



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Sohiong Jam



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CHAPTER 1

INTRODUCTION

1.1. About Sohiong

Sohiong fruit (*Prunus nepalensis*) is an important indigenous underutilized fruit of Khasi and Jaintia Hills in Meghalaya, India. It belongs to family Rosaceae. The trees start occurring from Kumaon hills of Indian state of upto Manipur in North East India. Also called as Khasi Cherry, this fruit is abundantly available in the hills of Meghalaya and Manipur of North East India in the altitude ranging from 1500 to 2000 m.

The Sohiong trees are evergreen, medium to large size 15-20 m height with grey bark, open, upright branches. There is no established orchard of this crop in the region. The fruit trees grow wildy in the forest areas or they are grown in homestead yard or as a subsidiary crop in the orchards of pear. The fruit being under-utilized and with very less area under cultivation (estimated area less than 52 hectares) there is no data on the area under cultivation and production of Sohiong fruit in India, even in the producing states.

The fruit is round in shape with smooth surface resembling to jamun or blackberry and is widely consumed among the local population as fresh or used for production of squash, ready to serve beverage, jams, preserves and wine. The fruits are rich in phytochemicals which exhibit excellent radical scavenging and iron chelating properties. The fruit has excellent nutritional qualities as well as unique taste, colour and flavour.

Sohiong fruit is highly perishable and the lack of storage facilities and processing machinery leads to minimum utilization of the fruit. Converting the fruit into value added products will help in increasing the popularization of the fruit in domestic and international markets.

Further, there is immense potential for Sohiong cultivation in North Eastern states as well as in humid temperate areas of the country with elevation above 1000 metres above MSL. These areas have all sets of climate and sufficient rainfall for growing Sohiong fruit successfully.

1.1.1. Socio-economic significance

The northeast Himalayan region of India is rich in diversity of wild edible plant species, particularly in Meghalaya. Wild edible plants are very important for the well being of the populations in the region, not only as sources of supplemental food, nutritionally balanced

diets, medicine, fodder and fuel, but also for developed methods of resource management, which may be fundamental to the conservation of some of the world's important habitats.

The term 'wild-food' is used to describe all plant resources outside of agricultural areas that are harvested or collected for the purpose of human consumption in forests; these are incorporated into the normal livelihood strategies of many rural people, shifting cultivators, continuous croppers or hunter gatherers. About 80% of the wild edibles are drawn from sacred groves and other forest areas and sold in the market by poorer community for income. These wild products being lesser-known and less available have a good market value.

Wild fruits have been important sources of indispensable nutrients, which are comparable with the most commercial species and also cheaply available. Better utilization of such wild edible plants that are of local or regional importance will effectively increase nutritional security of a broader population.

About 90% of the rural population in hilly terrain depends on traditional healthcare system and most of the wild edible plants are used in traditional healthcare system. This system in the ethnic communities is conservation-oriented and has great potential.

1.1.2. Commercially grown varieties

There are no major varieties of Sohiong. There are two types of Sohiong fruits existing based on size, viz., bigger and smaller fruit. The major differences in the physical properties of the two types can be seen in the table.

Table 1: Physical properties of the 2 types of Sohiong fruit

Parameters	Bigger fruit	Smaller fruit
Fruit weight (g)	7.91	3.98
Specific gravity	0.95	0.94
Fruit length (mm)	21.76	18.16
Fruit diameter (mm)	21.80	17.12
Stone weight (g)	2.44	1.00
Stone length (mm)	15.94	13.48
Stone diameter (mm)	15.08	11.48
Pulp recovery (%)	69.11	74.71
Pulp: stone ratio	2.24	2.95

The bigger fruits contain maximum value for bio-chemical characters, except for TSS, Beta-carotene, anthocyanin and fibre. Smaller fruit size types show higher value for potassium content, while the other mineral contents was recorded higher in bigger fruit.

The rich nutrient content offers scope for in-depth study in evaluation and utilization of Sohiong fruits for nutritional security of the diet among the tribal population of the region and to propagate cultivation across different areas.

1.1.3. Composition & Nutritive Value of Sohiong fruit

Table 2: Nutritive value of Sohiong fruit per 100 g of edible portions

Parameters	Average value
Energy (kCal)	307
TSS (%)	19.60 -20.15
Acidity (%)	2.56- 3.32
Ascorbic acid (mg/100 g)	50.04- 58.38
Reducing sugar (%)	4.26- 4.44
Total sugar (%)	7.50- 8.75
β-Carotene (mg/100 g)	2.16- 2.76
Anthocyanin (mg/100 g)	313.34- 358.86
Pectin (%)	1.80 - 2.00
Moisture in fruit (%)	59.71- 61.84
Fibre (%)	1.71- 2.50
Nitrogen (mg/100g)	69.95 - 70.01
Phosphorus (mg/100g)	87.53 - 115.00
Potassium (mg/100g)	485.01- 530.00
Sulphur (mg/100g)	787.50- 1362.52
Iron (mg/100g)	2.32- 9.60
Copper (mg/100g)	1.00 - 1.56
Zinc (mg/100g)	2.10- 2.42
Manganese (mg/100g)	5.62- 7.70

Source: ICAR NEH Research on Physical and biochemical content of Sohiong fruit, 2016

1.1.4. Health benefits of Sohiong fruit

- The fruits are an important source of energy with 307 kcal per 100 grams.

- The fruit is rich in Ascorbic Acid, Pectin, Beta Carotene, Anthocyanin, Sugars and minerals.
- The fruits serve as an essential component of human diet, supplying essential vitamins and minerals in addition to protein & energy.
- Fats and carbohydrates composition in Sohiong is higher than that in almonds and apples, making Sohiong a cheaper alternative to this costlier nut and fruit
- The fruit is used as an astringent and the leaf for diuretic and in dropsy.
- Sohiong is quite beneficial for healthy bones, tissues and heart
- Sohiong contains phytochemicals that scavenge free radicals, helping to reduce the otherwise resultant oxidative stress that the radicals would have caused.
- The fruit fibre can relieve constipation, lower serum cholesterol levels, reduce the risk of coronary heart disease, hypertension and diabetes.

1.2.Indian Market Outlook

In India, the Sohiong fruit trees grow wild in the forest areas and home backyards in the North eastern hilly states and there is no established orchard of this crop in the region. Sohiong has an immense potential for commercial cultivation in the state as well in other parts of the world where relatively cool climate exists. The Sohiong fruit quality possesses excellence and unique colour, taste and flavour. It is also rich in essential nutrients. It has a good potential for extraction of natural edible colour required in food industry. The fruits are eaten fresh when ripened. Products like Ready to serve (RTS) beverage, jam, squash and cherry wine are prepared from pulp and juice of the fruit due to the fact that it imparts desirable purple colour to the wine. The expansion of area for commercial cultivation of this crop in the state may offer income and employment generation for the tribal peoples.

Greater utilization of under-utilized or wild edible plants that are of local or regional importance will effectively increase nutritional security. By improving the linkage between production and utilization, the biodiversity of traditional crops can be safe guarded. There is immense potential Sohiong fruit cultivation in North Eastern states as well as in humid hilly cool areas in other states, where the sets of climate and sufficient rainfall for growing Sohiong fruit are available.

The fresh whole fruit has a very low shelf life; because of this perishable nature Sohiong fruits produced during a particular season results in a glut in the market and become scarce

during other seasons. Due to lack of proper handling and processing technology, the fruit could not be commercialized to its potential. Hence there is a huge scope for value addition of the fruit into various traditional and novel food products.

The fruit jam, squashes & cocktail market is expected to register a CAGR of 3.5% in the coming years of this decade. The jam, jelly, and preserves market is driven by the convenience of these foods, preference for ready-to-eat products, and multiple distribution channels. With the increasing popularity of gourmet varieties the market is likely to have a positive outlook in the coming years. Increasing health consciousness and the inclusion of organic ingredients is driving the market.

1.3. Value added products from Sohiong fruit

1.3.1. Sohiong RTS beverage

The fruit juice is mixed with strained syrup solution (as per requirement) and the mixture is homogenized. This RTS beverage is filled in glass bottles and corked tightly. The bottles are pasteurized at 85°C for 20 min and cooled to room temperature. The RTS bottles are stored at ambient temperature and usually chilled for serving.

1.3.2. Sohiong fruit squash

The fruit juice is strained to remove seed and unwanted particles from juice. The juice is measured to prepare sugar syrup. The sugar syrup is prepared by mixing 1.8 kg sugar, 1 L water and 15 g citric acid and then strained to remove dirt and scum. Once the sugar is completely dissolved, the syrup is mixed with juice homogeneously. Permitted level of preservative is added and the squash is bottled in clean and sterilized bottles.

1.3.3. Sohiong Jam

Using pectin as a setting agent, the fruit pulp can be converted to jam by adding sugar and boiling. The fruit juice has pectin content, which could be taken advantage of.

1.3.4. Sohiong Wine

The wine prepared from Sohiong juice is much similar to grape wine and very popular in the region. Homemade Sohiong wines are very popular.

1.4. Harvest & Post Harvest handling of Sohiong

1.4.1. Harvesting

Sohiong is a seasonal fruit and fruits start ripening in the month of August and continue up to early October depending on altitudinal variation. Harvesting of fruit should be done when fruit fully ripe and attain deep purple or blackish colour.

Flowering period varies from November to March & fruit ripen in July to early October depending on the altitudinal variation. Genotypes having rough stone surface start maturing March onwards.

1.4.2. Harvesting method

Whole bunches of fruit is harvested with a sharp sterilized knife or clippers with a sharp edge. Alternatively, the ripe berries can be clipped/ picked at the stricture in the stem and not close to the shoulder of the fruit. A short piece of stem, approximately 4 cm (1.5 inches) in length should be left attached to the fruit to help prevent water loss and fungal development. Harvesting should be done either in early morning or in the late afternoon. The fruits should be harvested with care and put in a plastic bucket or field container such as baskets without dropping or throwing. The fruit should always be handled gently to avoid bruise damage and the inner surface of the field container should be lined with newspaper or padding to minimize fruit scarring.

1.4.3. Yield

On an average, a 12-13 years old tree produces 110-160 kg fruit/ tree/ year or 27-30 tonnes/ hectare per annum. The tree bears fruits after seven to eight years of planting. The trees are perennial and can yield for 70-80 years. The tree has a very short harvest season

1.4.4. Storing and Transporting

The initial sorting of marketable versus unmarketable fruits should be made in the field at the time of harvest. Severely damaged, decayed, over-ripe fruits, or unmarketable fruits should be put into a separate container and discarded.

The field containers with marketable fruits should be put in the shade to avoid overheating of the fruit prior to transport to the processing area. Fruits should never be harvested when wet, as this will encourage the spread of disease. Fruit harvested when wet and stored in unventilated crates or sacks will rapidly spoil. The fruits may be packed in net sack bags (to enable proper ventilation) or plastic crates and transported to processing centre.

The fruits are sensitive to deterioration even under refrigerated storage. Hence they must be processed at the earliest possible after being harvested.

CHAPTER 2

Processing of Sohiong Jam

2.1 Process Flow for Production of Sohiong Jam

Sohiong Jam is a product made by boiling the fruit pulp with sufficient sugar to a reasonably thick consistency, firm enough to hold the fruit tissues in position. The ingredients that are used in the production of Sohiong jam and their proportion are as follows.

- Sohiong fruit pulp: 1 kg
- Sugar: 1kg
- Fruit based Pectin: 5g

Sugar facilitates preservation. Pectin is the main ingredient in the fruit which gives a set to the jam. Since the fruit pulp is acidic, addition of citric acid is not required. Proper processing eliminates the need for addition of preservatives.

The unit operations in the production of Sohiong jam are explained below.

2.1.1. Washing

The fruits are separated from the peduncle manually. They are then washed to remove extraneous matter. Simultaneously, the fruits are inspected to remove any immature, spoiled, bruised or damaged ones.

2.1.2. Cooking

The washed fruits are then weighed. The fruits are boiled with equal quantity of water in a steam vat till they become soft. This process enables pulping as well as colour extraction. The boiled fruit is allowed to cool.

2.1.3. Pulping

The boiled and cooled Sohiong is fed into mechanical pulper. The seeds and pulp are separated. The extracted pulp goes for further processing.

2.1.4. Weighing of ingredients

The fruit pulp is weighed and based on the it, other ingredients such as sugar and pectin are weighed based on the proportion.

2.1.5. Concentration

The fruit pulp and the sugar are gradually heated in the steam vat till sugar is dissolved. After the sugar is dissolved, rapid heating of the mix is done with continuous stirring. Once the mix starts boiling, the weighed pectin (along with a small quantity of sugar for uniform dissolving) is sprinkled over the boiling mix. Rapid heating is continued until the jam thickens.

Continuous stirring should be done during concentration to make sure the jam does not stick to the base of the pan. Jam should not be over-boiled as this can give rise to caramel flavors, over sweetness and discoloration, apart from being a waste of energy.

2.1.6. Judging the Endpoint

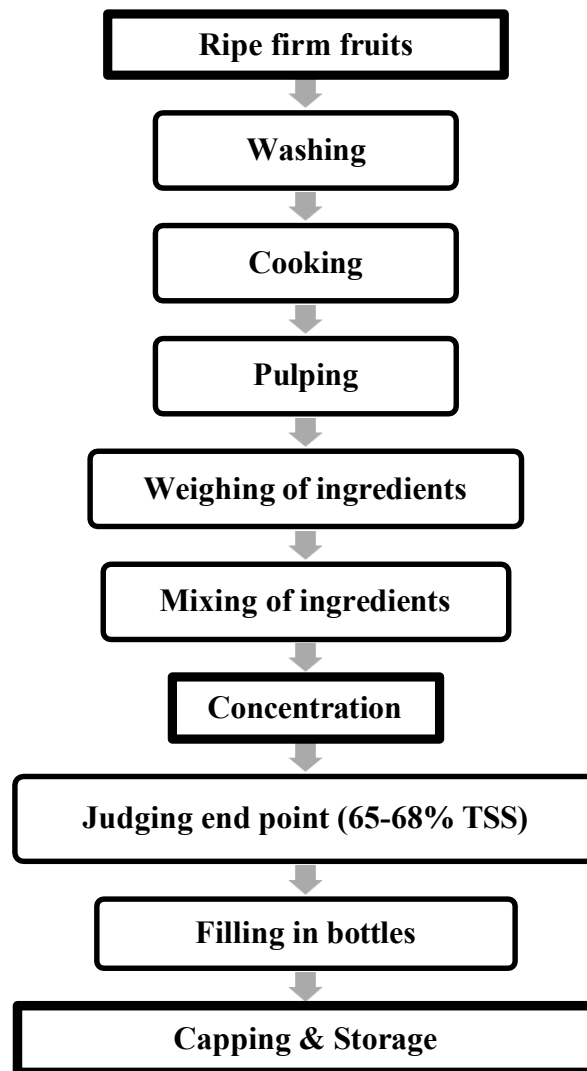
When the jam starts to thicken, it is important to test for the end point at frequent intervals. Endpoint should be measured using a Refractometer for consistency. Temperature/ other tests can be used, but these are not consistent methods. The final Total Soluble Solids (TSS) content of a jam or “end-point of the jam” should be 65 to 68%. Once this TSS is reached, the boiling is stopped.

2.1.7. Packaging

The jam should be allowed to cool slightly (to about 80°C for glass jars and 60°C for plastic jars). Then the jam is filled into clean, sterilized jars.

The jars should be warm to prevent them from cracking when the hot jam is poured in. If the jam is cooled too much it will be difficult to pour. Place the clean lids on top and fasten. Invert the jars to form a seal. The filled jars can be placed in water to cool down the jam so that it does not keep cooking in the jar. The gel starts to form as the temperature of the jam reduces (about 55°C) and continues until it is cold.

2.1.8. Flowchart for Sohiong Jam processing



2.2 Critical Process Parameters for Quality Control

- ❖ The weighing of ingredients should be done accurately, as it affects the total quality of the product.
- ❖ The correct sugar content is critical for proper gel formation and for preservation of the jam.
- ❖ Refined, granular and pure sugar is preferable for a high quality product.
- ❖ Monitoring of the final TSS content is very critical it influences the setting, texture and shelf life of the product
- ❖ The pan should be removed from the heat during testing as the jam will continue to cook and may become over-cooked, which cannot be reversed.

- ❖ It is important to stir the jam at all times during heating, otherwise it may burn at the bottom of the pan, causing off-flavors and discoloration.
- ❖ When the jam starts to thicken, it is important to test for the end point at frequent intervals
- ❖ The jars should still be warm to prevent them from cracking when the hot jam is poured in.
- ❖ The filled jars can be placed in water to cool down the jam so that it does not keep cooking in the jar. The temperature and level of water level are very critical

2.3 Defects in Processing

- ❖ Jam should not be excessively boiled for longer time as this can give rise to caramel flavors, over sweetness and discoloration, apart from being a waste of energy.
- ❖ If the final TSS of jam is lower than 65-68% the shelf life will be reduced. The jam will have a runny consistency and bacteria and moulds will be able to grow in the product.
- ❖ If the TSS is higher than 68%, the jam will be very stiff and the sugar might start to form crystals in the jam.
- ❖ During testing as the jam will continue to cook, it may become over-cooked and if the endpoint is crossed it cannot be reversed.
- ❖ Improper stirring may cause burning at the bottom of the pan, causing off-flavors and discoloration.
- ❖ If the jam is cooled too much it will be difficult to pour into the containers.
- ❖ If the water for cooling the jars is too cold, the glass may crack
- ❖ If the jars are moved or shaken while they are cooling or the gel will not form and the jam will not set.

CHAPTER 3

Packaging of Sohiong Jam

Food Packaging may be defined as the process of containing or enclosing manufactured food products in proper chosen packaging material for the particular product through a suitable system, thereby protecting it during distribution, storage, sale and use.

The following are the major functions of packaging, each of which must be understood by the food manufacturer

- Containing and safety of product that is of paramount importance.
- Increasing the shelf-life and ensuring longer availability
- Facilitating the handling, storage and distribution.
- Protecting against biological, chemical and distribution damages
- Providing convenience - at all stages of handling and to the consumer.
- Information about the product contained through the labelling.
- Security through a tamper evident design.
- Contribution to the product image through structural and graphic design - as a marketing and advertising tool.
- Environment protection by taking responsibility of empty packaging material after its use.

3.1 Characteristics of packaging material for Jams

The primary packages for jams must have the following characteristics:

- It should allow heat transmission. Heat transmission i.e. heat transfer is very fast during heating and cooling.
- It should be heat-resistant i.e. it should have resistance towards high filling temperature.
- It must be able to achieve and maintain vacuum and thereby prevent contamination with moisture, air and micro-organisms by assuring vacuum sealing.
- It should be sturdy in order to prevent handling and storage hazards.
- “Product quality maintenance” i.e. the package should not react with and change the properties of the product over a given period of storage and preservation.
- It should have resistance towards sunlight, storage temperature and atmospheric humidity.

3.2 Packaging material for Jams

3.2.1. Primary Packaging materials

For packaging of jams various packaging materials can be used. Glass is in major use and also among plastics HDPE, PVC, PS, PP etc. and Aluminium foil, are being used.

1. Metal Containers - Lacquered

Tin containers are also used namely, “Open Top Sanitary cans (OTS cans)”. The tinplate used for this is a low carbon mild steel base plate suitably coated with a thin layer of tin metal. Tin plate must have a very low sulphur, phosphorus and copper content. For preservation and processing, tin is an ideal container for jam packaging. It is hermetically sealed thereby avoiding contamination.

The only disadvantage with tin cans is that it slowly reacts with the contents over a period of time leading to “corrosion”. To overcome this, inside lacquered or resin-coated tin cans are used for food containing high acid content and sulphur content.

2. Glass Jars with Lug Caps

Basically, glass is better than other materials for packaging of jam for few reasons viz. it is very much chemically inert, aesthetic appeal in glass is much better and the product has long shelf-life in glass than any other material.

But on the other hand, the major drawbacks associated with glass are that they are heavy in weight, fragile, and require sterilization before refilling of product thereby increasing the production cost.

3. Plastic Containers

Plastic jars are already making in-roads into this market because of their light weight and resistance to breakage. High density polyethylene, polyvinyl chloride and some of the newer acrylics have been used for this purpose. HDPE has a linear structure. The promising properties of HDPE, which make it suitable for jam packaging, are its good moisture barrier properties, its excellent resistance to a wide range of chemical compounds, good tensile characteristics and good high temperature resistance. Injection moulded containers of PP or HIPS are also used for packing 200 grams of the product.

Unit servings of jams are packed in injection moulded plastic cups. They are closed with peelable membrane lids. Plastic cups are moulded from polystyrene, polyethylene, polypropylene or polyvinyl chloride. Closures can be foil laminates, clear plastic film or metallized plastic film. The type of plastic used must be capable of heat sealing or the membrane must have a suitable peelable adhesive or heat-seal coating, the selection of which will be governed by the material used to form the cup.

In the selection of a suitable heat-seal formulation, note must be taken of the temperature of jam fill. Jams are filled hot (82.2°C or higher) and the actual degree of peelable seal does not become evident until it has “set” for 24 hours. Problems revolving around membrane formation i.e. heat-seal coating separating from the inner foil ply, are a frequent plague to the material supplier. The foil used must be clean and free from oily residues to prevent separation of the laminate plies.

4. Flexible Packs

Jams are also packed in 2-3 layered co-extruded polyolefinic pouches of 200 and 400/500g capacities. The individual pouches are further placed in printed paperboard or E-fluted corrugated cartons.

The current changing trend in packaging indicates that products such as jams which were earlier packed using conventional materials like metal and glass have now gradually moved to plastics packaging. The plastics offer advantages of lighter weight, cost competitiveness, ease of handling and variety of shapes and sizes as compared to the conventional packs. This trend of plastics packaging is on the rise and is likely to continue.

3.2.2. Secondary & Tertiary packaging materials

- **Secondary packaging**

Secondary packages are mainly used to group primary packages. The jam products in primary packaging are overwrapped in secondary packaging materials. Materials are used for Secondary packaging of Jam products include Cellophane, PP or OPP film, Cardboard labels and paper wraps.

- **Tertiary packaging**

Tertiary packaging is useful for bulk handling, storage and transportation. Fully packed jam products are placed in open or closed folding cartons, trays or display cartons at the tertiary packaging stage. The packed cartons are sealed with cellophane.

3.2.3. Bulk packaging materials

Bulk packaging of jams is done in Plastic pails or drums.

Plastic pails are of 3 to 25 litres capacity and made of High Density Polyethylene by injection moulding. They are of two types - open head containers with removable lids or tight head containers (containers produced as single unit).

When the capacity is more than 25 litres, the containers are called drums. The standard sizes are 30, 60, 120 and 216 litres. Drums can also be open or closed type. These are usually made by extra high molecular weight HDPE.

CHAPTER 4

Food Safety Regulations & Standards

Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011

Chapter 2: Food Product Standards

Category 2.3 Fruit & Vegetable Products

Sub- Category 2.3.31 Jam, Jellies & Marmalades

1. Jam means the product prepared from a suitable fruit ingredient of one or two or more types which shall be—
 - (i) whole fruit, pieces of fruit, fruit pulp or fruit puree;
 - (ii) with or without fruit juice or concentrated fruit juice or dehydrated fruit as an optional ingredient;
 - (iii) mixed with a nutritive sweetener, with or without water; and
 - (iv) processed to a suitable consistency.
5. Jams shall be prepared from any fruit ingredient singly or in combination.
6. The prepared fruit content in jams, jellies and marmalades shall be not less than 45 per cent by weight,
7. The total soluble solids content, in the case of jams shall be not less than 65 per cent. by weight
8. The other substances that may be added to the products are cane sugar, sucrose, dextrose, and invert sugar, liquid glucose, honey, salt, herbs, spices, condiments and their extracts and other ingredients appropriate to the product whose standards are prescribed in these regulations.
9. Pectin derived from any fruit may be used at GMP level.
10. The product shall conform to the following quality factors, namely: -
 - (1) in case of jams, the finished product shall have gelled consistency. It shall have colour and flavour of original fruit and shall be free from burnt or objectionable flavors, weeping, crystallization, mould growth and shall show no sign of fermentation;
11. The product shall be free from extraneous matter normally associated with the fruits such as skin, pits, pit fragments and seeds.

12. Containers shall be well filled with the product which shall occupy not less than 90 per cent of the water capacity of the container.

(The water capacity of the container is the volume of distilled water at 27°C which the sealed container will hold when completely filled. When product is packed in glass containers, the water capacity shall be reduced by 20 ml.)

13. Standards specified in this sub-regulation shall not apply to—

- (a) the products when indicated as being intended for further processing including as those intended for use in the manufacture of fine bakery wares, pastries or biscuits;
- (b) the products which are clearly intended or labelled as intended for special dietary uses;
- (c) the reduced sugar products or those with very low sugar content;
- (d) the products where the foodstuffs with sweetening properties have been replaced wholly or partially by food additive sweeteners.

Table: Permitted Additives for Jams

Additive	Limit	Additive	Limit
Acesulfame potassium	1,000 mg/kg	Canthaxanthin	200 mg/kg
Alitame	100 mg /kg	Caramel III - ammonia caramel	200 mg/kg
Allura red AC	100 mg/kg	Caramel IV – sulfite ammonia caramel	1500 mg/kg
Annatto	GMP	Carmoisine	200 mg/kg
Aspartame	1,000 mg/kg	Carnauba wax	400 mg/kg
Aspartame-acesulfame salt	1,000 mg/kg	beta-Carotenes, vegetable	1,000 mg/kg
Benzoates	1,000 mg/kg	Curcumin	GMP
Brilliant blue FCF	200 mg/kg	Dimethylpolysil oxane	10 mg/kg
Carotenoids	500 mg/kg	Ethylene Diamine Tetra Acetates (EDTA)	130 mg/kg
Chlorophylls and chlorophyllins & Copper complexes	200 mg/kg	Erythrosine	100 mg/kg
Fast green FCF	200 mg/kg	Saccharins	200 mg/kg
Grape skin extract	500 mg/kg	Sorbates	1,000 mg/kg
Hydroxybenzoates para	250 mg/kg	Riboflavins	200 mg/kg
Iron oxides	200 mg/kg	Steviol glycosides	360 mg/kg
Indigotine (Indigo carmine)	200 mg/kg	Sucralose (Trichlorogalactosucrose))	400 mg/kg

Neotame	70 mg/kg	Tartaric acid, L (+)	GMP
Polydimethylsiloxane	30 mg/kg	Tartrazine	200 mg/kg
Ponceau 4R	200 mg/kg	Sunset yellow FCF	200 mg/kg

Table: Microbiological standards for Thermally processed fruit products

	Sampling Plan		Limit (cfu)	
	N (Number of units comprising a sample)	C (Maximum allowable number of units having microbiological counts above m)	Min (Microbiological limit that may be exceeded number of units c)	Max (Microbiological limit that no sample unit may exceed)
Process hygiene criteria				
Aerobic Plate Count	5	1	1 x 10 ² /g	1 x 10 ³ /g
Yeast and Mold Count	5	1	50/ g	1 x 10 ² /g
Enterobacteriaceae	5	0	Not detectable as per prescribed method	
Staphylococcus aureus (Coagulase + ve)	5	0	Absent/25 g	
Food safety criteria				
Salmonella	5	0	Absent/25 g	
Listeria monocytogenes	5	0	Absent/25 g	
Sulphite Reducing Clostridia (SRC)	NA	NA	NA	NA
E. Coli 0157 and Vero or Shiga toxin producing E coli	5	0	Absent/25 g	
Vibrio cholerae	5	0	Absent/25 g	

Food Safety & Standards (Contaminants, Toxins and Residues) Regulations, 2011

Contaminants, Toxins and Residues

Metal Contaminants

Product: Jams

Name of metal contaminant	Parts per Million (mg/kg or mg/L)
Lead	1 ppm
Tin	250 ppm

Food Safety and Standards (Packaging and Labelling) Regulations, 2011.**Packaging and labelling:**

The product covered by this standard shall be labelled in accordance with the Food Safety and Standards (Packaging and Labelling) Regulations, 2011.

Chapter 1 - General**Definitions**

In these regulations unless the context otherwise requires:

1. “Best before” means the date which signifies the end of the period under any stated storage conditions during which the food shall remain fully marketable and shall retain any specific qualities for which tacit or express claims have been made and beyond that date, the food may still be perfectly safe to consume, though its quality may have diminished. However, the food shall not be sold if at any stage the product becomes unsafe.
2. “Date of manufacture” means the date on which the food becomes the product as described;
3. “Date of packaging” means the date on which the food is placed in the immediate container in which it will be ultimately sold;
5. “Lot number” or “code number” or “batch number” means the number either in numerical or alphabets or in combination thereof,
 - representing the lot number or code number or batch number,
 - being preceded by the words “Lot No” or “Lot” or “code number” or “Code” or Batch No” or “Batch” or any distinguishing prefix
 - by which the food can be traced in manufacture and identified in distribution.
10. “Use – by date” or “Recommended last consumption date” or “Expiry date” means the date
 - which signifies the end of the estimated period under any stated storage conditions,
 - after which the food probably will not have the quality and safety attributes normally expected by the consumers and the food shall not be sold

11. “Vegetarian Food” means any article of Food other than Non- Vegetarian Food as defined in regulation 1.2.1(7).

Regulation 2.1: Packaging

Regulation 2.1.1: General Requirements

Containers made of plastic materials should conform to the following Indian Standards Specification, used for packing or storing whether partly or wholly, food articles namely:-

- IS: 10146 (Specification for Polyethylene in contact with foodstuffs);
- IS: 10142 (Specification for Styrene Polymers in contact with foodstuffs)
- IS: 10151 (Specification for Polyvinyl Chloride (PVC) in contact with foodstuffs);
- IS: 10910 (Specification for Polypropylene in contact with foodstuffs);
- IS: 12252 - Specification for Polyalkylene terephthalates (PET)

Regulation 2.1.2: Product-specific Requirements

Packaging requirements for Fruits and Vegetables Products

Every bottle in which any fruit product is packed shall be so sealed that it cannot be opened without destroying the licensing number and the special identification mark of the manufacture to be displayed on the top or neck of the bottle

For packing Preserves, Jams, Jellies, and Marmalades, new cans, clean jars, new canisters, bottles, chinaware jars, aluminium containers may be used and it shall be securely sealed.

Regulation 2.2: Labelling

Regulation 2.2.1: General Requirements

1. Every pre-packaged food shall carry a label containing information as required here under unless otherwise provided, namely -
2. The particulars of declaration to be specified on the label shall be in English or Hindi in Devnagri script: Provided that nothing herein contained shall prevent the use of any other language in addition to the language required under this regulation.
3. Pre-packaged food shall not be described or presented on any label or in any labelling manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect;
4. Label in pre-packaged foods shall be applied in such a manner that they will not become separated from the container;

5. Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use;
6. Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it;
7. License number shall be displayed on the principal display panel in the following format, namely:-



Provided that the existing products of a unit shall comply with the requirement of this clause on and after the six months of commencement of the Food Safety and Standards (packaging and labeling) Amendment Regulation ,2013.

Regulation 2.2.2 Labelling of Pre-packaged Foods

In addition to the General Labelling requirements every package of food shall carry the following information on the label, namely,—

1. The Name of Food: The trade name or description of food contained in the package.
2. Ingredient: *(For a single ingredient product, it can be mentioned as such.)*
3. Nutritional information –
4. Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product shall be given on the label containing the following:—

energy value in kcal;

the amounts of protein, carbohydrate (specify quantity of sugar) and fat in gram

5. Declaration regarding Veg or Non veg

Every package of Vegetarian Food shall bear a declaration to this effect by a symbol and colour code as stipulated below for this purpose to indicate that the product is Vegetarian Food.

The symbol shall consist of a green colour filled circle, having a diameter not less than the minimum size specified in the Table below, inside the square with green outline having size double the diameter of the circle, as indicated:



iv. Size of the logo (vegetarian)

S No	Area of principal display panel	Minimum diameter mm
1.	Upto 100 cms. Square	3
2.	100-500 cm square	4
3	500-2500 cm square	6
4	>2500 cm square	8

The symbol shall be prominently displayed on the package having contrast background on principal display panel, just close in proximity to the name or brand name of the product and on the labels, containers, pamphlets, leaflets, advertisements in any media.

6. Declaration regarding Food Additives-

- (i) For food additives falling in the respective classes and appearing in lists of food additives permitted for use in foods generally, the following class titles shall be used together with the specific names or recognized international numerical identifications:

Acidity Regulator, Acids, Anticaking Agent, Antifoaming Agent, Antioxidant, Bulking Agent, Colour, Colour Retention Agent, Emulsifier, Emulsifying Salt, Firming Agent, Flour Treatment Agent, Flavour Enhancer, Foaming Agent, Gelling Agent, Glazing Agent, Humectant, Preservative, Propellant, Raising Agent, Stabilizer, Sweetener, Thickener

7. Name and complete address of the manufacturer

- i. The name and complete address of the manufacturer and the manufacturing unit if these are located at different places; in case the manufacturer is not the packer, the name and complete address of the packing unit shall be declared on every package of food;
- ii. Where an article of food is manufactured or packed by a person or a company under the written authority of some other manufacturer or company, under its brand name, the label shall carry the name and complete address of the manufacturing or packing, the name and complete address of the manufacturer or the company and on whose behalf it is manufactured or packed or bottled.

8. Net quantity by weight shall be declared on every package of food.

9. Lot/Code/Batch identification shall be given on the label.

10. Date of manufacture or packing.

The date, month and year in which the commodity is manufactured, packed or pre-packed, shall be given on the label.

If the 'Best before Date' of the products is

- More than three months, the month and the year of manufacture, packing or pre-packing shall be given.
- Less than three months, the date, month and year in which the commodity is manufactured or prepared or prepacked shall be mentioned on the label.

11. Best Before and Use By Date : the month and year in capital letters upto which the product is best for consumption, in the following manner, namely:—

“BEST BEFORE..... MONTHS AND YEAR

OR

“BEST BEFORE..... MONTHS FROM PACKAGING

OR

“BEST BEFORE..... MONTHS FROM MANUFACTURE (Note: blank be filled up)

12. Instructions for use:

(i) Instructions for use, including reconstitution, where applicable, shall be included on the label, if necessary, to ensure correct utilization of the food.

Schedule H of FoSCoS: Sanitary and Hygienic Requirements for Food

Manufacturer/ Processor/ Handler

The place where food is manufactured, processed or handled shall comply with the following requirements:

1. The premises shall be located in a sanitary place and free from filthy surroundings and shall maintain overall hygienic environment. All new units shall set up away from environmentally polluted areas.
2. The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage to maintain overall hygienic environment.
3. The premises shall be clean, adequately lighted and ventilated and sufficient free space for movement.
4. Floors, Ceilings and walls must be maintained in a sound condition. They should be smooth and easy to clean with no flaking paint or plaster.
5. The floor and skirted walls shall be washed as per requirement with an effective disinfectant the premises shall be kept free from all insects.

- No spraying shall be done during the conduct of business, but instead fly swats/ flaps should be used to kill spray flies getting into the premises.
 - Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect free. The water used in the manufacturing shall be potable and if required chemical and bacteriological examination of the water shall be done at regular intervals at any recognized laboratory.
6. Continuous supply of potable water shall be ensured in the premises. In case of intermittent water supply, adequate storage arrangement for water used in food or washing shall be made.
 7. Equipment and machinery when employed shall be of such design which will permit easy cleaning. Arrangements for cleaning of containers, tables, working parts of machinery, etc. shall be provided.
 8. No vessel, container or other equipment, the use of which is likely to cause metallic contamination injurious to health shall be employed in the preparation, packing or storage of food. (Copper or brass vessels shall have proper lining).
 9. All equipments shall be kept clean, washed, dried and stacked at the close of business to ensure freedom from growth of mould/ fungi and infestation.
 10. All equipments shall be placed well away from the walls to allow proper inspection.
 11. There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.
 12. The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.
 13. Persons suffering from infectious diseases shall not be permitted to work. Any cuts or wounds shall remain covered at all time and the person should not be allowed to come in direct contact with food.
 14. All food handlers shall keep their finger nails trimmed, clean and wash their hands with soap, or detergent and water before commencing work and every time after using toilet. Scratching of body parts, hair shall be avoided during food handling processes.
 15. All food handlers should avoid wearing, false nails or other items or loose jewellery that might fall into food and also avoid touching their face or hair.
 16. Eating, chewing, smoking, spitting and nose blowing shall be prohibited within the premises especially while handling food.
 17. All articles that are stored or are intended for sale shall be fit for consumption and have proper cover to avoid contamination.

18. The vehicles used to transport foods must be maintained in good repair and kept clean.
19. Foods while in transport in packaged form or in containers shall maintain the required temperature.
20. Insecticides / disinfectants shall be kept and stored separately and `away from food manufacturing / storing/ handling areas.

Annexure
Manufacturers List of Food Processing Machineries

So	Name of the company	Machineries
1.	Gardners Corporation 158 Golf Links New Delhi 110003 India Tel: +91 11 2334 4287/2336 3640 Fax: +91 11 2371 7179	Juice filters, weighing machinery, Boiling equipment
2.	Narangs Corporation P-25 Connaught Place New Delhi 110001 India Tel: +91 11 2336 3547 Fax: +91 11 2374 6705	Cutting machinery
3.	Bajaj Machine Private Limited 7/20 7/27, Jai Lakshmi Industrial Estate, Side-IV Sahibabad Industrial Area Ghaziabad - 201301 U.P India Tel: +91 120 22775119/22775137 Fax: +91 120 22775137 Website: www.indiamart.com/bajajmachine	Juice extractors and Pulpers
4.	Buhler (India) Pvt Ltd 13-D, K A I D B Industrial Area, Attibele Bangalore Karnataka 562107 India Tel: +91 80- 27820000 Fax: +91 80-7820001 Website: www.buhlergroup.com	Juice extractors and Pulpers
5.	Delhi Industries 4 Paharganj Lane, New Delhi 110055 India Tel: +91 11 2529720, 27525200, 27536888 Fax: +91 11 25791291	Juice extractors and Pulpers
6.	Food Packs Indiana Thrikkariyoor, Kothamangalam, Ernakulam Kerala 686692 India	Juice extractors and Pulpers

7.	Geeta Food Engineering Plot No C-7/1 TTC Area Pawana MIDC Thane Belapur Road Behind Davita Chemicals Ltd Navi Mumbai 400 705 India Tel: +91 22 2782 6626/2766 2098 Fax: +91 22 2782 6337	Juice extractors and Pulpers
8.	Sri Rajalakshmi Commercial Kitchen Equipment No.57, (old No. 30/1) Silver Jubilee Park Road, Bangalore - 560 002 India Tel: +91 (0)812 2222 1054/223 9738 Fax: +91 (0)812 2222 2047	Boiling equipment
9.	Raylons Metal Works Kondivita Lane J. B. Nagar Post Office Post Box No. 17426 Andheri (E) Andheri - Kurla Road, Mumbai - 400 059 India Tel: +91 22 26323288 / 6325932	Boiling equipment
10.	Acufil Machines S. F. No. 120/2, Kalapatty Post Office Coimbatore - 641 035 Tamil Nadu, India Tel: +91 422 2666108/2669909 Fax: +91 422 2666255 Email: acufilmachines@yahoo.co.in, acufilmachines@hotmail.com	Bottle filling & Packaging equipment
11.	Autopack Machines Pvt Ltd 101-C Poonam Cambers A Wing, 1st Floor Dr Annie Besant Road, Worli Mumbai 400018 India Tel: +91 22 2493 4406/2497 4800/2492 4806 Fax: +91 22 2496 4926 E-mail: autopack@bom3.vsml.net.in Website: www.autopackmachines.com	Bottle filling & Packaging equipment



Contact Us

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