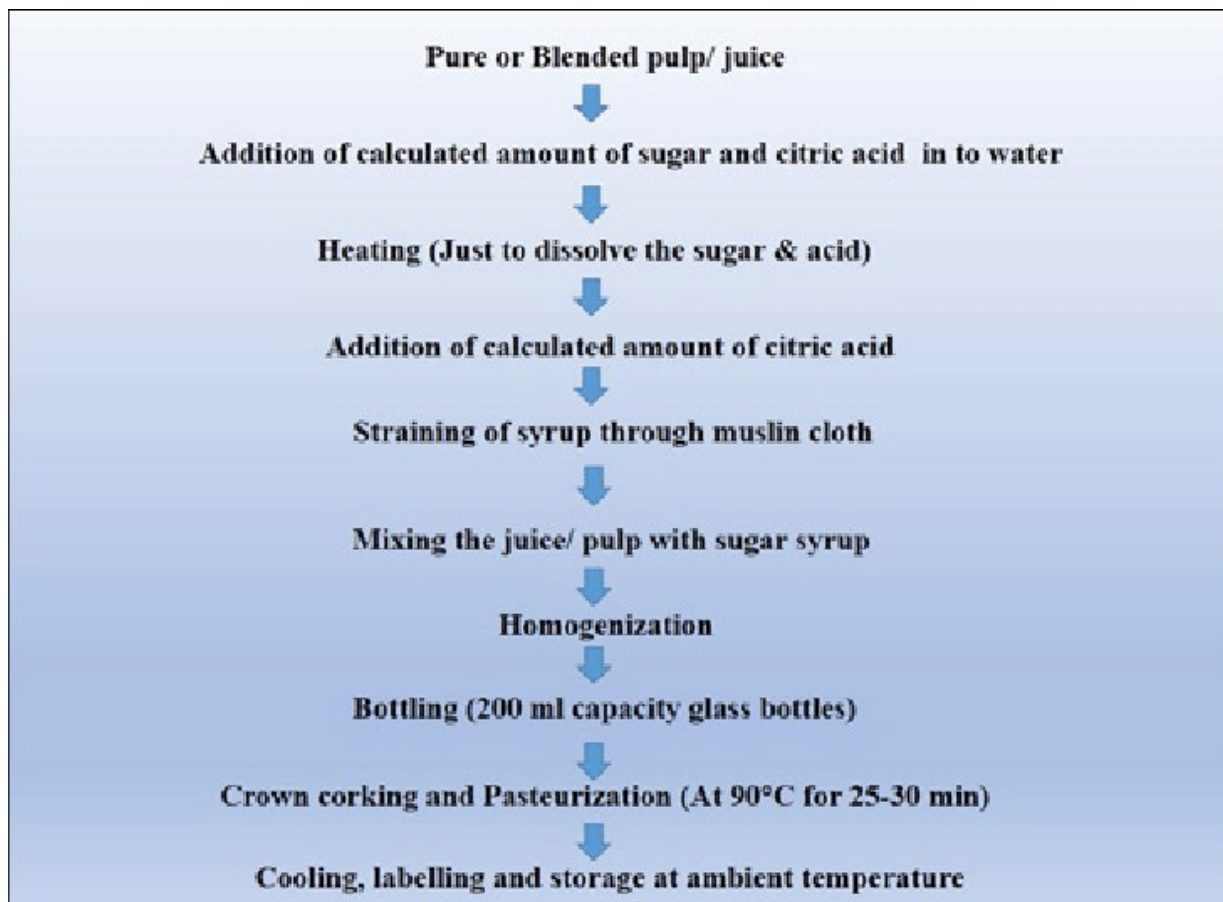
Nectar juice is also called nectar drink, or pulp juice. It refers to the juice containing fruit pulps and flesh.

Nectar juice is made of original fruit pulps or concentrated pulps, added with sugar and acid agent.

FSSAI specification for nectar:

TSS- 15%, **Acidity-** 1.5%

Flow sheet for nectar production:



2) Squash:

Definition: Squash is the product, which is prepared by mixing of calculated quantity of fruit juice or pulp, with sugar, acid and other ingredients. Squash can also be prepared from oranges, lemon, bael, guava, pear, apricot, muskmelon, papaya, passion fruit, peach, plum, mulberry, raspberry, strawberry, grapefruit, etc.

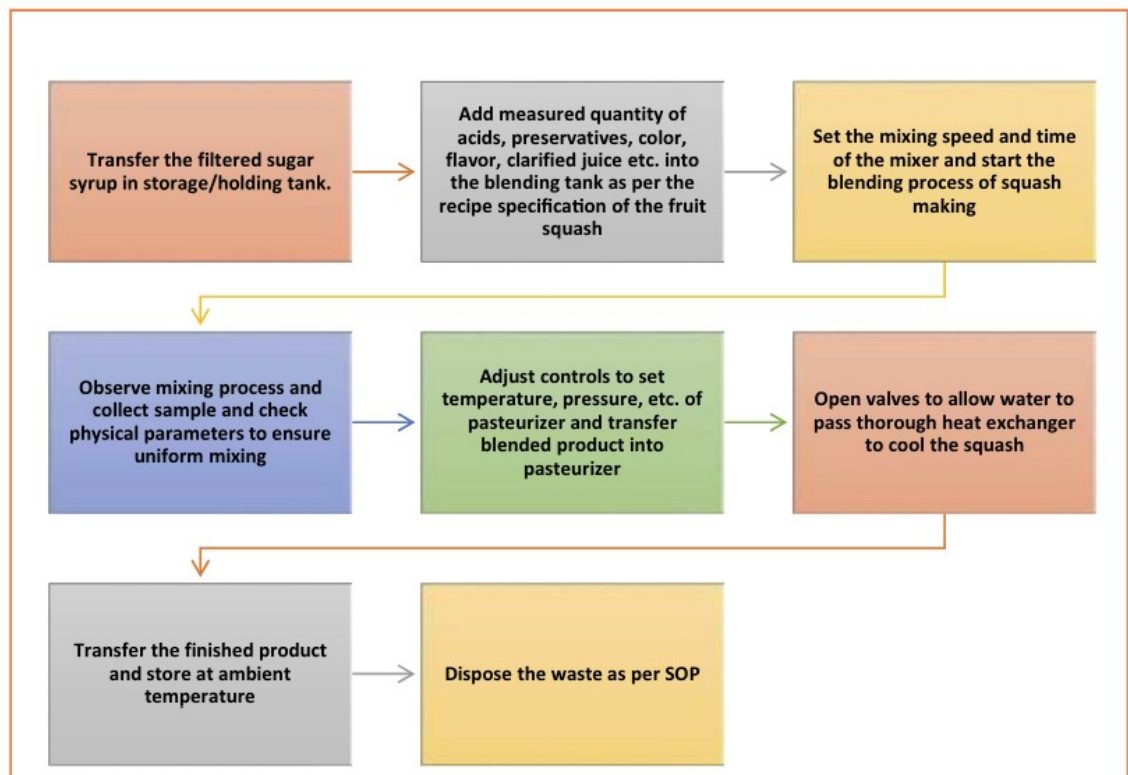
FSSAI specification for Squash:

Juice content -25%
Acidity - 1%
TSS-45 %
Preservative -350 ppm of SO₂ (or)
600 ppm of benzoic acid

Flow sheet for Squash production:

The following workflow process chart explains the preparation of fruit squash:





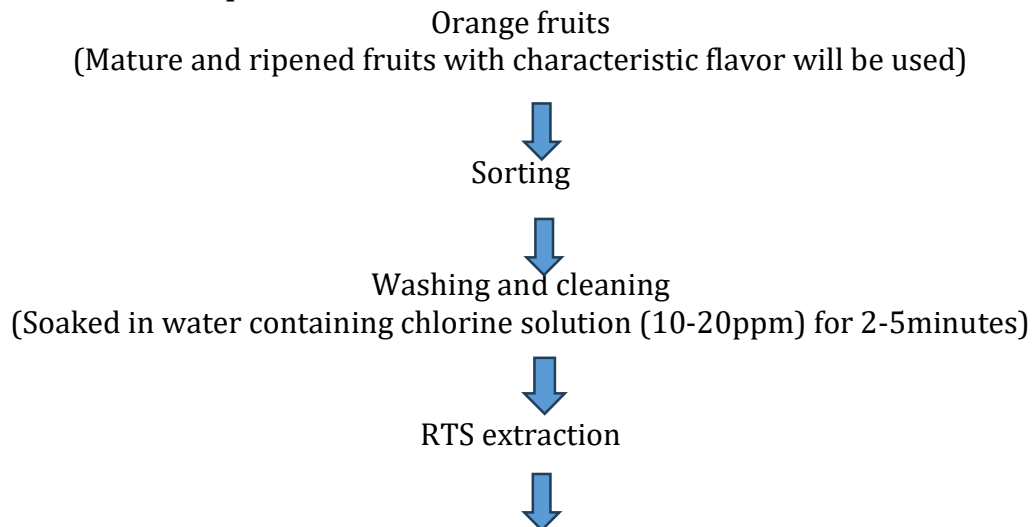
3) RTS (ready to serve):

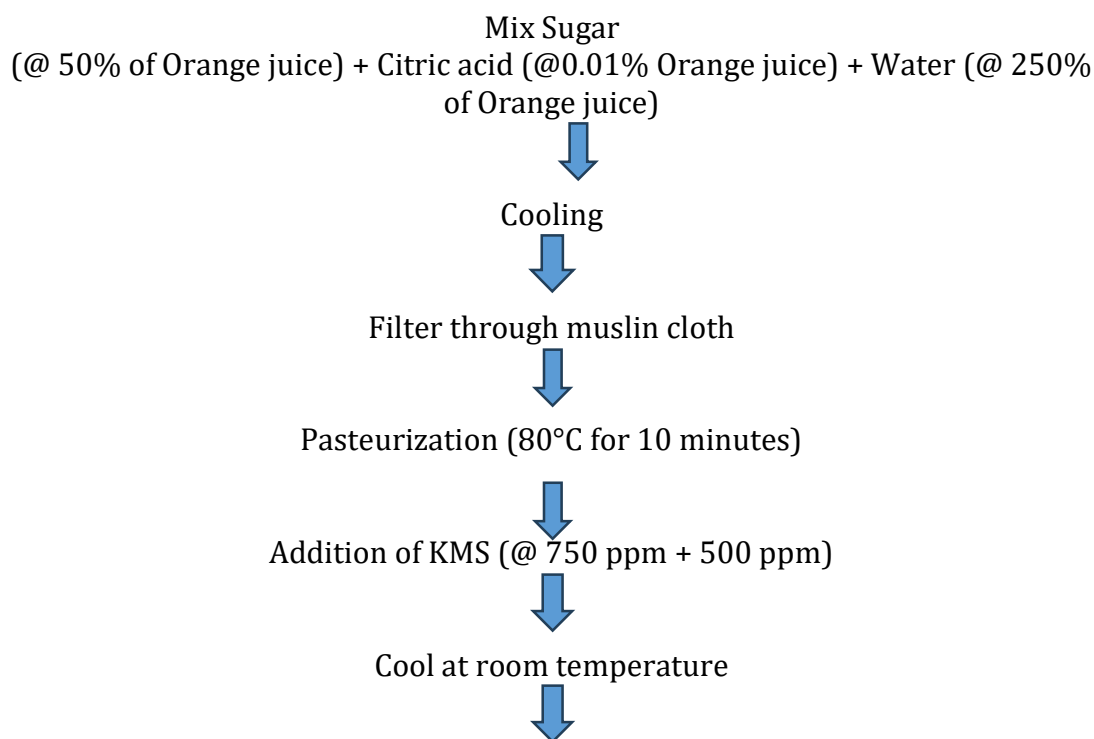
This is a type of fruit beverage containing at least 10% fruit juice and 10% total soluble solids besides about 0.3% acid. It is not diluted before serving and, hence, is known as ready-to-serve (RTS) beverage.

FSSAI specification for RTS:

Juice content -10%, Acidity – 0.2-0.3%, TSS-10 %, Preservative -70 ppm of SO₂

Flow sheet for RTS production:





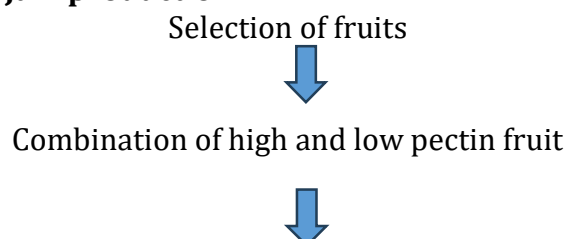
4) Jam :

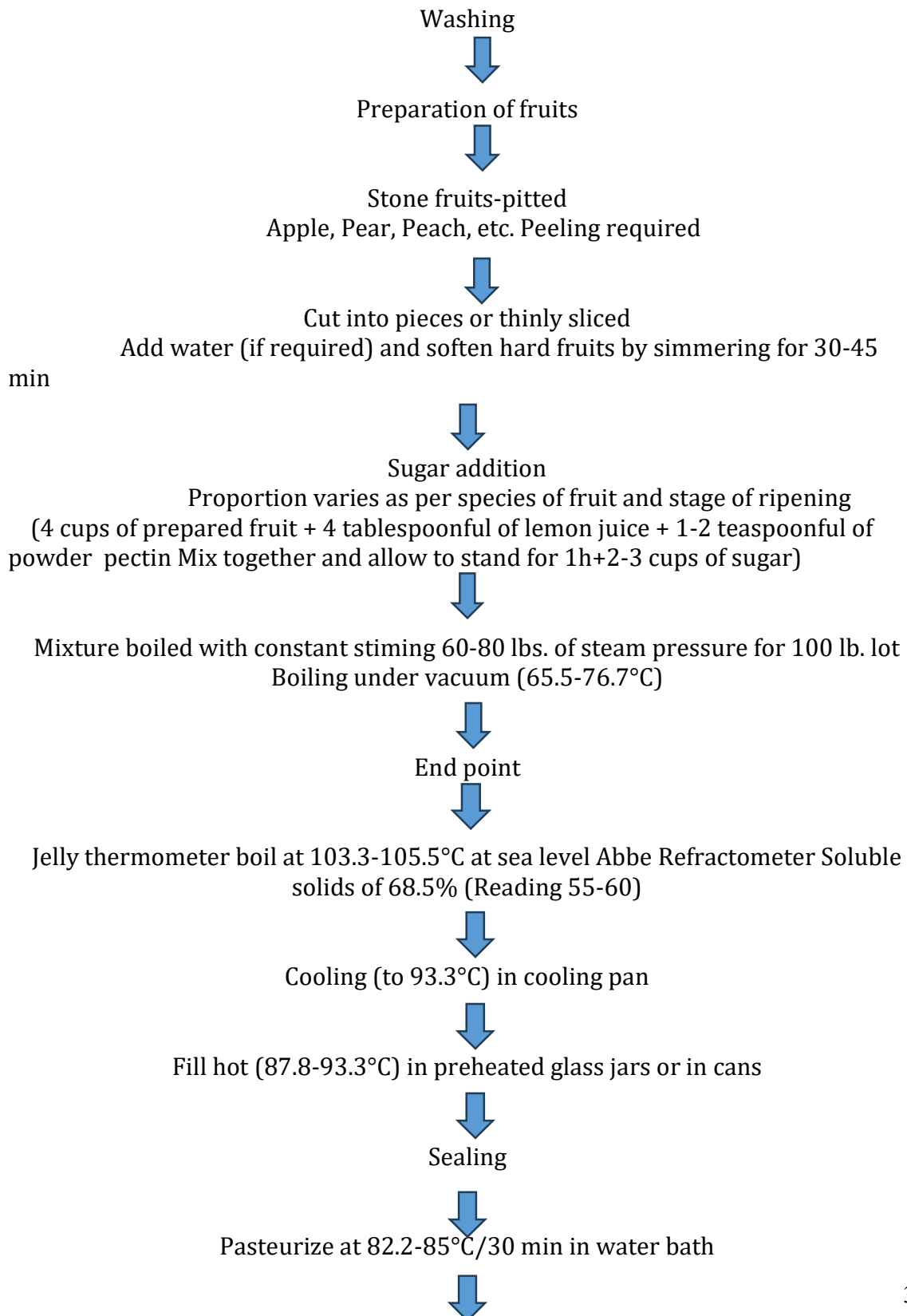
Definition: Jam means the product prepared from sound, ripe, fresh, dehydrated, frozen or previously packed fruits including fruit juices, fruit pulp, fruit juice concentrate or dry fruit by boiling its pieces or pulp or puree with nutritive sweeteners namely sugar, dextrose, invert sugar or liquid glucose to a suitable consistency

FSSAI specification for Jam:

Fruit	Pulp	–	45%
TSS(<i>Total</i>	<i>soluble</i>		<i>solids</i>)-65%
Citric	acid-		5g
Preservative-	40 ppm of SO ₂		

Flow sheet for Jam production:





Cooling
↓
Store in a cool place; RH 80%

5) Marmalade:

Definition: The term is generally used for products made from citrus fruits like oranges and lemons in which shredded peel is used as the suspended material. Citrus marmalades are classified into (1) jelly marmalade (2) jam marmalade. The FPO specifications for marmalade are TSS- 65% and fruit juice - 45% of the prepared product.

FSSAI specification for Marmalade :

Fruit Pulp – 45%

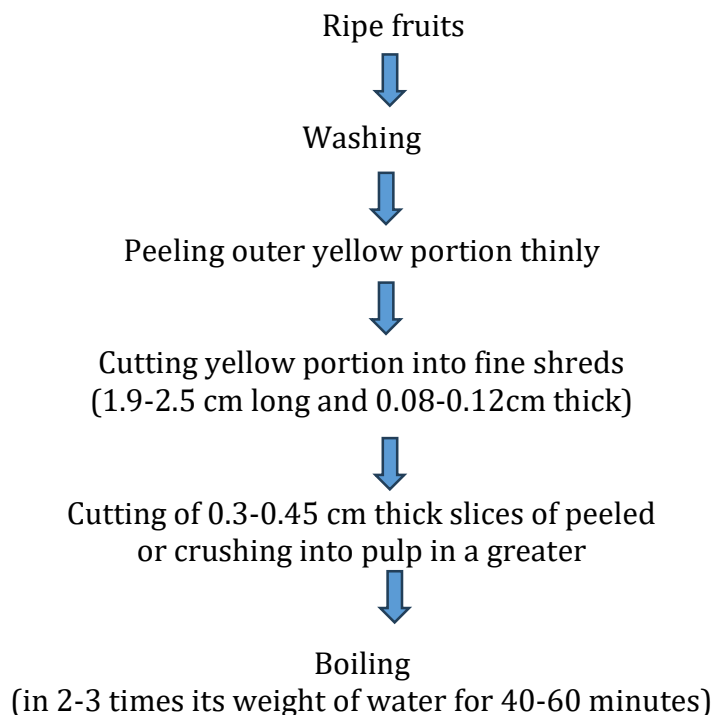
TSS-65%

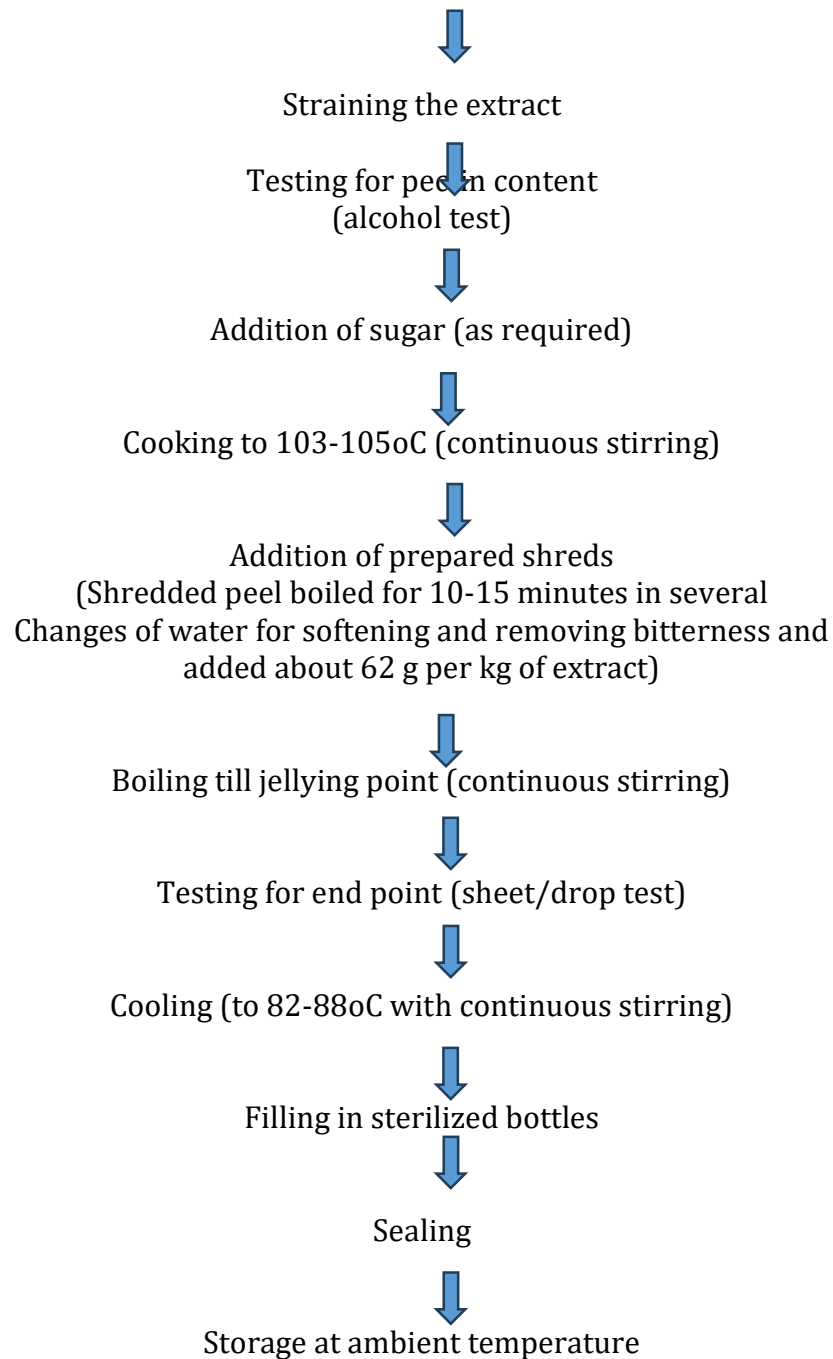
Citric acid -2 g

Preservative-40 ppm of SO₂

Shreds-62 g/lit

Flow sheet for Marmalade production :





Approx yield of above products: (Nectar, Squash, RTS, Jam, Marmalade)

Fresh oranges typically yield about 40-50% juice by weight.

From 100 kg of oranges, you can expect about 40-50 kg of orange juice depending upon the size & varieties.

1) $\text{Juice content (\%)} = \text{Juice content} / \text{Fruit wt} * 100$

2) $\text{Peel percentage (\%)} = \text{Peel content} / \text{Fruit wt} * 100$

Production Output for 100kg Oranges :

1) Orange Nectar:

Orange nectar typically contains around 25-50% orange juice, with the rest being water and sweeteners. We'll assume a common concentration of 40% for this calculation.

For every 100 liters of orange nectar, 40 liters would be pure orange juice.

From the juice yield of 100 kg of oranges (40 liters of juice):
40 liters of pure orange juice can make

$40/0.40 = \mathbf{100 \text{ liters of orange nectar. (Approx.)}$

Therefore, from 100 kg of oranges, you can produce approximately 100 liters of orange nectar, assuming a 40% concentration of orange juice in the final product.

2) Orange Squash :

Orange squash is a concentrated beverage, usually containing around 25-30% orange juice.

Assuming a 30% juice content for the squash:

For every 100 liters of squash, 30 liters would be pure orange juice.

From the juice yield of 100 kg of oranges (let's assume an average of 40 liters of juice):

40 liters of pure orange juice can make

$40/0.30 = \mathbf{133 \text{ liters of orange squash.}}$

Therefore, from 100 kg of oranges, you can produce approximately 133 liters of orange squash, assuming a 30% concentration of orange juice in the final product.

3) Orange RTS:

A common ratio for RTS juice is about 10-15% orange juice concentrate. Assuming 10% for calculation:
For 100 liters of RTS juice, you need 10 liters of pure orange juice.
Using the juice yield from 100 kg of oranges (let's assume 40 liters):
40 liters of orange juice can make approximately

$40/0.10 = 400$ **liters of RTS orange juice.**

So, from 100 kg of oranges, you can typically produce around 400 liters of RTS orange juice, assuming a 10% concentration of orange juice in the final product.

4) Orange Jam:

Fresh oranges typically yield about 40-50% juice by weight, and the pulp can also be used in jam making.
From 100 kg of oranges, you can expect about 40-50 kg of juice and pulp combined. Let's use of 40 kg.

The typical ratio for making jam is roughly 1:1.2 by weight of fruit pulp to sugar.

If we start with 40 kg of orange pulp and juice, we would need approximately 48 kg of sugar.

Thus, from **100 kg of oranges**, you can expect to produce **approximately 88 kg of orange jam**, accounting for some reduction in weight during the cooking process.

CHAPTER- 5

PROJECT CONCEPT AND JUSTIFICATIONS

It is proposed to set up a Orange processing facility of 2 TPD capacity at various locations for Citrus fruits mainly Oranges.

Rationale of the Project

Post-harvest losses in our country have been estimated about 35 % and only about 2% of the total F & V are processed. Maharashtra State is the largest producer of F & V in India. Delay in the harvest takes away its freshness, palatability, appeal & nutritive value. Due to insufficient demand, weak infrastructure, poor transportation and perishable nature of crops the grower sustain substantial losses. During the glut, the loss is considerable.

Estimated post harvest losses for some fruits

Sr.No.	Type of Fruits	Percent of Loss
1	Orange/ Mandarin	20-95
2	Lemon	20-85
3	Papaya	40-100
4	Banana	20-80

Careless and improper handling of agriculture produce reduces the market value and keeping quality, ultimately causing enormous losses and depriving rightful benefits to both growers and consumers. Besides these quantitative losses the loss suffered in quality before actual consumption can hardly be estimated. Although the R & D effort on the development of Post-harvest handling has helped in reducing the spoilage, considerable losses continue to occur. Moreover, most of the agricultural produce is seasonal, due to harvest glut the price falls drastically. This is applicable not only for F & V, but any type of agricultural produce.

The approach possible for solving the problem is the creation of cold storage facilities in the agriculture producing region as also in the major towns and urban consumption centers to ensure supply of agricultural produce round the year in the reasonable price and or converting the farm produce into value added products

Problem of Price fluctuations & Benefits of Cold Storage System and Processing facility

JUSTIFICATION OF THE PROJECT

The existing structure of marketing of perishables especially oranges, and other citrus fruits do not address the problems of farmers; it has low marketing efficiency, high post-harvest losses and does not foster competitiveness. There is no chain of facilities such as a modern system in respect of pack house with grading system and a small cold storage system. The availability of the oranges is seasonal in nature and they are perishable. The best way is to manufacture the various value added products such as nectar, squash, Ready to serve beverages(RTS), Jam/Jellies, marmalade, fruit carbonated beverages. The efforts will be done to manufacture these products round the year. For this purpose, the citrus fruits like oranges, sweet lime, lemon may be used as per the availability of these fruits. This will help to make to use the same machinery for the production of the said products.

Objectives of the Proposed Project:

Following are the main objectives of the proposed project

- To extract juice/pulp for the production of nectar, squash, RTS, jam/jellies and marmalade.
- To provide processing facilities so as to ensure price to the farmers commensurate with the quality of the produce.

- To create general awareness and provide education and training to framers, entrepreneurs and market functionaries on agricultural marketing including post-harvest management and processing facilities.
- The setting up of such units for the orange processing will be useful for the farmers, traders and processors in the area and will reduce post-harvest losses, assure quality products to consumers and improve the returns to the farming community.

CHAPTER – 6

SPECIFICATIONS OF ORANGE PROCESSING PLANT(2TPD)

The Citrus fruit processing plant based on handling of the fruits shall be 200Kg/hr or 2 TPD considering 10 hours per day working. The various products manufactured will be RTS, nectar, squash, jam/marmalade etc. as per the market demand. The machinery specifications are as under-

A) Multi fruits pulping and processing section

The machineries under this section are as follows.

1) Basket Type washer with basket (1 no.)

Function: For washing of Fruits & Vegetables.

Brief spec: There will be two shallow deep tanks mounted on a structure.

- Comprised of 4 Nos. perforated / Wire mesh baskets in tank.
- Each basket suitable to hold 5-10 kg depending upon type of fruit/vegetables.
- Washing is carried out with help of pressurized blower which is integral part of washer.
- Complete with necessary fittings like drain valve, Water inlet, etc.
- M.O.C: - contact parts SS 304 / Non-contact MS.
- Holding Capacity: approx. 20-40 Kg batch (depending on the product)
- Elec. Power: 1 HP / 3 Phs. / 50 Hrtz. / 415 V.

2) Working Tables (1no.)

Function: For sorting, inspection, cutting & handling of Fruits etc. **Brief spec:**

- Thick gauge SS table top and raised edges
- Drain outlet at one end, square tube structure.
- Size: Approx. 1500 mm X 900 mm X 900 mm. Ht.
- M.O.C: - Contact parts S. S. 304 / Non-contact MS

3) Fruit Mill (1no.)

Function: For crushing of seedless fruits before pulping. **Brief spec:**

- Chamber made from thick plates of 12mm serration inside for crushing of seedless fruits.
- High speed rotor /chopper fitted inside 2 sets of discharge screen, Complete with Feed & discharge chute.
- Heavy duty self-supporting structure.
- Main Shaft supported on heavy duty housing with bearings at both ends.

- Oil seals at back of the chamber to avoid leakage.
- Open able front door for easy cleaning of machine.
- 'V' belt duplex pulley driven.
- Adjustable motor plate for tensioning of 'V' belt.
- Easily removable screen for cleaning and changing.
- Motor / Structure covered from all side to avoid material spillage and safety.
- M.O.C.: Contact parts SS 304 / Non-contact MS.
- Elec. Power: - 3 HP / 3 PHs / 415 V / 50 Hertz.

4) Screw Type Juice Extractor (1no.)

Function: For extraction of juice from Fruits like peeled Oranges, lemon etc.

Construction:

- Heavy duty solid taper and grooved screw, housed in screen cage with juice collection arrangement.
- Body with top cover and Easy dismantling for cleaning.
- Spring loaded waste discharge arrangement.
- Complete Feed hopper, waste chute, Juice collection tray, etc.
- M.O.C: - contact parts SS 304 / Non-contact MS
- Input Capacity: 200 Kg / Hr. approx.
- Elect Power: - 1.5 HP / 3 phs / 415 V / 50 Hertz

5) Two Stage Pulper (1no.)

Function: For extraction of pulp/puree from fruit like Mango, crushed Tomato, Guava etc.

Brief spec:

- Pulper mounted on square tube rigid structure with coarse pulping screen 3 mm dia. Perforation.
- Coarse Pulper complete with 2 Nos. of Brushes & 2 Nos. of Cutting Beater blades with adjustable height.
- Polypropylene base nylon Brushes caged in SS 304 folded channels for extra strength.
- Hinged cover on top for easy cleaning after production batch.
- Pulper complete Feed hopper, Seed discharge chute, Screen, Motor covers. Etc
- 'V' Belt duplex pulley driven.
- 4 "Dia. product outlet pipe for transferring coarse pulp in fine pulper.
- Fine Pulper will be same as coarse pulper but instead beater blades there will be 4 Nos. of Brushes with adjustable height
- M.O.C: - Contact parts SS 304 / Non-contact MS.
- Input Capacity: 200 Kg / Hr.

- Elec. Power: - 3 HP (Coarse Pulper), 2 HP (Fine Pulper) / 3 Ph / 415 V / 50 Hertz

6) Steam Jacketted kettles,-2 Nos., Fixed Type

Function: For Cooking / Concentrating/mixing of product with other additives etc. Construction:

- Hemi spherical inner bowl made out of 4 mm/ss thick sheet
- Outer bowl (jacket) made of 4 mm sheet.
- Heavy duty tripod leg supports.
- Complete with all necessary steam fittings like pressure gauge, Steam inlet valve, steam safety valve, Air vent, Y Type strainer, steam trap etc.
- M.O.C.: contact parts SS 304 / Non-contact MS.
- Capacity: 150 Ltrs. (Water Volume)
- Elec. Power: 1 HP./ 3 PHs / 415 V / 50 Hertz.

7) Two Head Pneumatic Piston Filling Machine (1no.)

Function: Filling the squash, Jam, marmalade into PET Bottles etc.

Brief spec:

- Horizontally mounted piston of 500ml.capacity mounted on rigid sqr, Tube structure. 100 ml to 500 ml in single stroke.
- The syringe piston is operated by pneumatic cylinder.
- Set desired quantity by easy movement of lever.
- The 20 Lit. Tank is incorporated in the machine to receive product from Blending tank.
- The operator has to place empty bottle under nozzles and start the pneu. Switch.
- M.O.C.: contact parts SS 304 / Non-contact MS
- Hopper holding Capacity: approx. 20 Ltrs
- Elec. Power: - nil

8) Working Table (1No.)

Function: For packing, handling of bottles etc.

Brief spec:

- Thick gauge SS table top and raised edges
- Drain outlet at one end, square tube structure.
- Size: Approx. 1500 mm X 900 mm X 900 mm. Ht.
- M.O.C: - Contact parts S. S. 304 / Non-contact MS

9) Single Head Capping Machine (1no.)

Function: For capping of PET Bottles.

Brief spec:

- The main body will be of cast iron.
- The operator has to manually place the bottle and push the button.

10) Pneumatic Type Lug Capping Machine (1no.)

Function: For Lug capping of filled glass bottles specially for Jam.

- Single head type pneumatic foot /hand operated type machine.
- Operator has to place cap on bottle and place below capping head and press pneumatic foot operated switch.
- Pneumatic Fittings: Janatics /equivalent make.
- M.O.C.: wetted parts SS 202/ SS 304
- Elec. Power: 0.5 HP/single Ph / 220 V / 50 Hertz

B) Section –B, Additional Equipment for RTS Processing, 200Lts.Batch

1) Filter Press for hot syrup (1no.)

Function: For filtration of sugar syrup.

Construction:

- The unit consists of strong stainless-steel tank with top cover, SS handle, pressure gauge and tightening bolt.
- The set of perforated screen, filter pad and interlocking cups are fitted in center of tank.
- Fitted on either gear pump or centrifugal pump complete unit mounted on skid with caster wheel,
- The unit is provided with bypass system.
- MOC: SS 304
- Elec. Power: 1 HP / 3 Ph / 415 V / 50 Hertz.

2) Blending Tank (2 no.)

Function: For mixing pulp with sugar syrup & other additives for getting uniform product.

Construction:

- Cylindrical in shape with conical bottom with 3 leg support.
- Slow speed mixing stirrer at 70 RPM.
- Top cover open able, Inlet / outlet connections etc.
- Arrangement for mounting Motor/ Gearbox top of tank.
- MOC: contact parts SS 304 / Non-contact MS
- Capacity: 200 Ltrs.

3) Transfer Pump (2 nos.)

Function: For transferring pulp from Blending Tank to Homogenizer.

- Type: Centrifugal pump
- Discharge Head: 5 Mts
- Mounting: Foot Mounted Horizontal
- M.O.C: - Contact Parts SS 304
- Capacity: 10 LPM
- Elec. Power: - 1 Hp. / 3 Phs/ 415 V / 50 Hrtz.

4) High Pressure Homogenizer (1no.)

- Flow Rate (On water) 200 LPH
- Pressure 200 Bar
- Two stage, manually operated
- Homogenizing Valve & Valve Seat Imported Stellite material
- Lubrication Splash • Plungers Three, specially Alloy Steel • Mounting M.S. Frame with SS Enclosures
- Body- Cast Iron
- Drive Arrangement Pulley drive
- Inlet / Outlet Connection of 25 mm
- 1 HP, TEFC Electric motor of Crompton/reputed /equivalent make
- Capacity- 200 LPH
- Electric power- 1 HP/ 3 Ph/415 V/ 50 Hz
- M.O.C- wetted parts SS 304, Iron Cast Body

• ACCESSORIES

- Pressure Gauge Digital type, 0–400 Bar, 1 no. • Spares For Commissioning, Qty.-1 set • Tool Kit 1 set • Dampener (Suction & Discharge)

5) Skid Mounted Automatic Tubular Pasteurizer (1no.)

Function: The system is designed for pasteurizing fruit-based beverages and holding for 45 sec. We also provided one cooling section to cool upto 50 Deg C. product during divert. This will ensure smooth operation of plant during production. The system includes heating section, tower water return cooling section and all other accessories. The unit is complete with balance tank, sanitary stainless-steel pumps, corrugated tube heat exchanger for heating & cooling, return cooler, necessary interconnecting pipelines, automated valves, fittings and other process operations, Auto based control panel, etc. All the components shall be mounted on SS fabricated skid.

Technical Specifications

Product RTS Beverage • Capacity of Plant 200 LPH • Heat treatment Temperature Program °C 30 – 92 – 60°C • Temperature of Pasteurization °C 92°C • Temperature of Filling °C 60°C • Tube MOC Inner SS 304 • Pipe Line size 38 mm (SMS) • Holding in Tubes 45 se
Utilities Required

• Steam 125 kg/hr @ 3.0 kg/cm² • Air requirement 7 kg/cm², • Power required 3 Phase / 415V AC/ 50 Hz. • Cooling tower inlet/outlet temp 32/45°C • Cooling tower requirement approx..1500 LPH @ 32°C • Water requirement approx..2000 LPH Potable type

The Pasteurizer Consist of

a) The Feed /CIP Pump (1no.), 200 LPH

This pump will be used to transfer the juice from balance tank to tubular heat exchanger. This pump is basically a hygienic version pump with all contact parts will be made from SS304 and mechanical seal to avoid the juice coming of rotating part. This pump will have driven motor to run the pump.

b) Variable Frequency Drive (1no.)

This will vary the speed of drive motor of pump there by control the flow rate of juice to tubular heat exchanger. This will be A/C frequency drive.

c) Flow Regulating Valve (1no.)

This will vary the speed of drive motor of pump there by control the flow rate of juice to tubular heat exchanger. This will be A/C frequency drive.

d) Tubular Heat Exchanger (30-92-60 C), 1no. 200LPH

This corrugated tubular heat exchanger with corrugation sufficient enough to have maximum heat transfer. The fruit juice will first heated by using the hot water and then will be sent to filling. In case if the temperature is not achieved, then the juice will be sent to cooling section, where the juice will be cooled by using the cooling tower water. The tubes will be made from SS 304.

e) Return Cooling (1no.)

In case the pasteurization temperature is not achieved the product so cooled down, before sending it back to balance tank. The product will be cooled by using cooling tower.

f) Holding Tubes, 45 Sec.(1no.)

It will be designed for continuous holding of the product for the specified holding time in SS304 tubes. The holding tube would be in plain tubes.

g) Auto Flow Diversion Valve (1no.)

For Pasteurization Temperature: The valve made of SS 304, 3-way type shall be provided to divert the flow back to the balance tank in case product temps drops below the set pasteurization temperature.

h) Heating Device (1no.)

The unit would be supplied with steam / water mixing system to generate hot water at required temperature. The system would be supplied with • Hot water PHE – 1 no; • Hot Water Pump – 1 no suitable • Pneumatically operated Steam Control valve (R.K./Equiv) - 1no; • Cooling Water Modulating Valve (R.K./Equiv) – 1 no; • Steam trap (Ball float type) – Make: Forbes Marshall – 1 no.

i) Electrical Control panel (1no.)

• SS enclosure Control Panel for housing panel mounting instruments, completely pre-wired ready for installation, suitable for skid mounting. Push buttons for starting and stopping of product supply pump and indicating lamps. • SS enclosure Control Panel for housing panel mounting instruments, • Temperature Indicator Controller for Pasteurization Temperature • Temperature recorder • Digital Temperature Indicator For the Product Outlet • Temperature Recorder for Pasteurization & outlet • PID controller (PPI/STD), For auto control of the steam • I/P convertor • Solenoid valve For auto air flow regulation • Push buttons Indicating lamps • Hooter (alarm) • Other Auto Controls • M.O.C : SS 304

j) SS 304 Pipes & Fittings (Lot)

All inter connecting pipes with necessary fittings for product as well as service will be supplied within the scope of supply.

• Product: The supply will include all the necessary SS 304 pipes and fittings from the outlet of balance tank to the finished pasteurized product outlet as required interconnecting the above equipment.

• Hot Water: The supply will also include necessary SS 304 pipes and fittings for pumping hot water to the heating section of the pasteurizer and return to the hot water set.

K) Skid for the above

The above equipment would be mounted on a skid made from square pipe. The skid would be fitted with SS ball feet arrangement. The equipment Would be interconnected with product piping.

6) Insulated Storage Tank(1no.)

Function: For storage of Juice received from Pasteurizer.

Construction:

- Cylindrical in shape with conical bottom with 4 leg support with raised height.
- Two part open able Top cover for easy cleaning.
- Complete with Water Inlet connection, outlet connection, Drain etc.
- 50 mm thick glass wool insulation cladded with SS 304 sheet.
- MOC: Contact parts SS 304 / Non-contact MS
- Capacity: 250 Ltrs

7) Product Piping (Lot)

1.5" OD SS 304 with supporting includes valve & fitting. Interconnecting product piping for all machineries and equipment's offered by us complete with SMS / Triclover valves, Fittings, clamps etc. • MOC: SS 304.

8) Electrical Panel(1no.)

Function: Electric panel for distribution supply to machinery.

Brief spec: Mild steel standard control panel with Fan with filter, Tube light etc.

Distribution panel with circuit breaker arrangement to all above machines in Case of overload.

- With glass window, LED indicators, labelling etc.
- M.O.C.: Mild Steel

9) Two Head Volumetric Filling Machine (1no.)

Function: For filling the product in to PET Bottles. Brief spec: • The machine is useful for filling accurate quantities of liquids/Juice into bottles. • The quantity of fill can be adjusted as per requirement. • Only liquids without particulate matter can be filled. • The machine consists of a motor and an attached gearbox. • BPM will vary according to viscosity of liquid, bottle mouth diameter and size. • M.O.C.: wetted parts SS 304 • Elec. Power: - 230 V / 1 Phs. / 415 V / 50 Hrtz

10) Shrink Wrapping Machine (1no.)

Function: For shrink labelling of Bottles. (Labels to be placed manually on bottles before passing through shrink labelling machine) Brief spec: • With electronic temperature controller & electronic seal timer for precise control of wrapping parameters • Suitable for 100ml to 1ltrs bottles. • MOC: Mild Steel

C) Material Handling & Lab testing Equipment

- 1) Plastic Crates/buckets (20Lit)- 50 Nos.
- 2) Plastic Pallets , suitable (2nos.)
- 3) Hand Pallet, 1MT capacity, 2nos.
- 4) Weighing scale, water bath, water distillation, microscope, refractometer, Retort for Lab.
- 5) Weighing scale for plant, 100 Kg, 1no.

D) Utility section

- 1) ETP Plant (2KLD capacity)
- 2) Steam boiler with chimney, control panel & accessories, 0.6 TPH (wood fired)
- 3) Air Compressor, 2Hp, 1no.
- 4) RO water plant, 0.5 KLD
- 5) Cooling Tower, 40TR
- 6) Cold storage (4MT capacity)
- 7) DG set, 7.5 KVA

CHAPTER-7

FINANCIAL VIABILITY

7.1 Introduction

This is a model project Report for the Primary Orange Processing Unit involving a production of Ready to serve Beverages (RTS), Jam and Marmalade from handling of citrus fruits more emphasis on oranges of capacity of 2 TPD.

The financial viability of the said unit has been worked out. The details have been explained in following paras.

7.2 Project cost

The project cost estimates have been prepared on the assumptions that the plant & machinery as per standard specifications shall be purchased from the approved machinery suppliers in India, whereas the civil construction of various buildings and machinery foundation shall be carried out by the local contractors using locally available construction materials.

On the basis of present market price, the estimated capital cost of the proposed scheme will be Rs.158.20 lac.

7.2 Total cost of project

Sr. No.	Particulars	Amount (Rs. lac)
1	Land Development	3.00
2	Building & other civil work	49.88
3	Plant and Machinery including Taxes & Duties	79.47
4	Misc. Fixed Assets	12.90
5	Preliminary & Pre-operative and Contingencies	6.30
6	Contingency Provision	1.65
7	Margin Money	5.00
	Total	158.20

7.2.1 Particulars of Land & Land development

Sr. No.	Particulars	Amount (Rs. lac)
1	Land development & Tree plantation	3.00
	Total	3.00

7.2.2 Particulars of Civil Works To be Made

Sr. No.	Particulars	Amount (Rs Lac)
1	Civil & structural work, roads, fencing , GST	48.90
2	Architecture's Fees	0.98
	Total	49.88

7.2.3 Details of Plant and Machinery

Sr.No.	Particulars	Amount (Rs Lac)
A	Multi fruit pulping & processing section	15.75
1	Additional equipment for RTS processing	24.00
2	Pet Bottle making section	0.00
3	Material handling and Lab equipment	1.75
4	Utility section	21.25
	Total of above	62.75
	Erection & Commissioning	3.14
	GST 18%	11.86
	P F charges & Insurance	1.73
	Final Total	79.47

7.2.4 Miscellaneous Fixed Assets

Sr No.	Particulars	Amount (Rs Lac)
1	PC, & Printer	0.50
2	Refrigerator	0.50
3	Transformer, PCC & electrification	8.50
4	Steam & water piping	3.00
5	Fire fighting equipment	0.50
6	Biometric machine	0.40
	Total	12.90

7.2.5 Pre -operative Expenses

Sr No.	Particulars	Amount (Rs Lac)
1	Establishment expenses Fees	0.50
2	Stamp duties & Legal charges	0.50
3	Travelling Expenses	0.50
4	Printing, stationery , postage & telephone	0.30
5	Interest capitalization on Term Loan	4.50
	Total	6.30

7.2.6 Contingency Charges

Sr No.	Particulars	Amount (Rs Lac)
1	Building & Civil Works (in civil estimate considered)	0.00
2	Land development	0.06
3	Plant & Machineries @ 2%	1.59
	Total	1.65

7.2.7 Margin Money

Sr No.	Particulars	Amount (Rs Lac)
1	Margin Money	5.00
	Total	5.00

7.3 Means of Finance

The Orange processing and manufacturing of RTS and other products based unit will be beneficial for fetching better price for the oranges due to value addition. The financing pattern of such proposal is 85 debts and 15 percent own equity. However, the beneficiary is likely to receive subsidy of Rs 79 Lacs. The debt percentage shall reduce to 50.07 %

The financing pattern for the model project of Orange RTS is envisaged as under.

Sr.No.	Particulars	Percent	Amount, Rs lac
1	Own Equity	15%	23.73
2	Debt		
	Term loan	50.07%	55.47
3	Subsidy under package	49.93%	79.00
	Total	100	158.20

7.4 Assumptions Underlying the Profitability Projections

The proposed orange processing Project-manufacturing of RTS & other value added products based unit is expected to be completed by the end of Dec 2025 and commercial production will start probably from Jan 2026. The assumptions in regard to production of following products have been taken as under.

Sr.No.	Particulars	Year		
		I	II	III
1	Orange handling per day	2 TPD	2 TPD	2 TPD
2	Capacity Utilization, Percent	60	70	80
3	Net working days	108	126	144
4	Total Oranges handled , MT/A	216	252	288

5	Fruit juice pulp @ 40%, MT/A	86.4	100.8	115.2
6	RTS Production(10% juice in RTS),MT/A	864	1008	1152

7.5 Scheme of Project Implementation

Estimated capital cost and the financial viability of the proposed orange processing into juice pulp, jam/marmalade based unit has been worked out on the assumption that the above project shall be completed by the end of Dec 2025.

7.6 Physical Targets

The financial viability and profitability projections along with funds flow statement for the next ten years are based on the following physical targets.

Sr.No.	Particulars	Unit	Value
1	Installed capacity on fruit basis	MT/day	2
2	Capacity Utilization (from 5th year onward)	%	100
3	Gross Working Day, Max.	Days/A	180
4	Oranges handled/A	MT/A	360
5	Fruit juice/pulp as raw material(40% recovery)	MT/A	144
6	RTS production(10% juice in RTS)	MT/A	1440

7.7 Financial Projections

The projected financial forecast for the next 10 years for Orange processing into RTS based unit have been worked out on the above physical targets at 100% capacity utilization and it is furnished at Annexure - I. The summarized results of the above-mentioned period are as under:

Sr.No.	Particulars	Amount, Rs lac
1	Net Sales	7776.00
2	Less: Operating Cost	6667.13
3	Profit/ loss before depreciation, Tax and interest	1108.87
4	Less: Rs Lac	
	a) Depreciation 131.71	
	b) Interest on Term loan 28.98	
	c) Interest on working Capital 16.50	

	d) Income tax on profit	281.04	458.23
5	Profit/loss after depreciation, interest and tax on term loans & Working Capital		650.63
6	Add back depreciation		131.71
7	Total Cash Accruals		782.34

7.8 Basic Financial Parameters of Projected Profitability

While preparing the projected profitability, the following financial parameters have been assumed.

7.8.1 Sales Realization

Sr.No.	Particulars	Unit	Value
1	RTS	Rs/ MT	60000

7.8.2 Cost of purchase of Oranges per MT

It is considered Rs 18000 per MT

7.8.3 Cost of Utilities

It is given in Annexure 12. The utilities cost is estimated as Rs 22.81 Lakh at 100% capacity utilization

7.8.4 Salary and Wages

The calculation of salary and wages is considered in Annexure 10. The estimated cost of direct salary and wages shall be Rs 49.83 lakh per annum

7.8.5 Repairs & Maintenance

The percentage of repairs and maintenance on Building and fixed assets as 1% and Plant & Machinery is considered 1.5 % from 1st year onwards.

7.8.6 Insurance

The insurance charges on building ,plant & machinery and fixed assets cost & on stock @ 0.5 % has been considered.

7.8.7 Depreciation

The depreciation has been calculated as per provisions of the Companies Act, 2013 on straight-line method on total plant.

7.8.8 Interest on Term Loan

It has been assumed in the projections that the total term loan of FI amount of Rs. 55.47 lac will be repaid in 14 equal (half yearly) installments with one-year moratorium period after completion of the project. Interest rate has been assumed at the rate of 11 % per annum.

7.8.9 Arrangement of Working Capital

Rate of interest on working capital loan is assumed @ 11% per annum.

7.9 Projected balance sheet:

The projected balance sheet for the next 10 years after completion of the proposed scheme of the project is enclosed.

7.10 Financial Parameters

7.10.1 The Projected Funds Flow Statement

From the projected funds flow statement placed at Schedule-D, it is apparent that the factory will start repayment of term loan installments from the second year after commissioning of the project and the total amount of Bank term loan including interest thereon will be repaid fully in 8th year after completion of the scheme.

7.10.2 Sensitivity Analysis

Sr. No.	Particulars	Average DSCR	BEP at 100% installed Capacity	Pay Back Period (PBP)	Internal Rate of Return (IRR)
1	Base Case: Orange purchase price 18000/MT (Pulp price Rs45000/MT), Orange RTS sale price as Rs 60000/MT,	7.87	35.89	2Yr 11 Month	35.50
2	If Orange pulp price is increased by 10% i.e. Rs 49500/MT, sale price as above	7.48	37.41	3Yr 1 Month	34.71

3	If RTS price decreased by 10% i.e. RTS Rs 57000/MT	5.26	49.05	4 Yr 2 Months	28.07
4	If orange price increased by 10% (49500/MT) & if RTS price decreased by 10%(57000/MT)	4.87	51.96	4 Yr 6 Months	26.27

7.11 Important Financial Indicators

The important financial indicators for the project are as follows-

Sr. No.	Particulars	Value
1	Internal Rate of Return (IRR)	35.50 %
2	Break Even Point (BEP)	35.89 %
3	Pay Back Period (PBP)	2 years 11 Month
4	Debt Service Coverage Ratio (DSCR)	
	Average	7.87
	Maximum	10.54
	Minimum	4.26

The project is financially viable based on the above financial parameters which are favorable.

It may be noted that the maximum working days considered per annum are 180 days/Annum at 100% capacity utilization. It is expected that the plant can be operated for minimum 300 days per annum using the oranges and other fruits like sweet lime and lemon and also other fruits grown in the region. The financial parameters will improve further and thereby the profitability will also be better.

SCHEDULES

SCHEDULE- A
ESTIMATED COST OF THE PROJECT

(Rs.In Lakhs)

SN	PARTICULARS	AMOUNT
1	Land Development	3.00
2	Building & other civil works	49.88
3	Plant and Machinery	79.47
4	Misc. Fixed Assets	12.90
5	Preoperative & Preliminary Expenses	6.30
6	Contingency Provision	1.65
7	Margin Money for Working Capital	5.00
	TOTAL	158.20

MEANS OF FINANCE

(Rs.In Lakhs)

SN	PARTICULARS	SHARE	AMOUNT
1	Factory Contribution	15.00%	23.73
2	Govt. Subsidy	50.07%	79.00
2	FI Term Loan	49.93%	55.47

SCHEDULE-B									
PROJECTED PROFITABILITY STATEMENT									

								Rs.in Lacs		
PARTICULARS	Operating years									
	I	II	III	IV	V	VI	VII	VIII	IX	X
1) No. of working days	108	126	144	162	180	180	180	180	180	180
2) Capacity Utilization (%)	60%	70%	80%	90%	100%	100%	100%	100%	100%	100%
3) Sales Realization	518.40	604.80	691.20	777.60	864.00	864.00	864.00	864.00	864.00	864.00
4) Production Cost										
a) Raw Material	79.25	92.45	105.66	118.87	131.93	131.93	131.93	131.93	131.93	131.93
b) Wages & Salaries	39.00	49.34	49.78	49.83	49.83	49.83	49.83	49.83	49.83	49.83
c) Consumables & Packaging	311.40	363.30	415.20	467.10	519.00	519.00	519.00	519.00	519.00	519.00
d) Utilities	15.16	16.95	18.91	20.86	22.81	22.81	22.81	22.81	22.81	22.81
e) Repairs and maintenance	0.00	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82
f) Other manufacturing expenses	6.65	7.64	8.63	9.62	10.61	10.61	10.61	10.61	10.61	10.61
TOTAL	451.46	531.50	600.00	668.10	736.01	736.01	736.01	736.01	736.01	736.01
5) Gross Profit (EBIDT)	66.94	73.30	91.20	109.50	127.99	127.99	127.99	127.99	127.99	127.99
6) Interest on Working Capital	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
7) Interest on FI Term Loan	6.10	5.88	5.01	4.14	3.27	2.40	1.53	0.65	0.00	0.00
9) Income Before Depreciation	59.19	65.77	84.54	103.71	123.07	123.94	124.81	125.69	126.34	126.34
10) Depreciation (SLM)	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
11) Operating profit (PBT)	46.02	52.59	71.37	90.54	109.90	110.77	111.64	112.52	113.17	113.17
12) Tax @ 30%	8.83	12.80	19.95	26.87	33.57	34.51	35.30	35.98	36.49	36.75
13) Net Profit (PAT)	37.19	39.80	51.41	63.67	76.33	76.26	76.34	76.54	76.67	76.42

SCHEDULE-C								
DEBT SERVICE COVERAGE RATIO (DSCR)								
	(Rs.In Lakhs)							
PARTICULARS	rating years							
	I	II	III	IV	V	VI	VII	VIII
Profit After Tax	37.19	39.80	51.41	63.67	76.33	76.26	76.34	76.54
Depreciation	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
Interest on FI term loan	6.10	5.88	5.01	4.14	3.27	2.40	1.53	0.65
Total inflow	56.46	58.85	69.59	80.98	92.77	91.83	91.04	90.36
Interest on FI term loan	6.10	5.88	5.01	4.14	3.27	2.40	1.53	0.65
Installments of FI term loan	0.00	7.92	7.92	7.92	7.92	7.92	7.92	7.92
Total outflow	6.10	13.80	12.93	12.06	11.19	10.32	9.45	8.57
Annual DSCR	9.26	4.26	5.38	6.71	8.29	8.89	9.63	10.54
Average DSCR	7.87							
Maximum DSCR	10.54							
Minimum DSCR	4.26							

SCHEDULE-D									
PROJECTED CASH FLOW STATEMENT									
(Rs.In Lakhs)									
PARTICULARS	YR.OF IMM	rating years							
		I	II	III	IV	V	VI	VII	VIII
a) Share Capital	23.73	.----	.----	.----	.----	.----	.----	.----	.----
b) Govt. subsidy	79.00								
c) FI Term Loan	55.47	.----	.----	.----	.----	.----	.----	.----	.----
d) Profit aft.Int. and Depn. & Taxation		37.19	39.80	51.41	63.67	76.33	76.26	76.34	76.54
e) Depreciation		13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
f) Working Capital Loan		5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T O T A L	158.20	55.36	52.97	64.58	76.84	89.50	89.43	89.51	89.71
a) Capital Expenditure	145.25	.----	.----	.----	.----	.----	.----	.----	.----
b) Repayment of Term Loan		0.00	7.92	7.92	7.92	7.92	7.92	7.92	7.92
c) Increase in Working Cap.		15.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T O T A L	145.25	15.00	7.92	7.92	7.92	7.92	7.92	7.92	7.92
C) Opening Cash and bank balance		12.95	53.31	98.36	155.02	223.94	305.51	387.02	468.60
D) Current Bank Credits	12.95	40.36	45.04	56.66	68.92	81.58	81.50	81.58	81.79
E) Closing Cash & Bank balance	12.95	53.31	98.36	155.02	223.94	305.51	387.02	468.60	550.38

SCHEDULE-E									
PROJECTED BALANCE SHEET									
(Rs.In Lakhs)									
PARTICULARS	YR.OF IMM	Operating years							
		I	II	III	IV	V	VI	VII	VIII
a) Share Cap.(Member)	23.73	23.73	23.73	23.73	23.73	23.73	23.73	23.73	23.73
b) Subsidy	79.00	79.00	79.00	79.00	79.00	79.00	79.00	79.00	79.00
c) Profit & Reserve		37.19	76.99	128.40	192.07	268.41	344.66	421.00	497.54
d) FI Term Loan	55.47	55.47	47.55	39.62	31.70	23.77	15.85	7.92	0.00
e) Working Cap. Loan		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
TOTAL	158.20	200.39	232.27	275.75	331.50	399.91	468.24	536.65	605.27
a) Fixed Assets (Net Of Depreciation)	145.25	132.08	118.91	105.74	92.57	79.40	66.22	53.05	39.88
b) Initial Wkg.Cap.Ass.		15.00	15.00	15.00	15.00	15.00	15.00	15.00	15.00
c) Addl.Cur. Assets	12.95	53.31	98.36	155.02	223.94	305.51	387.02	468.60	550.38
T O T A L	158.20	200.39	232.27	275.75	331.50	399.91	468.24	536.65	605.27

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SCHEDULE- G											
PAYBACK PERIOD											
(Rs.In Lakhs)											
Particulars	Operating Years										
		I	II	III	IV	V	VI	VII	VIII	IX	X
Cash Outflow	-158.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Profit after Tax		37.19	39.80	51.41	63.67	76.33	76.26	76.34	76.54	76.67	76.42
Depreciation (SLM)		13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
Less: Prelim. Expenses		6.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cash inflow		44.06	52.97	64.58	76.84	89.50	89.43	89.51	89.71	89.85	89.59
Net Cash inflow		-114.14	-61.17	3.41	80.26	169.76	259.19	348.69	438.40	528.25	617.84
The payback period		2years 11 months									

SCHEDULE- H											
INTERNAL RATE OF RETURN (IRR)											
											(Rs. In Lakhs)
Particulars		Operating Years									
		I	II	III	IV	V	VI	VII	VIII	IX	X
Total outflow	158.20										
Net profit after tax		37.19	39.80	51.41	63.67	76.33	76.26	76.34	76.54	76.67	76.42
Depreciation		13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
Interest on FI term loan		6.10	5.88	5.01	4.14	3.27	2.40	1.53	0.65	0.00	0.00
Interest on Working Capital		1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65
NET CASHFLOW		58.11	60.50	71.24	82.63	94.42	93.48	92.69	92.01	91.50	91.24
INTERNAL RATE OF RETURN (IRR)		35.50	%								

ANNEXURES

ANNEXURE - 1					
LAND & LAND DEVELOPMENT					
					(Rs.In Lakhs)
SN	PARTICULARS	Unit	Rate		AMOUNT
	LAND				
1	Land		Available		0.00
2	Land Development				2.00
3	Internal Roads				0.00
4	Tree plantation				1.00
5	Wire Fencing & gate		LS		0
	TOTAL				3.00
ANNEXURE - 2					
BUILDING & OTHER CIVIL WORK					
					(Rs in Lakhs)
SN	(Chhattisgrah exxemption)				AMOUNT
A	Cost of Building & civil work				
1	Main Factory Building & Boiler building				48.90
	Total civil cost				48.90
B	Archtect Fees @2%				0.98
	Total cost				49.88

ANNEXURE - 3				
ESTIMATED COST OF PLANT & MACHINERY OF 2TPD Fruit PROCESSING PROJECT				
(Rs in lakhs)				
SN	Particulars	Quantity	Rate, Rs	Total Cost
A	Multi fruit Pulping Procesing section(10 equipment)	1	1575000	15.75
B	Additional Equipment for RTS processing(10 equipment)	1	2400000	24.00
C	Pet Bottle Making Section	1	0	0.00
D	Material Handling and Lab equipment	1	175000	1.75
E	Utility Section	1	2125000	21.25
F	Total of Above			62.75
G	Commissing	1	313750	3.14
H	GST18%			11.86
I	P and F charges(2 %) & Insurance (0.75%)			1.73
	Final Total			79.47

ANNEXURE - 4		
MISCELLANEOUS FIXED ASSETS		
		(Rs in Lakhs)
Sr. No.	ITEMS	AMOUNT
1	Computer & printer	0.50
2	Refrigerator,	0.50
3	Transformer, PCC & Electrification	8.50
4	Steam piping, waterpiping ,	3.00
5	Fire Fighting equipment	0.50
6	Biometric machine	0.40
	Total	12.90

ANNEXURE - 5			
PREOPERATIVE EXPENSES			
		(Rs in Lakhs)	
SN	ITEMS		Amount
1	Establishment Expenses		0.50
2	Stamp duties & legal charges		0.50
3	Travelling Expences		0.50
4	Printing, Stationary, Postage & Telephone etc.		0.30
5	Interest capitalization on Term Loan (10 months)		4.50
		Total	6.30

ANNEXURE - 6				
CONTINGENCY PROVISIONS				
(Rs. in lakhs)				
SN	ITEMS	Percent	Estimated cost	AMOUNT
1	Land Development	2.00%	3.00	0.06
2	Building & Civil Works	0.00%	49.88	0.00
3	Plant & Machineries	2.00%	79.47	1.59
	TOTAL			1.65

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Rs in lakhs

ANNEXURE 9												
RAW MATERIAL REQUIREMENT												
(Rs in Lakhs)												
S.N.	PARTICULARS	Operating Years										
		Unit	I	II	III	IV	V	VI	VII	VIII	IX	X
A	Fruits as Raw material											
1		TPD	2	2	2	2	2	2	2	2	2	2
2	Working Days/Annum	Days	180	180	180	180	180	180	180	180	180	180
3	Capacity utilization		60%	70%	80%	90%	100%	100%	100%	100%	100%	100%
4	Fruits as Raw material per Annum, MT	MT/A	216	252	288	324	360	360	360	360	360	360
5	Fruit juice @40% of fruits, MT/A	0.4	86.4	100.8	115	130	144	144	144	144	144	144
6	Fruit juice for RTS production, MT/A	1	86.4	100.8	115.2	129.6	144.0	144.0	144.0	144.0	144.0	144.0
7	RTS Production(10% juice in RTS), MT/A	MT/A	864	1008	1152	1296	1440	1440	1440	1440	1440	1440
B	For RTS, Production Ingredients											
1	Juice pulp	MT/A	86.4	101	115	130	144	144	144	144	144	144
2	Sugar	MT/A	77.76	90.72	103.68	116.64	130	130	130	130	130	130
3	Stabilizer @ 0.1 Ton/100T RTS	MT/A	0.86	1.0	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.4
4	Citic acid @ 0.3 T/100T RTS	MT/A	2.59	3.02	3.46	3.89	4.32	4.32	4.32	4.32	4.32	4.32
5	Preservative@0.01T/100T RTS	MT/A	0.086	0.101	0.115	0.130	0.144	0.144	0.144	0.144	0.144	0.144
6	color @ 0.01 T/100 T RTS	MT/A	0.086	0.101	0.115	0.130	0.144	0.144	0.144	0.144	0.144	0.144
7	Flavour @0.01 T/100 T RTS	MT/A	0.086	0.101	0.115	0.130	0.144	0.144	0.144	0.144	0.144	0.144
C	Cost of Raw Materials											
1	Juice Pulp @ 45000/T	45000	38.9	45.4	51.8	58.3	64.8	64.8	64.8	64.8	64.8	64.8
2	Sugar @ 40000/T	40000	31.10	36.29	41.47	46.66	51.84	51.84	51.84	51.84	51.84	51.84
3	Stabilizer @ 5Lakh/T	5	4.3	5.0	5.8	6.5	7.2	7.2	7.2	7.2	7.2	7.2
4	citric acid @ 1.2 Lakh/MT	1.2	3.11	3.63	4.15	4.67	5.18	5.18	5.18	5.18	5.18	5.18
5	Preservative & Sod. Benzoate @ 1.2 L/ M	1.2	0.104	0.121	0.138	0.156	0.173	0.173	0.173	0.173	0.173	0.173
6	Colour @ 10Lakh/Ton	10	0.86	1.01	1.15	1.30	1.44	1.44	1.44	1.44	1.44	1.44
7	Flavour @ 10Lakh/Ton	10	0.86	1.01	1.15	1.30	1.30	1.30	1.30	1.30	1.30	1.30
	Total, Rs Lakh		79.25	92.45	105.66	118.87	131.93	131.93	131.93	131.93	131.93	131.93

(Rs in Lakhs)

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		ANNEXURE11										
	Consumable & packing material										Rs Lakh	
No.	Particulars	Operating Years										
		Unit	I	II	III	IV	V	VI	VII	VIII	IX	X
1	orange handling capacity	TPD	2	2	2	2	2	2	2	2	2	2
2	Working Days/annum	Days/A		180	180	180	180	180	180	180	180	180
3	Fruits as raw material per annum	MT/A		252	288	324	324	324	324	324	324	324
4	Annual RTS production, MT/A	MT/A	864	1008	1152	1296	1440	1440	1440	1440	1440	1440
A	Packing materials for RTS/Annum											
1	No.of Bottles(200gm)@5000nos./Ton RTS	Lakh no.	43.2	50.4	57.6	64.8	72.0	72.0	72.0	72.0	72.0	72.0
2	No.of Bottle caps @5000nos./Ton RTS	Lakh no.	43.2	50.4	57.6	64.8	72.0	72.0	72.0	72.0	72.0	72.0
3	No.of bottle lables @5000nos./Ton RTS	Lakh no.	43.2	50.4	57.6	64.8	72.0	72.0	72.0	72.0	72.0	72.0
4	No.of Cartons(24 bottles,200gm),4.8Kg/Carton	Lakh no.	1.80	2.1	2.4	2.7	3.0	3.0	3.0	3.0	3.0	3.0
5	Cartoon tape & gum	Lakh no.	1.8	2.1	2.4	2.7	3.0	3.0	3.0	3.0	3.0	3.0
B	Total Cost value,Rs lakhs											
1	RTS Bottles (200gms) @ Rs 5 per bottle	5	216.0	252.0	288.0	324.0	360.0	360.0	360.0	360.0	360.0	360.0
2	RTS Bottle caps(200gm) @ Rs1 / cap	1	43.2	50.4	57.6	64.8	72.0	72.0	72.0	72.0	72.0	72.0
3	RTS bottle Lables (200 gm)@ Rs 0.5 / lable	0.5	21.60	25.20	28.80	32.40	36.00	36.00	36.00	36.00	36.00	36.00
4	RTS bottle Cartoon (200gm)@ Rs 15 / Carto.	15	27.00	31.50	36.00	40.50	45.00	45.00	45.00	45.00	45.00	45.00
5	RTS BOPP Tape &gum @ Rs 2 per cartoon	2	3.60	4.20	4.80	5.40	6.00	6.00	6.00	6.00	6.00	6.00
	Total,Rs lakh		311.40	363.30	415.20	467.10	519.00	519.00	519.00	519.00	519.00	519.00

		ANNEXURE 12													
		Particulars of Utilities													
													(Rs.In Lakhs)		
Sr. No.	Particulars	Operating Years													
		Unit	I	II	III	IV	V	VI	VII	VIII	IX	X			
1	Installed Capacity based on fruits	KLPD	2	2	2	2	2	2	2	2	2	2			
2	Total Woking Days per annum	Days	180	180	180	180	180	180	180	180	180	180			
3	Capacity utilization	Percent	60%	70%	80%	90%	100%	100%	100%	100%	100%	100%			
A	Maximum Fresh Water/A @ 7Cu.M/day	Lac Lit	7.56	8.8	10.08	11.3	12.6	12.6	12.6	12.6	12.6	12.6			
B	Electricity														
1	Total units @80Kw h/hr	Lac unit	1.04	1.21	1.38	1.56	1.73	1.73	1.73	1.73	1.73	1.73			
2	During Idle days@120 units/day	lac unit	0.33	0.29	0.27	0.24	0.22	0.22	0.22	0.22	0.22	0.22			
3	Total units	Lac unit	1.37	1.50	1.65	1.80	1.95	1.95	1.95	1.95	1.95	1.95			
C	Steam														
1	Steam @0.3 TPH (10hr working/day)	MT/A	324	378	432	486	540	540	540	540	540	540			
D	Cost of Utilities														
1	Water @ Rs 700/Lac Lit	700	0.05	0.06	0.07	0.08	0.09	0.09	0.09	0.09	0.09	0.09			
2	Electricity rate @Rs 7.5/ unit	7.5	10.25	11.22	12.36	13.49	14.63	14.63	14.63	14.63	14.63	14.63			
3	Steam @ Rs 1500/MT	1500	4.86	5.67	6.48	7.29	8.10	8.10	8.10	8.10	8.10	8.10			
	Total, Rs Lakhs		15.16	16.95	18.91	20.86	22.81	22.81	22.81	22.81	22.81	22.81			

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		ANNEXURE 14												
		Particulars of Other Manufacturing Expenses												
										(Rs in Lakhs)				
S.N.	PARTICULARS	Operating years												
		Percent	I	II	III	IV	V	VI	VII	VIII	IX	X		
1	Capacity utilization		60%	70%	80%	90%	100%	100%	100%	100%	100%	100%		
2	Selling & Distribution Exp.	0.5 % on sale	2.59	3.02	3.46	3.89	4.32	4.32	4.32	4.32	4.32	4.32		
3	Stationery, Postage, Telephone & other Administrative Overhead	Lumpsom	1.50	1.75	2.00	2.25	2.50	2.50	2.50	2.50	2.50	2.50		
4	Rent, rate and taxes	Lumpsom	1.20	1.40	1.60	1.80	2.00	2.00	2.00	2.00	2.00	2.00		
5	Insurance building, M/c, other Assets	0.50	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71		
6	On Stock	0.50	0.65	0.76	0.86	0.97	1.08	1.08	1.08	1.08	1.08	1.08		
	Total		6.65	7.64	8.63	9.62	10.61	10.61	10.61	10.61	10.61	10.61		

					ANNEXURE 15					
					REPAYMENT OF TERM LOAN AND INTEREST					
									(Rs.In Lakhs)	
PARTICULARS	Operating Years									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Term Loan from FI	55.47	47.55	39.62	31.70	23.77	15.85	7.92	0.00	0.00	0.00
Annual Installment for FI	0.00	7.92	7.92	7.92	7.92	7.92	7.92	7.92	0.00	0.00
FI Interest @ 11%	6.10	5.88	5.01	4.14	3.27	2.40	1.53	0.65	0.00	0.00

ANNEXURE - 16					
DEPRECIATION CHART					
(Rs Lakh)					
Description		Building	Plant and M/c	Misc. Fixed Assets	Total
Straight Line Method (SLM)					
Rate of depreciation %		5.00	10.00	15.00	
Acquired cost		49.88	79.47	12.90	142.25
Pre-operative Expenses	6.30	1.58	3.15	1.58	6.30
Contingencies	1.65	0.41	0.82	0.41	1.65
Total apportioned cost		51.87	83.45	14.89	
Depreciation amount		2.59	8.34	2.23	13.17
Written Down Value (WDV) Method					
Rate of depreciation		10	25	25	
First year	Depreciation	5.19	20.86	3.72	29.77
	WDV	46.68	62.59	11.17	
Second year	Depreciation	4.67	15.65	2.79	23.11
	WDV	42.01	46.94	8.37	
Third year	Depreciation	4.20	11.73	2.09	18.03
	WDV	37.81	35.20	6.28	
Fourth year	Depreciation	3.78	8.80	1.57	14.15
	WDV	34.03	26.40	4.71	
Fifth year	Depreciation	3.40	6.60	1.18	11.18
	WDV	30.63	19.80	3.53	
Sixth year	Depreciation	3.06	4.95	0.88	8.90
	WDV	27.56	14.85	2.65	
Seventh year	Depreciation	2.76	3.71	0.66	7.13
	WDV	24.81	11.14	1.99	
Eighth year	Depreciation	2.48	2.78	0.50	5.76
	WDV	22.33	8.35	1.49	
Ninth year	Depreciation	2.23	2.09	0.37	4.69
	WDV	20.09	6.27	1.12	
Tenth year	Depreciation	2.01	1.57	0.28	3.86
	WDV	18.08	4.70	0.84	

	ANNEXURE 17						
	FI TERM LOAN REPAYMENT						
						(Rs Lakh)	
Quarter	Loan Amt	Loan Insta	Balance	Interest	Annual In	Ann. Insta	Total
				11.00%			
1	55.47	0.00	55.47	3.05	6.10		6.10
2	55.47	0.00	55.47	3.05		0.00	
3	55.47	3.96	51.50786	3.05			
4	51.51	3.96	47.54571	2.83	5.88	7.92	13.81
5	47.55	3.96	43.58357	2.62			
6	43.58	3.96	39.62143	2.40	5.01	7.92	12.94
7	39.62	3.96	35.66	2.18			
8	35.66	3.96	31.70	1.96	4.14	7.92	12.06
9	31.70	3.96	27.74	1.74			
10	27.74	3.96	23.77	1.53	3.27	7.92	11.19
11	23.77	3.96	19.81	1.31			
12	19.81	3.96	15.85	1.09	2.40	7.92	10.32
13	15.85	3.96	11.89	0.87			
14	11.89	3.96	7.92	0.65	1.53	7.92	9.45
15	7.92	3.96	3.96	0.44			
16	3.96	3.96	0.00	0.22	0.65	7.92	8.58

				ANNEXURE 18							
				DETAILS OF TAXATION							
											(Rs.In Lakhs)
Particulars				Operating Years							
		I	II	III	IV	V	VI	VII	VIII	IX	X
Profit before tax but after depreciation (SLM) & interest		46.02	52.59	71.37	90.54	109.90	110.77	111.64	112.52	113.17	113.17
Add depreciation in SLM		13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17	13.17
Less : dep. in WDV method		29.77	23.11	18.03	14.15	11.18	8.90	7.13	5.76	4.69	3.86
Profits after dep. on W.D.V.		29.42	42.66	66.51	89.56	111.89	115.04	117.68	119.93	121.65	122.48
Lossess carried to next year		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Taxable income		29.42	42.66	66.51	89.56	111.89	115.04	117.68	119.93	121.65	122.48
INCOME TAX @ 30 %		8.83	12.80	19.95	26.87	33.57	34.51	35.30	35.98	36.49	36.75

Project Implementation Schedule											
Sr.No	Activity	Time frame in months									
		1	2	3	4	5	6	7	8	9	10
1	Permission from local authority, NOC's										
2	Selection of M/c										
3	Civil Work										
4	Order for Machines										
5	Installation of M/c										
6	Testing										
7	Commercial Use										

Proposal for

MULTI FRUIT PROCESSING MACHINERY
Capacity: 200KG/HR INPUT

For

M/S. MAHARASHTRA STATE AGRICULTURAL MARKETING BOARD
(MSAMB)



By

ANJOPLUS MACHINES.
Vasai, Maharashtra



MSME
MICRO, SMALL & MEDIUM ENTERPRISES
सूक्ष्म, लघु एवं मध्यम उद्यम

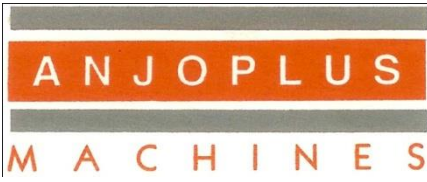


AADHAAR
UDYOG AADHAR
MSME : Micro, Small and Medium
Enterprises

Mango Juice/Pulp Canning/Treatment Plant/Packhouse
Tomato Ketchup/Sauce/Powder/Paste etc.
Orange/Kinnow/Lemon Processing
Vegetable Dehydration/Grading/Packing & Processing
And Various other Fruit & Vegetable Processing

Tamarind Pulp/Paste/Powder/Sauce etc.
Spice Processing
Pineapple Processing
Custard Apple Processing





REF: QUO/122/AP/R2/2024

Mit Industrial Estate, Unit No.0 1,
Chinchpada Agarwal road, Village- Gokhivare,
Vasai – (E), Pin. Code: 401 208
Dist.: Palghar, Maharashtra.
Phone: 0091-7757992321, 9881136777
Email: anjoplusmachines@fruitprocessing.co.in
Web: www.fruitprocessing.co.in

Date: 04/09/2024

MAHARASHTRA STATE AGRICULTURAL MARKETING BOARD

Plot No. R-7, Market Yard,
Gultekdi,
Pune -411 037
Mob: 9822417412
Email: bbgunjal@yahoo.com

Kind Atten. **MR B B GUNJAL (Project Consultant)**

Subject: Quotation for Multi Fruit Processing Machinery (Input Capacity: 200Kg/Hr)

Dear Sir,

With reference to your inquiry regarding your requirement for Orange Processing Machinery; We have now worked out detailed quotation with detail specification for the same which is as under kindly go through the same.

We are sure that you will find our above offer most competitive, and favour us with your valued order.

In case you need any further information/clarification, please feel free to contact the undersigned.

Thanking you and assuring you of our best services all the times.

Yours Sincerely,

For M/s ANJOPLUS MACHINES

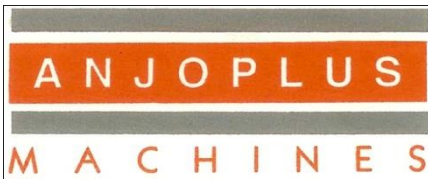
Mr. Kiran A Satpalkar
+91 9881136777 / 7757992321



Mango Juice/Pulp Canning/Treatment Plat/Packhouse
Tomato Ketchup/Sauce/Powder/Paste etc.
Orange/Kinnow/Lemon Processing
Vegetable Dehydration/Grading/Packing & Processing
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WE ARE ANJOPLUS MACHINES

MANUFACTURER & SUPPLIER OF FOOD AND FRUIT PROCESSING MACHINERY

Anjoplus Machines is an engineering organisation engaged in various engineering activities like Designing, Manufacturing, supplying & commissioning of standard and tailor made equipment's and machineries.

Our support to the customer is from concept to commissioning and efforts are always made for user's friendly design. This opens an avenue for us to Showcase our capabilities to prospective customers and win the business on quality.

Our experience with corporate company 'MATHER & PLATT' for more than 25 years , in executing prestigious projects for Clients like Balaji foods, MM poonjiaji spices, crispy foods pune & various lubricating oil industries etc. With total experience of 40 years ANJOPLUS MACHINES has also supplied food processing (canning) and packaging, bottling machineries and ancillary equipment's for snack food plants to local and export.

We have supplied Fruit processing plant to following food companies such as Tasty bite eatables, Gokul Foods, Kanhaiya Foods, Patanjali Foods, and Rasdhara canning, Food and Inns, Hygeia Foods, Aatco Foods.

OUR PRESTIGIOUS CUSTOMERS



Mango Juice/Pulp Canning/Treatment Plat/Packhouse
Tomato Ketchup/Sauce/Powder/Paste etc.
Orange/Kinnow/Lemon Processing
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KUSHAL AYURVEDIC PHARMACY

Tamarind Pulp/Paste/Powder/Sauce etc.
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UDYOG AADHAR
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Enterprises

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MULTI FRUIT PROCESSING MACHINERY – 200 KG/HR (INPUT CAPACITY)

SECTION-A

MULTI FRUIT PULPING & PROCESSING SECTION

1) BASKET TYPE WASHER WITH BASKET:

Function: For washing of Fruits & Vegetables.

Brief spec: There will be two shallow deep tanks mounted on a structure.

- Comprised of 4 Nos. perforated / Wire mesh baskets in tank.
- Each basket suitable to hold 5-10 kg depending upon type of fruit/vegetables.
- Washing is carried out with help of pressurized blower which is integral part of washer.
- Complete with necessary fittings like drain valve, Water inlet, etc.
- M.O.C: - contact parts SS 304 / Non-contact MS.
- Holding Capacity: approx. 20-40 Kg batch (depending on the product)
- Elec. Power: 1 HP / 3 Phs. / 50 Hrtz. / 415 V.
- Qty: - 1 No.



2) WORKING TABLES:

Function: For sorting, inspection, cutting & handling of Fruits etc.

Brief spec:

- Thick gauge SS table top and raised edges
- Drain outlet at one end, square tube structure.
- Size: Approx. 1500 mm X 900 mm X 900 mm. Ht.
- M.O.C: - Contact parts S. S. 304 / Non-contact MS
- Qty: - 1 No.



3) FRUIT MILL:

Function: For crushing of seedless fruits before pulping.

Brief spec:

- Chamber made from thick plates of 12mm serration inside for crushing of seedless fruits.
- High speed rotor /chopper fitted inside 2 sets of discharge screen, Complete with Feed & discharge chute.
- Heavy duty self-supporting structure.
- Main Shaft supported on heavy duty housing with bearings at both ends.
- Oil seals at back of the chamber to avoid leakage.
- Open able front door for easy cleaning of machine.
- 'V' belt duplex pulley driven.
- Adjustable motor plate for tensioning of 'V' belt.
- Easily removable screen for cleaning and changing.
- Motor / Structure covered from all side to avoid material spillage and safety.
- **M.O.C.:** Contact parts SS 304 / Non-contact MS.
- **Elec. Power:** - 3 HP/ 3 PHs / 415 V / 50 Hrtz.
- **Quantity:** - 1 No.



4) **SCREW TYPE JUICE EXTRACTOR:**

Function: For extraction of juice from Fruits like peeled Oranges, lemon etc.

Construction:

- Heavy duty solid taper and grooved screw, housed in screen cage with juice collection arrangement.
- Body with top cover and Easy dismantling for cleaning.
- Spring loaded waste discharge arrangement.
- Complete Feed hopper, waste chute, Juice collection tray, etc.
- **M.O.C:** - contact parts SS 304 / Non-contact MS
- **Input Capacity:** 200 Kg / Hr. approx.
- **Elect Power:** - 1.5 HP / 3 phs / 415 V / 50 Hrtz.
- **Qty:** - 1 No.



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5) SINGLE STAGE PULPER:

Function: For extraction of pulp from Mango, Soaked Tamarind, crushed tomato, Guava etc.

Brief spec:

- Pulper mounted on square tube rigid structure
- Specially designed screen of Pulper.
- 2 Nos. of food grade nylon Brushes & 2 No's of beater blades.
- Complete with Feed hopper, Waste discharge chute.
- Product outlet tray for discharge of pulp.
- Easily removable screen & top cover for cleaning of machine.
- MOC: Contact parts SS304.
- Input Capacity: 100-200 kg/Hr
- Elec. Power: - 1 HP. / 3 phs.
- Qty: - 1 No.



6) **STEAM JACKETTED KETTLE (FIXED TYPE):**

Function: For Cooking / Concentrating/mixing of product with other additives etc.

Construction:

- Hemi spherical inner bowl made out of 4 mm/ss thick sheet
- Outer bowl (jacket) made of 4 mm sheet.
- Heavy duty tripod leg supports.
- Complete with all necessary steam fittings like pressure gauge, Steam inlet valve, steam safety valve, Air vent, Y Type strainer, steam trap etc.
- **M.O.C.:** contact parts SS 304 / Non-contact MS.
- **Capacity:** 150 Ltrs. (Water Volume)
- **Elec. Power:** 1 HP./ 3 PHs / 415 V / 50 Hrtz.
- **Qty:** - 2 Nos.



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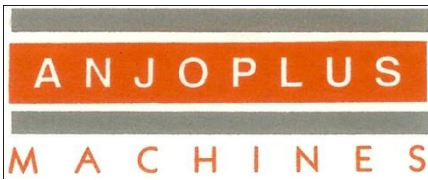


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7) WORKING TABLE:

Function: For packing, handling of bottles etc.

Brief spec:

- Thick gauge SS table top and raised edges
- Drain outlet at one end, square tube structure.
- Size: Approx. 1500 mm X 900 mm X 900 mm. Ht.
- M.O.C: - Contact parts S. S. 304 / Non-contact MS
- Qty: - 1 No.

8) SINGLE HEAD CAPPING M/C.

Function: For capping of PET Bottles.

Brief spec:

- The main body will be of cast iron.
- The operator has to manually place the bottle and push the button.
- Qty: - 1 No.



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SECTION - B ADDITIONAL EQUIPMENT FOR RTS PROCESSING – 200 LTRS BATCH

9) FILTER PRESS FOR HOT SYRUP:

Function: For filtration of sugar syrup.

Construction:

- The unit consists of strong stainless-steel tank with top cover, SS handle, pressure gauge and tightening bolt.
- The set of perforated screen, filter pad and interlocking cups are fitted in center of tank.
- Fitted on either gear pump or centrifugal pump complete unit mounted on skid with caster wheel,
- The unit is provided with bypass system.
- MOC: SS 304
- Elec. Power: 1 HP / 3 Ph / 415 V / 50 Hrtz.
- Quantity: 1 No.

10) BLENDING TANK:

Function: For mixing pulp with sugar syrup & other additives for getting uniform product.

Construction:

- Cylindrical in shape with conical bottom with 3 leg support.
- Slow speed mixing stirrer at 70 RPM.
- Top cover open able, Inlet / outlet connections etc.
- Arrangement for mounting Motor/ Gearbox top of tank.
- **MOC:** contact parts SS 304 / Non-contact MS
- **Capacity:** 200 Ltrs.
- **Quantity:** 2 Nos.

11) TRANSFER PUMP:

Function: For transferring pulp from Blending Tank to Homogenizer.

- Type: Centrifugal pump
- Discharge Head: 5 Mts
- Mounting: Foot Mounted Horizontal
- **M.O.C:** - Contact Parts SS 304
- **Capacity:** 10 LPM
- **Elec. Power:** - 1 Hp. / 3 Phs/ 415 V / 50 Hrtz.
- **Qty:** - 2 Nos.



12) HIGH PRESSURE HOMOGENIZER:

- Flow Rate (On water) 200 LPH
- Pressure 200 Bar
- Two stage, manually operated
- Homogenizing Valve & Valve Seat Imported Stellite material
- Lubrication Splash
- Plungers Three, specially Alloy Steel
- Mounting M.S. Frame with SS Enclosures
- Body- Cast Iron
- Drive Arrangement Pulley drive
- Inlet / Outlet Connection of 25 mm
- 1 HP, TEFC Electric motor of Crompton/reputed /equivalent make
- Capacity- 200 LPH
- Electric power- 1 HP/ 3 Ph/415 V/ 50 Hz
- M.O.C- wetted parts SS 304, Iron Cast Body
- Qty-1 no.
- ACCESSORIES
- Pressure Gauge Digital type, 0–400 Bar, 1 no.
- Spares For Commissioning, Qty.-1 set
- Tool Kit 1 set
- Dampener (Suction & Discharge)



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13) SKID MOUNTED TUBULAR PASTEURISER: AUTOMATIC:

Function: The system is designed for pasteurizing fruit-based beverages and holding for 45 sec. We also provided one cooling section to cool upto 50 Deg C. product during divert. This will ensure smooth operation of plant during production. The system includes heating section, tower water return cooling section and all other accessories. The unit is complete with balance tank, sanitary stainless-steel pumps, corrugated tube heat exchanger for heating & cooling, return cooler, necessary interconnecting pipelines, automated valves, fittings and other process operations, Auto based control panel, etc. All the components shall be mounted on SS fabricated skid.

❖ TECHNICAL SPECIFICATION:

- Product RTS Beverage
- Capacity of Plant 200 LPH
- Heat treatment Temperature Program °C 30 – 92 – 60°C
- Temperature of Pasteurization °C 92°C
- Temperature of Filling °C 60°C
- Tube MOC Inner SS 304
- Pipe Line size 38 mm (SMS)
- Holding in Tubes 45 sec
- Return Cooling

❖ UTILITIES REQUIREMENT:

- Steam 125 kg/hr @ 3.0 kg/cm²
- Air requirement 7 kg/cm²,
- Power required 3 Phase / 415V AC/ 50 Hz.
- Cooling tower inlet/outlet temp 32/45°C
- Cooling tower requirement approx..1500 LPH @ 32°C
- Water requirement approx..2000 LPH Potable type

THE PASTEURISER CONSISTS OF:

A. FEED/CIP PUMP – 200 LPH

This pump will be used to transfer the juice from balance tank to tubular heat exchanger. This pump is basically a hygienic version pump with all contact parts will be made from SS304 and mechanical seal to avoid the juice coming of rotating part. This pump will have driven motor to run the pump.

- **Capacity:** 200 LPH
- **Qty:** - 1 No.



B. VARIABLE FREQUENCY DRIVE (VFD)

This will vary the speed of drive motor of pump there by control the flow rate of juice to tubular heat exchanger. This will be A/C frequency drive.

- **Capacity:** STD
- **Qty:** - 1 No.

C. FLOW REGULATING VALVE

Flow Controller for Product: Stainless steel SS 304 manual flow control device will be supplied to maintain the required flow rate. The flow controller will be of a sanitary design.

- **Capacity:** STD
- **Qty:** - 1 No.

D. TUBULAR HEAT EXCHANGER (30-92-60 C)

This corrugated tubular heat exchanger with corrugation sufficient enough to have maximum heat transfer. The fruit juice will first heated by using the hot water and then will be sent to filling. In case if the temperature is not achieved, then the juice will be sent to cooling section, where the juice will be cooled by using the cooling tower water. The tubes will be made from SS 304.

- **Capacity:** 200 LPH
- **Qty:** - 1 No.

E. RETURN COOLING

In case the pasteurization temperature is not achieved the product so cooled down, before sending it back to balance tank. The product will be cooled by using cooling tower

- **Capacity:** STD
- **Qty:** - 1 No.

F. HOLDING TUBES

It will be designed for continuous holding of the product for the specified holding time in SS304 tubes. The holding tube would be in plain tubes.

- **Capacity:** 45 sec.
- **Qty:** - 1 No.



G. AUTO FLOW DIVERSION VALVE

For Pasteurization Temperature:

The valve made of SS 304, 3-way type shall be provided to divert the flow back to the balance tank in case product temps drops below the set pasteurization temperature.

- **Capacity:** 1 set.
- **Qty:** - 1 No.

H. HEATING DEVICE

- The unit would be supplied with steam / water mixing system to generate hot water at required temperature. The system would be supplied with
- Hot water PHE – 1 no;
- Hot Water Pump – 1 no suitable
- Pneumatically operated Steam Control valve (R.K./Equiv) - 1no;
- Cooling Water Modulating Valve (R.K./Equiv) – 1 no;
- Steam trap (Ball float type) – Make: Forbes Marshall – 1 no;
- **Capacity:** STD.
- **Qty:** - 1 No.

I. ELECTRICAL CONTROL PANNEL

- SS enclosure Control Panel for housing panel mounting instruments, completely pre-wired ready for installation, suitable for skid mounting. Push buttons for starting and stopping of product supply pump and indicating lamps.
- SS enclosure Control Panel for housing panel mounting instruments,
- Temperature Indicator Controller for Pasteurization Temperature
- Temperature recorder
- Digital Temperature Indicator For the Product Outlet
- Temperature Recorder for Pasteurization & outlet
- PID controller (PPI/STD), For auto control of the steam
- I/P convertor
- Solenoid valve For auto air flow regulation
- Push buttons Indicating lamps
- Hooter (alarm)
- Other Auto Controls
- **M.O.C :** SS 304
- **Qty:** - 1 No.



J. SS 304 PIPES AND FITTINGS

All inter connecting pipes with necessary fittings for product as well as service will be supplied within the scope of supply.

- **Product:** The supply will include all the necessary SS 304 pipes and fittings from the outlet of balance tank to the finished pasteurized product outlet as required interconnecting the above equipment.
- **Hot Water:** The supply will also include necessary SS 304 pipes and fittings for pumping hot water to the heating section of the pasteurizer and return to the hot water set.
- **Qty:** - 1 set.

K. SKID FOR THE ABOVE

The above equipment would be mounted on a skid made from square pipe. The skid would be fitted with SS ball feet arrangement. The equipment would be interconnected with product piping.

- **Qty:** - 1 lot.



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14) INSULATED STORAGE TANK:

Function: For storage of Juice received from Pasteurizer.

Construction:

- Cylindrical in shape with conical bottom with 4 leg support with raised height.
- Two part open able Top cover for easy cleaning.
- Complete with Water Inlet connection, outlet connection, Drain etc.
- 50 mm thick glass wool insulation cladded with SS 304 sheet.
- **MOC:** Contact parts SS 304 / Non-contact MS
- **Capacity:** 250 Ltrs.
- **Quantity:** 1 No.



15) PRODUCT PIPING:

1.5" OD SS 304 with supporting includes valve & fitting.

Interconnecting product piping for all machineries and equipment's offered by us complete with SMS / Triclover valves, Fittings, clamps etc.

- **MOC:** SS 304.
- **Quantity:** 1 No



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16) ELECTRICAL PANEL:

Function: Electric panel for distribution supply to machinery.

Brief spec: Mild steel standard control panel with Fan with filter, Tube light etc.

- Distribution panel with circuit breaker arrangement to all above machines in case of overload.
- With glass window, LED indicators, labelling etc.
- M.O.C.: Mild Steel
- Quantity: 1 No.

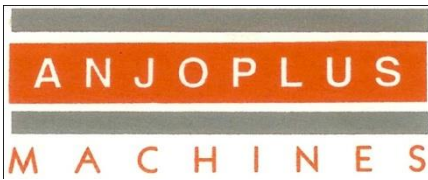
17) TWO HEAD VOLUMETRIC FILLING MACHINE:

Function: For filling the product in to PET Bottles.

Brief spec:

- The machine is useful for filling accurate quantities of liquids/Juice into bottles.
- The quantity of fill can be adjusted as per requirement.
- Only liquids without particulate matter can be filled.
- The machine consists of a motor and an attached gearbox.
- BPM will vary according to viscosity of liquid, bottle mouth diameter and size.
- **M.O.C.:** wetted parts SS 304
- **Elec. Power:** - 230 V / 1 Phs. / 415 V / 50 Hrtz.
- **Qty:** - 1 No.





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18) SHRINK WRAPPING MACHINE:

Function: For shrink labelling of Bottles. (Labels to be placed manually on bottles before passing through shrink labelling machine)

Brief spec:

- With electronic temperature controller & electronic seal timer for precise control of wrapping parameters
- Suitable for 100ml to 1ltrs bottles.
- MOC: Mild Steel
- Qty: 1 no.

(Please Note all the photos in the offer are indicative and for reference. The actual machine may vary as per its capacity, size & new develop technology & design.)



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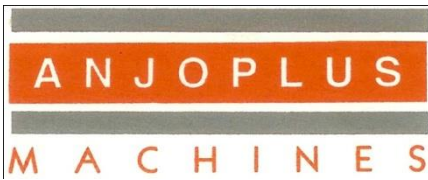


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INSTALLATION & COMMISIONING:

The services will be subjected to following terms and conditions –

- A) You will have to arrange To & Fro Ticket (Air / Railway)
- B) You will have to arrange decent hotel accommodation for our team & also arrange Suitable boarding & local conveyance for our team during their stay.
- C) These services will be of supervisory nature. You will have to provide supporting Manpower, tools & tackles.
- D) The services will be provided for 10 days & 8 hours per days, in case if any extra days Required services will be provided @ Rs.2000/ Day per person.
- E) All the infrastructure facilities and supporting services will be provided by you, to enable our team to carry out the job effectively.
- F) You will have to provide minor medical assistant at site if required.



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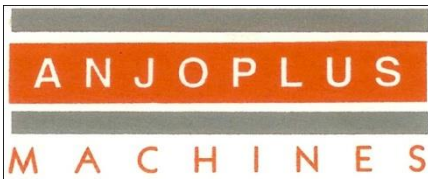
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PRICE SCHEDULE

SR. NO.	PARTICULAR				AMOUNT (RS)	
A	EX WORKS PRICE FOR MULTI FRUIT PULPING & PROCESSING SECTION				RS 15,75,000/-	
B	EX WORKS PRICE FOR ADDITIONAL EQUIPMENT FOR RTS PROCESSING				RS 24,00,000/-	
C	EX WORKS PRICE FOR MATERIAL HANDLING & LAB TESTING EQUIPMENT'S				RS 1,75,000/-	
	Description		Capacity	Qty		
	Plastic Crates		20 L	20		
	Plastic Pallets		Suitable	2		
	Hand Pallet Truck		1 MT	1		
	Weighing Scale		10 Kg	1		
	Weighing Scale for Plant		100 Kg	1		
D	EX. WORKS PRICE FOR UTILITIES SECTION				RS 21,25,000/-	
	Description		Capacity	Qty		Amount
	ETP Plant		2 KLD	1		RS 5,00,000/-
	Steam Boiler with Chimney Control Panel and all accessories (Wood fired)		0.6 TPH	1		RS 5,25,000/-
	Air Compressor		2 HP	1		RS 75,000/-
	R.O Water Plant		0.5 KLD	1		RS 1,25,000/-
	Cooling Tower		40 TR	1		RS 50,000/-
	Cold Storage		4 MT (approx.)	1		RS 4,65,000/-
	DG set		7.5 KVA	1		RS 3,85,000/-
	INSTALLATION & COMMISIONING @ 5% OF PROJECT COST				RS 3,13,750/-	
	TOTAL EX. WORKS PRICE FOR ABOVE MACHINERY				RS 65,88,750/-	
	GST@18%				RS 11,85,975/-	
	TOTAL PROJECT EX WORKS PRICE				RS 77,74,725/-	





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Chinchpada Agarwal road, Village- Gokhivare,
Vasai – (E), Pin. Code: 401 208
Dist.: Palghar, Maharashtra.
Phone: 0091-7757992321, 9881136777
Email: anjoplusmachines@fruitprocessing.co.in
Web: www.fruitprocessing.co.in

Terms & Condition

- 1) 50 % advance against purchase order.
- 2) 50 % balance payment +taxes against Performa invoice before dispatch & trails at our Vasai Unit.
- 3) Delivery period 14 to 16 weeks from the date of 50% advance received.
- 4) Jurisdiction Vasai - Mumbai.
- 5) Transit insurance @ 1 % of total value.
- 6) G.S.T @ 18 % or as applicable at the time of dispatch.
- 7) Price quoted are on Ex. Works basis, Packing, forwarding, inland freight, Transit insurance, Loading/ Unloading, Taxes Duties will be charged extra as applicable at the time of Invoicing. However, Packing & Forwarding@ 2.5% of Ex. Works value.
- 8) Installation & Commissioning charges. **(Quoted above)**
- 9) Offer shall remain valid for the period of 30 days from the date of offer.
- 10) We reserve the right to make changes in the Specifications, dimensions, design, description, shades of paint etc. of components or material which in our judgment are necessary. Such changes however shall be made only to augment the performance or life of the equipment. The information given in any of our quotation, leaflets, drawings etc. is intended to present a general idea of the equipment offered.
- 11) In the event of cancellation of an order after payment of advance by the buyer or if buyer fails to make the balance payment, then ANJOPLUS MACHINES reserves the right to forfeit the advance.
- 12) Any condition or other matter related to this offer not expressly stipulated will be a matter of mutual discussion and agreement at the time of accepting the offer. If this offer is accepted & order placed, all the conditions mentioned herein stand automatically accepted by you.
- 13) Battery Limits:
 - All Civil Foundations
 - Main Electric Supply to the Control Panel / Individual machines/steam pipeline/ RO water pipeline/ Pneumatic Air pipeline/Electrical fittings/motor starter etc.
 - Unloading /shifting of the machine
 - Permission from any local authorities
 - Any item not specifically mentioned in our Offer.

We hope you will find our offer most competitive and would favor us with your valued order.
Further, if you need any details / clarifications, please feel free to contact us.

Thanking you and expecting your valued order.

For M/s ANJOPLUS MACHINES

Mr. Kiran A Satpalkar

+91 9881136777 / 7757992321



MSME
MICRO, SMALL & MEDIUM ENTERPRISES
सुक्ष्म, लघु एवं मध्यम उद्यम



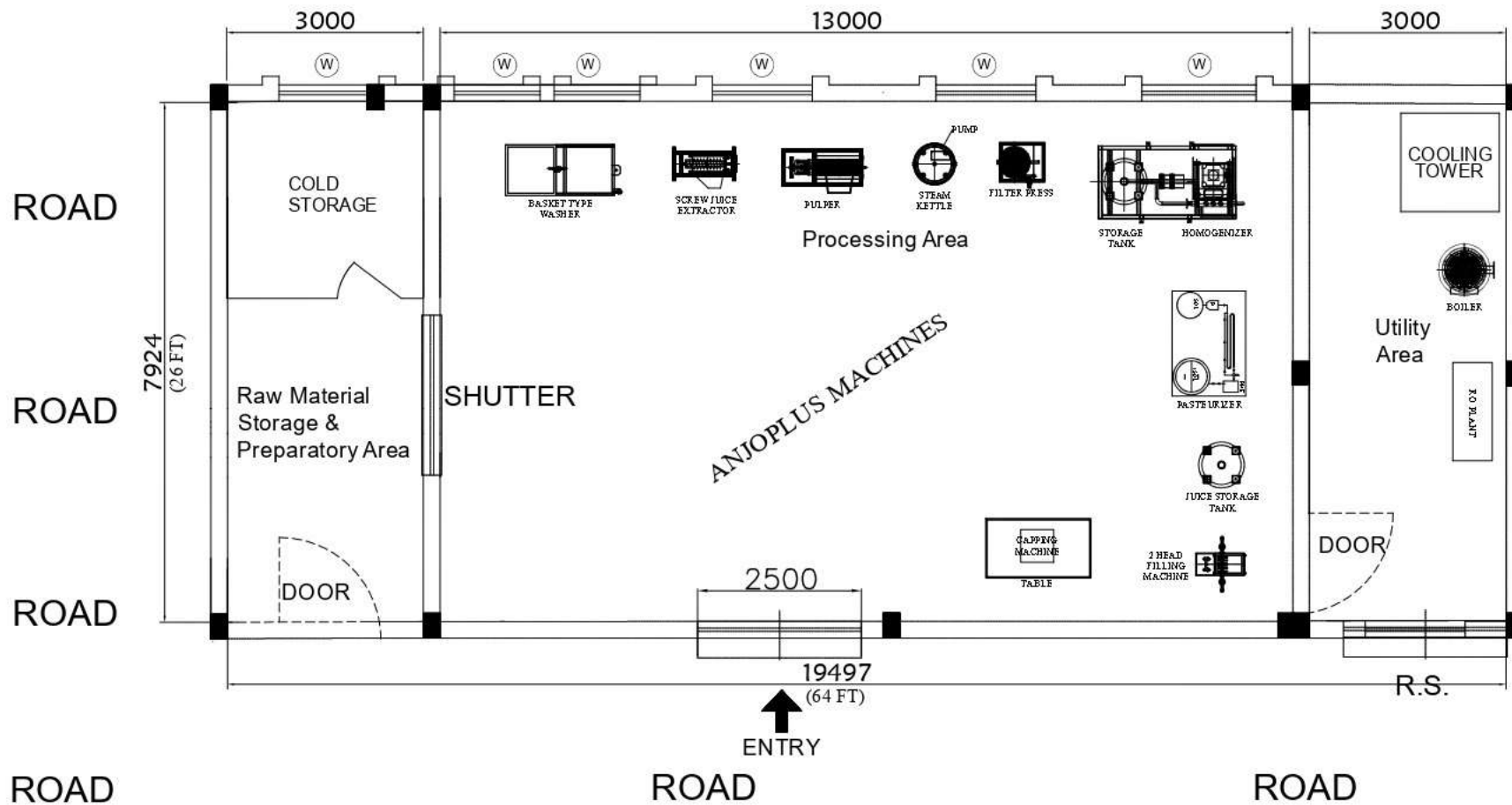
UDYOG AADHAR
MSME : Micro, Small and Medium
Enterprises

Mango Juice/Pulp Canning/Treatment Plant/Packhouse
Tomato Ketchup/Sauce/Powder/Paste etc.
Orange/Kinnow/Lemon Processing
Vegetable Dehydration/Grading/Packing & Processing
And Various other Fruit & Vegetables Processing

Tamarind Pulp/Paste/Powder/Sauce etc.
Spice Processing
Pineapple Processing
Custard Apple Processing



Tentative Layout For RTS Project



CIVIL ESTIMATES

Name of Work -Orange Processing Unit (20 X 8 M)		
RECAPITULATION SHEET		
Sr.No	Description	Amount
A	Work Portion	
1	Cost for Civil Work Main Building	3886923.00
	TOTAL (A)	3886923.00
2	5 % Contengencies	194346.15
3	GST On A 18%	699646.14
B	Civil Work Royalty /Testing Charges	
	Add For Material Testing	51305.77
	Add For Royalty Charges	18966.05
4	Add 1% Labour insurance	38869.23
5	Total Cost Of Work	4890056.34
	SAY	4890056.00
	Estimate is prepared on assumption of strata, standard weight for structural steel is considered for estimate purpose. As per actual design weight may vary of structural steel.	
	Estimate is prepared on the basic Rates of PWD SSR 2022-23 (As current SSR for 2023-24 and 2024-25 was not published)	
	Lead charges are not considered for Estimate.	
	Additional % on SSR rates for muncipal area is not Considered	
	If proposed facility area is in tribal/naxelite area then additional 10% and 30 % Rate may increase respectively.	
	For proposed facility site, If strata is Black Cotton Soil then cost will increase	
	Above Plinth level 1.5 M Ht Brickwork Is Considered	

Name of Work -Orange Processing Unit (20 X 8 M)

ABSTRACT

S.N.	SSR Item No.	Description	Quantity	Unit	Rate	Amount
1	21.02	Excavation for foundation in earth, soils of all types, sand, gravel and soft murum , including removing the excavated material upto a distance of 50 m. beyond the building area and stacking or spreading as directed, preparing the bed for the foundation and necessary back filling, ramming, watering, including shoring and strutting as necessary complete.				
		Lift Up to 1.5 M	95.240	Cu.M	215.30	20505
2	21.12	Excavation for foundation in hard murum including removing the excavated material upto distance of 50 meterRs. beyond the building area and stacking or spreading as directed, preparing the bed for the foundation and necessary back filling, ramming, watering including shoring and strutting etc. complete.				
		Lift from 1.5 M to 3.0M	19.44	Cu.M	324.50	6308
3	21.36/679	Filling in plinth and floors with approved excavated materials in 15 cm. to 20 cm. layers including watering and compaction complete.	19.44	Cu.M	124.80	2426
4	21.37/680	Filling in plinth and floors with contractors approved material / murum / stone dust in 15cm. to 20cm. layers including watering and compaction complete.	140.180	Cu.M	826.80	115901
5	21.4/683	Providing soling using 80 mm size granite / quartzite / gneiss / trap metal in 15 cm. layer including hand packing filling voids with sand / grit, ramming, watering etc complete.	37.930	Cu.M	1512.20	57358
6	24.01/756	Providing and laying Cast in situ/Ready Mix cement concrete in M-10 of trap/ granite/ quartzite/ gneiss metal for foundation and bedding including bailing out water, Steel centering, formwork, laying/pumping, compacting, roughening them if special finish is to be provided, finishing if required and curing complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand V	5.180	Cu.M	5938.40	30761

S.N.	SSR Item No.	Description	Quantity	Unit	Rate	Amount
7	24.04/757	Providing and laying Cast in situ/Ready Mix cement concrete in M-15 of trap/ granite/ quartzite/ gneiss metal for foundation and bedding including bailing out water, Steel centering, formwork, laying/pumping, compacting, roughening them if special finish is to be provided, finishing if required and curing complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand V	27.790	Cu.M	6488.60	180318
8	25.11\765	Providing and laying in situ /Ready Mix cement concrete M-20 of trap / granite /quartzite/ gneiss metal for R.C.C. work in foundations like raft, strip foundations, grillage and footings of R.C.C. columns and steel stanchions etc. including bailing out water, Steel centering formwork, laying/pumping cover blocks, compaction and curing roughening the surface if special finish is to be provided (Excluding reinforcement and structural steel) etc. complete, with fully automatic micro processor based PLC with SCADA enabled reversible Drum Type mixer/ concrete Batch mix plant (Pan mixer) etc. complete. With fine aggregate (Natural Sand / Crushed sand VSI Grade finely washed etc)	32.400	Cu.M	7263.40	235334
9	25.31/770	Providing and casting in situ cement concrete of required grade of trap / granite /quartzite/ gneiss metal for R.C.C. columns as per detailed design and drawings or as directed, including steel centering, plywood/steel formwork, compaction, finishing uneven and honeycombed surface with C.M. 1:3 of sufficient minimum thickness to give a smooth and even surface or roughening the surface if special finish is to be provided and curing etc. complete. Including use of plastisizer wherever necessary as directed by Engineer (Excluding reinforcement, including cover block) . The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed)	2.150	Cu.M	14209.50	30550

S.N.	SSR Item No.	Description	Quantity	Unit	Rate	Amount
10	25.5/772	Providing and casting in situ cement concrete of required grade of trap / granite / quartzite / gneiss metal for R.C.C. beams and lintels as per detailed design and drawings or as directed, including steel centering, plywood/steel formwork steel props, compaction, finishing uneven and honeycombed surface with C.M.1:3 of sufficient minimum thickness to give a smooth and even surface or roughening if special finish is to be provided and curing etc. complete. Including use of plastisizer wherever necessary as directed by Engineer-In-charge (Excluding reinforcement, including cover block) . The Cement Mortar 1:3 plaster is considered for rendering uneven and honeycombed surface only. Newly laid concrete shall be covered by gunny bag, plastic, tarpaulin etc. (Wooden centering will not be allowed)	10.820	Cu.M	12872.77	139283
11	33.3/945	Providing and laying in situ cement concrete M20 with tremix treatment for 100 mm thickness for flooring with groove cutting of 4mm wide and 20mm deep with necessary refilling with bitumen etc. complete.	160.000	Sq.M	703.00	112480
12	26.33/797	Providing and fixing in position TMT - FE - 500 bar reinforcement of various diameters for R.C.C. pile caps, footings, foundations, slabs, beams columns, canopies, staircase, newels, chajjas, lintels pardis, copings, fins, arches etc. as per detailed designs, drawings and schedules. including cutting, bending, hooking the bars, binding with wires or tack welding and supporting as required complete.	6.704	MT	93291.10	625377
13	27.12/878	Providing second class Burnt Brick masonry with conventional/ I.S. type bricks in cement mortar 1:6 in foundations and plinth of inner walls/ in plinth external walls including bailing out water manually , striking joints on unexposed faces, raking out joints on exposed faces and watering etc. Complete	3.864	Cu.M	8065.20	31164
14	27.13\879	Providing second class Burnt Brick masonry with conventional/ I.S. type bricks in cement mortar 1:6 in superstructure including striking joints, raking out joints, watering and scaffolding etc. Complete	46.400	Cu.M	8313.80	385760
15	32.03/883	Providing internal cement plaster 12 mm thick in a single coat in cement mortar 1:5 without neeru finish to concrete or brick surface in all positions including scaffolding and curing complete. Providing groove at joint of B.B. Masonry and concrete members complete	117.750	Sq.M	390.00	45923

S.N.	SSR Item No.	Description	Quantity	Unit	Rate	Amount
16	32.11/89 1	Providing sand faced plaster for external portion in cement mortar using Kharsalia / Kasaba or similar type of sand, in all positions including base coat of 15 mm. Thick in C.M. 1:4 using water proofing compound at 1 kg per cement bag, curing the same for not less than 3 days and keeping the surface of the base coat rough to receive the sand faced treatment 6 to 8 mm thick in C.M. 1:4 finishing the surface by taking out grains, making grooves and curing for fourteen days scaffolding etc. complete.	74.250	Sq.M	660.90	49072
17	36.11/10 33	Providing and applying washable oil bound distemper of approved colour and shade to old and new surfaces in two coats including scaffolding, preparing the surfaces (excluding the primer coat) complete.	117.750	Sq.M	49.90	5876
18	35.21	Providing and applying priming coat on concrete/ masonry/ Asbestos Cement plastered surfaces including scaffolding if necessary, preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter and sand papering as required etc. complete.	117.750	Sq.M	37.40	4404
19	35.26/10 76	Providing and applying two coats of exterior weather shield paint of approved manufacture and of approved colour to the plastered surfaces including cleaning ,preparing the plaster surface ,applying primer coat ,scaffolding if necessary, and watering the surface for two days etc complete.	172.500	Sq.M	306.80	52923
20	21.22	Providing preconstructional antitermite treatment as per I.S. 6313 (Part-II) by treating the bottom surface and sides of excavation at the rate of 5 litres of emulsion concentrate of 1.0 percent of chlorophyrifos per square meter of surface area covering 10 years guarantee on bond paper.	363.530	Sq.M	111.30	40461
21	21.24	Providing preconstructional antitermite treatment as per I.S. 6313 (Part-II) by treating the top surface of plinth filling at the rate of 5 litres of emulsion concentrate at 1.0 percent of clorophyrifos per square metre of surface area covering ten years guarantee on bond paper.	160.000	Sq.M	112.30	17968
22	39.25	Providing and fixing rolling steel shutters fabricated from 18/20 guage steel laths with slide guides, bottom rail, brackets, door suspension shaft, housing box at the top including mechanical gear operation arrangement and one coat of red lead primer etc. complete.	20.630	Sq.M	5520.30	113884

S.N.	SSR Item No.	Description	Quantity	Unit	Rate	Amount
23	39.77	Providing and fixing in position Mild steel fixed staggered (Z Type) Ventilator as per detailed drawing with hot deep zink coating including fabricating with Mild steel 'Z' Section of size 20mm x 25 mm and 3 mm thick at weight 1.42 Kg/Rmt,with stainless steel mosquito net of 304 Grade,4 mm thick float glass ?as directed by Engineer In charge including necessary welding, grinding, two coats of oil paint etc.complete	10.800	Sq.M	4196.40	45321
24	23.04	Providing structural steel work in trusses, other similar trussed purlins and members with all bracing, gusset plates etc. as per detailed designs and drawings or as directed including cutting, fabricating, hoisting, erecting fixing in position, Making riveted/ bolted/ welded connection and one coat of anticorrosive paint and over it 2 coats of oil painting approved quality and shade etc. complete.	4.562	MT	124237.40	566771
25	38.04	Providing and fixing corrugated galvanised iron sheets of 0.63mm thick (24 B.W.G.) for roofing without wind tiles including fastening with galvanised iron screws and bolts, lead and bitumen washers as per drawing etc. complete.(Weight of 5.5 Kilogram/sq.m.).	416	SQM	904.80	376397
26	31.05	Providing water proof bedding for flooring of Bath and WC 25 mm thick in C.M. 1:3 including using approved water proofing compound in specified proportion as per manufacturers specifications for per bag of cement including leveling, curing and covering 10 years guarantee on court fee stamp paper of Rs.500/- including ponding test etc. complete.As directed by Engineer in charge. (S. S. R. I. No. 31.05 & Page No. 256) For Flooring At Toilet Blocks	14.26	SQM	447.20	6377
27	43.05	Providing and fixing on walls/ ceiling/ floor 40 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc.complete	100.00	RMT	663.50	66350
28	42.55	Providing and fixing on walls/ ceiling/ floor 15 mm dia. CPVC pipe with necessary fittings, remaking good the demolished portion etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc.complete	75	RMT	276.60	20745
29	41.4	Providing and fixing 15 mm dia screw down bib / stop tap of brass including necessary socket, union, nut, testing etc. complete (Prior approval of sample & brand by Architect is necessary before use)	4	NOS.	697.80	2791

S.N.	SSR Item No.	Description	Quantity	Unit	Rate	Amount
30	41.47	Providing and fixing screw down 40mm dia meter wheeled stop tap of brass including necessary sockets/union nut complete.	2	NOS.	1217.80	2436
31	42.86	Providing and fixing European type wall-hung white water closet of Paryware/Hindware with push valve concealed type with cover plate 32mm size of JAQUAR MAKE SERIES FLV-1095 including soil pipe vent pipe up to outside face of wall. 100mm dia	4	NOS.	15627.00	62508
32	43.37	Providing and fixing 15 mm diameter PVC Aqua kraft type Supreme make or equivalent make super jet spray with flange 2 in 1 faucet 1.50 metre long including all accessories etc complete	4	NOS.	486.70	1947
33	41.66	Providing and fixing colour glazed earthenware Wash Hand Basin of 55cm x 40cm size including pillar tap brackets, rubber plugs and brass chain, stop tap and necessary pipe connection including UPVC waste pipe and trap upto the outside face of the wall. Making good damaged surface testing etc. complete. With UPVC Bottle trap.	2	NOS.	6225.40	12451
34	41.8	Providing and fixing 10cm C.I. Nahani Trap including C.I. grating bend and piece of C.I. pipe upto the outside face of the wall complete	6	NOS.	1172.10	7033
35	42.02	Providing and fixing 15cm x 10cm salt glazed stoneware gully trap in cement concrete 1:4:8 outside the building including cast iron grating in the sink, connecting glazed stoneware pipe, brick masonry chamber with cast iron lid and cast iron grating for the gully trap.	2	NOS.	1694.20	3388
36	42.16	Providing and constructing Brick Masonry Inspection Chamber 60cm x 45cm including 1:4:8 cement concrete foundation 1:2:4 cement concrete channels half round G.S.W. pipes, Brick masonry, plastering from inside and air tight 75 mm thick RCC cover etc. complete.	2	NOS.	10361.50	20723
37	42.28	Providing, laying and fixing P.V.C. pipe of 110 mm. dia. with fittings such as bends, tees, reducers, clamps, etc. including necessary excavation, trench filling etc. complete. Including removing existing pipe line if necessary and conveying and stacking the same in PWD chowky or as directed etc. complete.	100	RMT	617.80	61780
38	42.54	Providing and fixing H.D.P container Syntex or alike one piecen moulded water tank made out of low density polythyler and built corrugation including of delivery up to destination hoisting and fixing of accessories such as inlet, outlet overflow of all tanks capacity above 1000 to 20,000 litres	5000	Litre	11.40	57000

S.N.	SSR Item No.	Description	Quantity	Unit	Rate	Amount
39	41.6	Providing and fixing White Glazed Earthenware Lipped Flat Back / Corner Type Urinal with PVC 5 liters flushing cistern with fittings, inlet pipe with stop tap, brackets for fixing the cistern, 32 mm diameter P.V.C. flush pipe with fitting including lead soil pipe, lead trap and soil pipe connection up to the outside face of wall. Spec. No. Bd.V. 26 Page No. 564. (S. S. R. I. No. 41.60 & Page No. 347)	4	NOS.	4979.50	19918
40	48.46	RWH-Shallow Percolation Pit providing, constructing 2.0m deep shallow depth percolation pit comprising of 1.0m dia pre-cast RCC rings, 300mm thick side filling around outside of RCC rings (annular space)with 40mm size boulders including filling of percolation pit upto 0.5m depth (from bottom up)with 25-75mm clean washed gravels followed by 0.5m depth of 10-25mm of clean washed stones followed by 0.5m of washed river fine aggregate	2	NOS.	53560.00	107120
41	42.18	Providing and fixing hume pipe septic tank 900mm diameter with vent pipe and cap including necessary (including excavation and laying)	2	NOS.	17395.00	34790
42	42.19	Providing soak pit of size 120cm x 120cm x 120cm including excavating and filling with brick-bats.	2	NOS.	3070.10	6140
43		providing Turbo Ventilator	10	NOS.	10090.10	100901
					G.TOTAL	3886923.00