

A starter's guide to
Mfg. of Jams & Jellies

JAMS & JELLIES



Introduction:

Jams and jellies are spreads typically made from fruit, sugar, and pectin. Jelly is made with the juice of the fruit while jam uses the meat of the fruit as well. Jams and jellies are prepared to preserve fruits by using sugar and pectin either added from outside or which is with the fruits. One can prepare the product sitting in the house and can utilize their idle hours. It is a very productive activity and can give employment to the entrepreneurs in urban marketing as well as in the rural sector. Cooking jams, jellies and marmalades using fruits, sugar, pectin and edible acids is one of the oldest food preserving processes known to mankind and presents a way of making food stable by increasing the content in soluble solids.

Market Snapshot:

There are good reasons to believe that the processed products of fruit & vegetable business will remain a growth industry for a long time, one of the main reasons for expectation of growth is that the consumption of fruit jam/ jelly/marmalade is gaining popularity day by day owing to the growing change in the food habits and increased consumption of bread and other convenient snack foods.

The changing dietary pattern has been instrumental in increasing the consumption of jams and jellies. The present day busy schedule of the working class and students has made jams and jellies as one of the important additions to breakfast table of almost every urban household. The rural populace is also duplicating the trend.

There is huge scope for establishing jam and jelly processing units in the state, because of abundant and quality fruit production locally.

It is worth mentioning that a major portion of Indian food processing industry is dependent on the state particularly Kashmir for their quality raw material (fresh fruits) requirements.

Raw Material Selection:

Jams and jellies are made from a variety of fruits, either singly or in combination. Most of the fruits are harvested in the fall. The level of ripeness varies. Pears, peaches, apricots, strawberries, and raspberries gel best if picked slightly underripe. Plums, cherries and apples are best if picked when just ripe. The processing plants are advised to be built close to the fruit farms so that the time elapsed between harvest and preparation is between 12-24 hours.

The most important quality criteria for fruit selection are:

- optimal state of ripeness
- full fruity flavour
- variety-specific colour
- no blemishes (no spots, no bruises)
- sufficient consistency (solidity of form)
- soluble solids content in agreement with quality standards
- perfect hygienic condition of raw materials and packaging

Manufacturing Process:

1. **Jam:** The fruit are cleaned, washed and sliced. Slices are then converted to pulp in a pulping machine. Pulp is then transferred to a stainless steel steam jacketed vacuum pan in required lots and boiled. A small quantity of water is also added before boiling the mixture to facilitate pulping. Requisite amount of pectin is added at this stage. The product together with an almost equal quantity of citric acid is boiled to a temperature of 200°C-220°C determined by a preserver's thermometer. The product is cooled before packing.

2. **Jelly:** The washed and peeled traits are fed into hopper of juice extractor and the juice is filtered. The juice containing sufficient pectin and the dry sugar are boiled in the stream-jacketed kettle until a satisfactory jelly is obtained. Necessary preservative are added towards the end of boiling process. The extracted and clean juices are sent into stainless steel blending tank, where juice is mixed with sugar syrup and other ingredients like citric acid essence. The product is cooled before packing.

*The ingredients must be added in carefully measured amounts. Ideally, they should be combined in the following manner: 1% pectin, 65% sugar, and an acid concentration of pH 3.1. Too much pectin will make the spread too hard; too much sugar will make it too sticky.

Common Problems in Jam and Jelly Making:

Some of the most common problems with jams and jellies are softness, weeping, fermentation, darkening, clouding, mold and crystal formation.

- **Softness:** If jelly is too soft, there may be incorrect proportions of sugar, acid and juice. Making too large a batch or undercooking may also be a cause.
- **Weeping:** Another problem is jelly that weeps. If this happens there may be too much acid in the fruit or too much acid added in the form of lemon juice. Also, the storage place may have been too warm or the temperature changed too much during storage.
- **Fermentation:** This may occur because of too little sugar or improper sealing. The boiling water bath process helps to get an adequate seal and prevent fermentation.
- **Darkening:** Sometimes jellies and jams darken at the top of the container. There are two main reasons; either the storage place was too warm or a faulty seal has allowed air to leak in. Red fruits such as strawberries are especially prone to fading.
- **Clouding:** It may be for one of the following reasons: first, you may have poured the jelly mixture into the jars too slowly allowing bubbles to form. Or, you may have allowed the jelly mixture to stand before it was poured. Other reasons are that your juice may have had too much pulp because of improper straining, or your jelly set too fast, probably because the fruit was not ripe enough.
- **Mold Formation:** Mold growth may occur on jam and jelly products when there is an imperfect seal or too much air space between the jar lid and jellied product. The prevention of mold growth on jams and jellies is important for economic as well as food safety reasons because moulds may be harmful and shouldn't be eaten. The best way to avoid problems with mold growth on jam and jelly products is to pour the hot jam into hot, pre-sterilized canning jars. Pour to within a fourth of an inch of the top of the jar. Seal with pre-treated lids and process in water bath for the recommended time.
- **Crystal Formation:** A final problem is crystals in jelly. This may be caused by too much sugar or not cooking the mixture long enough for the sugar to dissolve. Another cause may be cooking the jelly too long or too slowly, and ending up with too much evaporation of liquid. Once the jelly is made, allowing it to stand uncovered may also result in evaporation of liquid and the formation of crystals on top of the jelly.

Economics:

Capital Cost	₹ 11.00 Lakhs
a) Land	Owned/Leased
b) Civil Works	₹ 6.00 Lakhs
c) Machinery & Equipment	₹ 4.00 Lakhs
d) Misc. Fixed Assets and Installations	₹ 1.00 Lakhs
Operating Cost (Per month)	₹ 4.00 Lakhs
Total Cost	₹ 15.00 Lakhs*

* The above calculations are based on the following plant specifications:

- Processing capacity : 40 Tonnes/Annum(TPA)
- Operational hours : 8 Hours/day
- Power requirement : 12 KW
- Fuel (Gas cylinders) : 80 Nos/Annum
- Operating cost components : Raw material, consumables, Packing Material (Jars, printed labels, cardboard cartons).

Dos & Don'ts:

Do

1. Select the location where availability of raw material, clean water, power input and market access is ensured.
2. Survey markets before jumping into this venture.
3. Ensure natural ventilation in production premises to avoid use of electricity during day hours.
4. Obtain the certifications under Essential Commodities Act(1955), Prevention of Food Adulteration Act(1954), The Fruit Products Order (1955), BIS ,JKSPCB.

Don't

1. Establish the plant in congested residential area.
2. Establish the plant away from the areas with raw material abundance.
3. Start the plant without necessary registrations and license.

Check List:

1. Land

- Area: 1/2 - 1 Kanal (owned/leased)
- Nature: Non-residential area preferably Industrial estate.

2. Building

Total Covered Area	--	2000 Sq.ft
Processing shed		1000 Sq.ft
Raw material store		500 Sq.ft
Finished goods store		500 Sq.ft

3. Machinery & Equipment

- Boiler
- Pulping Machine (with 1 HP motor)
- Steam Jacketed kettle
- Pulping machine
- Seed Extractor (with 1 HP motor)
- Steam Generator with accessories
- Jar Cleaner
- Fruit Washer
- Crown Corking machine
- Jar Sealing machine
- Misc. items like SS Top Processing table, SS Vessels, Saucepan, Mixing Containers, Knives, Weighing balance etc.

4. Money

- Check various financial schemes at JKEDI.

5. Suppliers

- Machinery to be procured from the registered dealers outside the state preferably turnkey suppliers.
- Raw material to be procured from the local fruit growers.

6. Buyers

- Local Hotels, Restaurants, Coffee Shops
- Bakery manufacturers (as filling for cakes and cookies)
- Tourists (domestic and foreign).
- Local Households.
- Child development centres.

Relevant government departments:

- Bureau of Indian Standards (BIS) - *For ISI Certification*
- Prevention of Food Adulteration (PFA)- *For NOC*
- J&K State Pollution Control Board (JKSPCB)- *For NOC*
- J&K SIDCO- *For Land Allotment.*
- J&K Power Development Deptt.(PDD)- *For Electricity Connection*
- J&K Public Health Engineering Deptt.(PHE)- *For Water Connection*
- Concerned District Industries Centre(DIC)- *For SSI Registration*