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Orange jam production technology: A better way to cope up post-harvest losses as a business start-up

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Abstract

Jams are recommended by nutritionist for its health benefits including less cholesterol and fats, improves hair, skin and fingernail health, decreases blood pressure, reduces problem of constipation, reduces risk of heart attack and other health benefits. The preparation of jam also helps in decreasing the post-harvest losses. Here, preparation means value addition to fruits. As it has high health benefits on consumption and the demand of ready-to-eat food due to busy life schedule of the people in the city is rising, this project will not only provide advantage to health and environment but also help the growth of the economy in that place as it will generate employment to many people. The ready-to-eat food are always cheaper so people of different backgrounds will be able to purchase it. This project has a great market potential as there is a growing demand for healthier foods. It is also an easily accessible business as it is easy to sell and needs less investment. All over the project seems to be a profitable business as a start-up for agripreneurship.

Keywords: Nutritional value, Orange Jam, Post-harvest losses, Value addition

Introduction

Jam is a condiment which is usually made from fruits, sugar and pectin. Eating of fruit jams can boost the health of the heart by providing a range of vitamins, minerals, anti-oxidants and fibre. Therefore, the nutrient-rich jams can reduce the risk of potential cardiovascular diseases. This miraculous fibre is widely used in the food industry, especially in the production or manufacture of foods that allow our breakfasts, snacks and deserts to be more pleasurable. Due to rapid change in lifestyle, it led to the increased consumption of ready-to-eat food. Currently the youths are consuming bread and jam regularly, especially for breakfast, as these do not require much time for preparation.

This jam making can create economic opportunities at various levels. It can support fruit and vegetable growers and farmers by providing an additional market for their produce. It can also generate employment opportunities in the processing, packaging and distribution stages of the jam production chain. Additionally, if the project succeeds and gains popularity, it can contribute to the growth of the local food industry and boost the regional economy.

Across the world, food-processing is considered to be a burgeoning sector because of its immense potential for growth and socio-economic impact. It not only leads to income generation but also helps in reduction of post-harvest losses, value addition in fruits and foreign exchange earnings and also amplifies manufacturing competitiveness.

Importance

Orange jam, like many fruit preserves, holds importance in several areas, spanning from nutritional benefits to cultural and practical uses. Here's a brief:

Nutritional Value

Oranges are well-known for their high vitamin C content, which is an important antioxidant that supports the immune system. While some of this vitamin C can be lost during the cooking process of jam making, orange jam still provides a source of this vital nutrient. It also contains other beneficial compounds, including potassium and certain B vitamins. The fiber present in oranges, some of which is retained in jam, can contribute to digestive health.

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Prevention from unnecessary wastage

At present about 40% of Indian horticultural produces go waste due to lack of facilities. So, processing of fruits and vegetables offers immense scope for wastage minimization and value addition, thus, can generate significant income and employment in countries of agrarian economy. Fruits can be processed to produce various products like jam, jelly, squash, RTS, marmalades.

Culinary delicacy

Orange jam is a versatile ingredient that can be used in various culinary applications including spreading on bread, toast, and pastries; adding flavor to desserts and baked goods; Used as a glaze for meats and sauces.

Rapid Urbanization

This is expected to gush the sales of fruit jam and jellies. Urbanization has resulted in the establishment of modern café stores and mobile food trucks, which make use of the jams and jellies in sandwiches and lot of other dishes.

Cultural Significance

In many cultures, fruit preserves like orange jam hold a place in traditional cuisine and family recipes. Marmalade, which is a type of orange jam, has a strong cultural tie to places like the United Kingdom.

In essence, orange jam is important for its ability to provide some nutritional benefits, extend the shelf life of a fruit, and add delicious flavor to a wide range of foods.

Materials and Methods

Raw Materials

- Since, fruit is the primary raw material. Here, orange is the main raw material.
- Other raw materials required are sugar, citric acid and preservatives.
- Packaging materials like sterilized glass bottles, wooden crates, flexible containers are required.

Principal Equipment's

Pulper, Steam-jacketed Kettle, bottle washing machine, cap sealing machine.

Auxiliary Equipment's

All items like baby boiler, washing tank, weighing balance, sauce pan, knives, containers, storage tanks, burner, mixer grinder.

Manufacturing Process (for 1kg)

- Selection of Fruit- Fully ripe fruit should be harvested for jam making and weighed in weighing balance i.e. 1kg.
- Washing/cleaning of fruit- Fruits should be washed by clean cold water.
- Preparation of Fruit- Fruit should be peeled and removal of core material for jam making. Cooking with Sugar- After extraction of fruit pulp in pulping machine start cooking is to be done with 1/3 quantity of sugar in steam-jacketed kettle. After some time, remaining sugar is added.
- Adding of Citric Acid- For enhancement of test citric acid should be added at 103°C temperature along with preservative as per quantity. Here, 2 gm for 1 kg jam.
- Judging of End-Point- a. Sheet or Flake test- A small amount of jam is taken out during boiling, in a spoon or wooden ladle and cooled slightly, then it is allowed to drop. If the product falls off in the form of a sheet or flakes instead of flowing and a continuous stream or syrup, it means that the end-point has been reached and product is ready, boiling has to be continued till the sheet is positively formed, b. Temperature- 105°C, c. TSS- 68-70%, d. Weight Test- If total weight of jam is 1.5 times more than sugar weight, jam is prepared.
- Packaging - Jam should be filled in sterilized glass jar with the help of glass filling and sealing machine.
- Storage- It should be stored at dry and cool place with proper labelling for selling purpose.

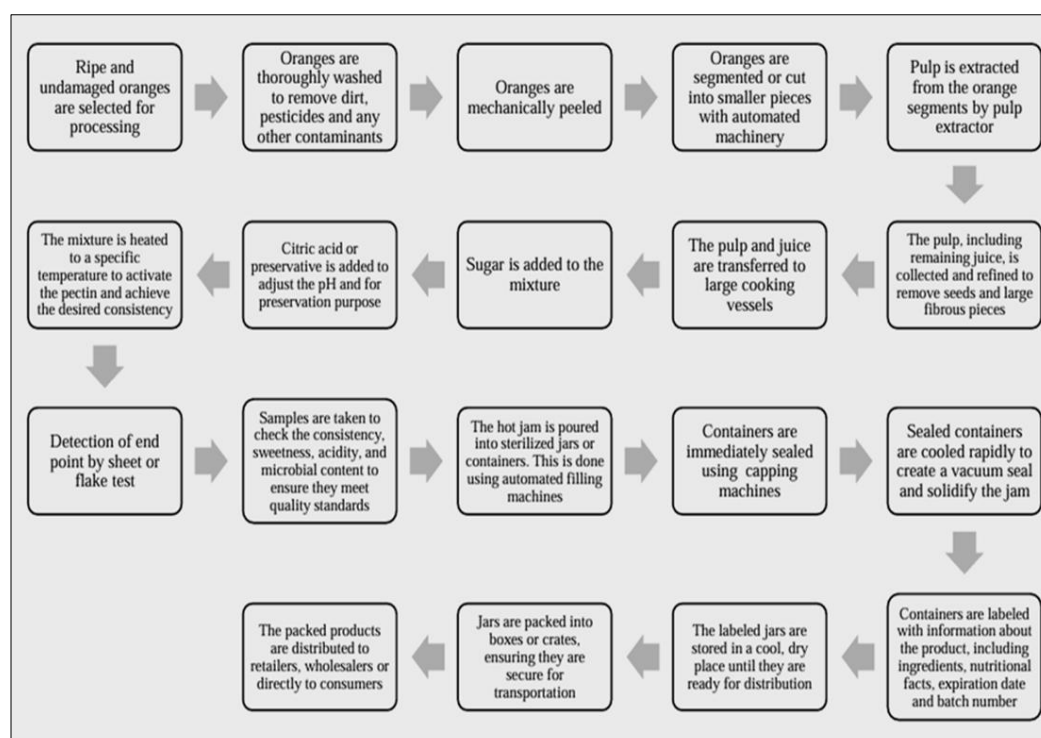


Fig 1: A Flow-chart on Orange Jam Processing

Results and Discussions

A five-year plan has been calculated and studied about the profit or return that we can get. Basic assumptions

- Total days in a year- 300 days (120 working days in 1st year and remaining 180 days on preliminary and preoperative activities i.e. 40% production capacity in 1st year and it increases @10% per year)
- Total land area- 2000 Sq. ft.
- Project life- 5 years
- Batches per day- 3
- Working hours/day- 8 hrs. (7hrs. for production and 1h for regular maintenance and other activities)
- Plant Capacity/year- 49500 kg
- Raw materials- Orange, Sugar, Citric acid, Preservatives
- Electricity- 60 KWh

- Packaging Material- Glass, fibre jars

Table 1: Basic Assumptions

Sl. No.	Description	Amount
1	Jam Price (Rs. /kg)	Rs. 175 (increased @Rs.5/year)
2	Number of Batches	3
3	Production per day	165 kg
4	Production per year	49500 kg

Here, the cash flow statement is provided for 5 years after considering and calculating all the requirements including taxes and current market rate of raw materials (according to Indian market value and rate). From the economic outlay we can see that, the benefit-cost ratio is 1.27, whereas, the Internal Rate of Return is 68% for a 5 years duration. Hence, a good profit can be achieved.

Table 2: Cash-flow Statement

Sl. No.	Description	Amount (Rs. lakhs)
1	Total Financial Outlay (TFO)	61.06
2	Bank Loan @75%	45.79
3	Margin Money @25%	15.26

Table 3: Means of Finance

Sl. No.	Particulars	1 st Year (Rs. lakhs)	2 nd Year (Rs. lakhs)	3 rd Year (Rs. lakhs)	4 th Year (Rs. lakhs)	5 th Year (Rs. lakhs)	Total (Rs. lakhs)
1	Total Fixed Cost (Rs.)	31.72	0	0	0	0	
2	Total Variable Cost (Rs.)	29.34	31.55	33.77	36.01	38.11	
3	Total Cost (Rs.)	61.06	31.55	33.77	36.01	38.11	200.52
4	Gross Income (Rs.)	34.65	44.55	54.94	65.83	77.22	277.20
5	Net Income (Rs.)	-26.41	12.99	21.16	29.81	39.10	76.67
6	DF@15% $\{1/(1+DF)^Y\}$	0.8696	0.7561	0.6575	0.5718	0.4972	
7	Discounting Cost (DF*Total Cost) (Rs.)	53.09	23.85	22.20	20.59	18.94	138.70
8	Discounting Benefit (DF*Benefit) (Rs.)	30.13	33.68	36.12	37.64	38.39	175.97
9	NPW 15% DF (Rs.)	37.27	9.82	13.91	17.04	19.44	
10	BCR 15% DF	1.27:1					
11	IRR	68%					

So, from the above three tables we can conclude that Jam business is indeed a profitable business, within five years only we can get a good profit.

Here, a brief idea of total revenue and total cost is provided through bar graph.

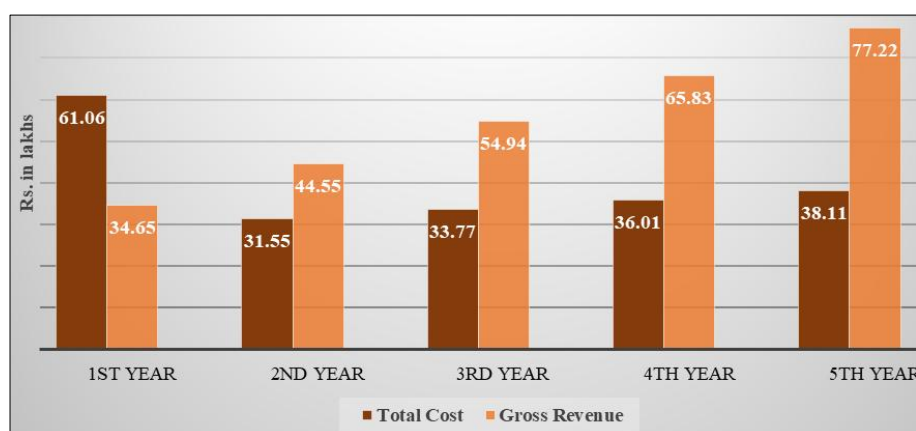


Fig 2: Gross Revenue and Total Cost Graph

Market Potential

The market potential of jam can vary depending on several factors such as consumer preferences, market trends and availability of similar products.

Growing demand for healthier food options- In truth, jams, in terms of taste and aesthetics, besides giving a very special touch to some meat, fish or dessert dishes, are very important for human health as they contain pectin which is

probiotic action soluble fibre that has many benefits, namely to the digestive system, control of blood sugar levels and reduction of bad cholesterol levels. Many health-conscious customers have started to adopt them.

Easily Accessible Business

Jam processing factory can be easily set up with minimum capital and workforce. The raw materials are readily available and easily accessible in the market.

Easy to Sell

Due to rising demands and everyday use mainly in urban areas. It is easy to put jam on any platforms easily accessible by all. Nowadays, jams are sold on various online platforms like Amazon, Flipkart, Grofers and are available in grocery stores to shopping malls.

Tourism and Hospitality

The tourist destinations are increasing day by day and being a thriving hospitality industry, there may be opportunities to supply jams to hotels, restaurants, cafes and gift shops catering to tourists looking for locally produced goods.

Profitable Business

Indeed, jam industry is a profitable business. After going statistically, we can say that the demand for processed vegetable and fruit products is sure to multiply in the coming years. So, we can expect satisfactory returns from the jam-making business. Another primary reason is the changing food habits of people. Today, more and more individuals have started to consume easy snack items like bread in breakfast leading to increased consumption of spreads like jam.



Fig 3: Adding of sugar in orange pulp, End point detection of orange jam, Packaged and labelled orange jam ready for selling

Conclusion

Jam making is counted as a remunerative business in India. One of the best things about this business is that it requires low investment as compared to other food processing sectors. Additionally, we can consider the subsidies and allowances offered by the government for the food processing sector. Due to the growing customer demands, it has opened golden opportunities for both private and foreign players. India being the 2nd largest global producer of fruits and vegetables, so people have a number of chances of starting a jam business industry by using varieties of fruits and vegetables. Right strategy and expert planning are necessary to start a fruit jam manufacturing industry. The chief consumers of jams are hotels, restaurants and households. The net production of vegetables and fruits in India is about 14 lakh tons approximately. Out of which, processed fruit pulp covers around 25%, while jams account for 10%. So, we can expect satisfactory returns from the jam-making business.

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