



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Custard Apple RTS Beverage



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CHAPTER 1

INTRODUCTION

1.1 ABOUT

Custard Apple (Sitaphal) is a tropical fruit grown mainly in the tropical climate. They are a sub-tropical deciduous tree belonging to the Annonaceae family. The fruits are well known for their delicious taste and are heart shaped with light green skin, a soft creamy white flesh. The Fruit takes between 20 and 25 weeks to reach maturity in sub-tropical climates where the days are not too warm and the nights not too cool. The custard apple is believed to be a native of the West Indies but it was carried in early times through Central America to southern Mexico. It has long been cultivated and naturalized as far south as Peru and Brazil. It is commonly grown in the Bahamas and occasionally in Bermuda and southern Florida. Nutritionally, the fruit is rich in carbohydrates, minerals and excellent source of vitamin C. It is said to contain the qualities of the rejuvenating drugs. It has been found to be very useful to the brain and the nervous system. It also enhances muscular strength and tones up the heart.

The processed products have good potential for internal as well as external trade. Seasonal losses in surplus fruits can be avoided by processing into different value-added products that make them more attractive to the buyer and/or more readily usable to the consumer. The fresh fruits have limited shelf life; therefore, it is necessary to process fresh fruits in to different value-added products to increase its availability over an extended period and to stabilize the price during the glut season.



Varieties

There are two main varieties of Custard Apples, the Pinks Mammoth (or Hillary White) and the African Pride. Both are sweet, juicy and full of flavour. Other varieties found in India are Red Sitaphal, Balanagar, Washington, British Guinea, Island Gem, Atemoya.

1.2 PRODUCTION

World Scenario

The fruit is cultivated mainly in the Mediterranean. Spain is a big producer. Custard Apple is considered an important crop in Chile, where it is grown for national and international markets, primarily the United States, Japan and a number of Latin American countries. The fruit is also produced on a commercial scale in Argentina, Bolivia, Ecuador, Mexico and Peru and production has begun in Colombia and Brazil. In the United States, Custard Apple has been cultivated in southern California. Demand greatly exceeds supply in all United States markets. Outside Europe and the Americas, Custard Apple is cultivated in Central Africa Thailand, Indonesia, Australia and most recently New Zealand. In general, the fruit commands high wholesale and retail prices, but costs are high and major crop losses from frost and fruit splitting are a common threat. In South America, the fruit fly is an additional menace.

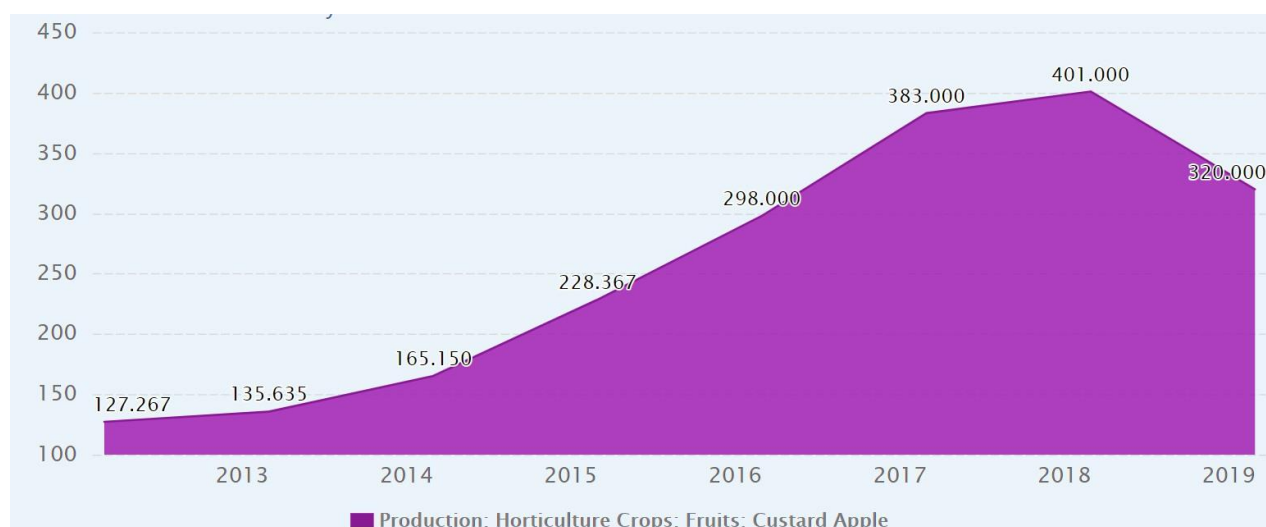


Indian Scenario

Custard apple growing regions in India include Assam, Bihar, Madhya Pradesh, Maharashtra, Odisha, Gujarat, Rajasthan, and Uttar Pradesh, Andhra Pradesh, Telangana and Tamil Nadu. Along with Maharashtra, Gujarat is another large custard apple growing state.

Custard Apple	2018-19		2019-20 (1st Advance Estimate)		2019-20 (2nd Advance Estimate)	
	Area	Production	Area	Production	Area	Production
	(in '000 Ha)	'000 MT	(in '000 Ha)	'000 MT	(in '000 Ha)	'000 MT
	40	339	42	349	41	347

(Source: National Horticulture Board, 2020)



(Source: Department of Agriculture and cooperation, 2019)

1.3 HEALTH BENEFITS

1. High in antioxidants

Custard Apple is loaded with antioxidants, which fight free radicals in the body. High levels of free radicals can cause oxidative stress, which is associated with chronic illnesses, including cancer and heart disease. Certain compounds in Custard Apple — including kaurenoic acid, flavonoids, carotenoids, and vitamin C have powerful antioxidant effects. Custard Apple's carotenoid antioxidants may be particularly powerful.

2. May boost mood

Custard Apple is an excellent source of vitamin B6 (pyridoxine). Vitamin B6 plays an important role in the creation of neurotransmitters, including serotonin and dopamine, which help regulate the mood. Inadequate levels of this vitamin may contribute to mood disorders. By boosting levels of this important vitamin, Custard Apple may help reduce your risk of depression related to vitamin B6 deficiency.

3. May benefit eye health

Custard Apple is rich in the carotenoid antioxidant lutein, one of the main antioxidants in the eyes that maintain healthy vision by fighting free radicals. Lutein may also protect against other eye issues including cataracts, which is a clouding of the eye that causes poor eyesight and vision loss. Therefore, consuming lutein-rich foods such as Custard Apple may boost eye health and fight conditions like AMD and cataracts.

4. May prevent high blood pressure

Custard Apple is high in nutrients that help regulate blood pressure, such as potassium and magnesium. Both potassium and magnesium promote the dilation of blood vessels, which in turn helps lower blood pressure.

5. May promote good digestion

Because fibre cannot be digested or absorbed, it adds bulk to stool and helps move it through the intestines.

In addition, soluble fibres like those found in Custard Apple can feed the good bacteria in gut, as well as undergo fermentation to produce short-chain fatty acids (SCFAs). These acids include butyrate, acetate, and propionate. By supporting healthy bowel movements and nourishing gut bacteria, Custard Apple and other fibre-rich foods can promote optimal digestive health.

6. May have anticancer properties

Some of the compounds in Custard Apple may help fight cancer. Custard Apple's flavonoids include catechin, epicatechin, and epigallocatechin. Some of these flavonoids have been shown to stop the growth of cancer cells in test-tube studies.

7. May fight inflammation

Custard Apple provides several anti-inflammatory compounds, including kaurenoic acid. This acid has strong anti-inflammatory effects and has been shown to decrease certain inflammatory proteins in animal studies.

8. May boost immunity

Like other tropical fruits, Custard Apple is loaded with vitamin C, a nutrient that boosts immunity by fighting infections and disease. Vitamin C deficiency is linked to impaired immunity and an increased risk of infections. Human studies further reveal that vitamin C may help decrease the duration of the common cold. Consuming Custard Apple and other foods rich in this vitamin is an easy way to ensure adequate immune health.

Nutritional content

Sl. No.	Nutrient	Amount (100 g)
1.	Water	79.39 g
2.	Energy	45 kcal
3.	Protein	1.57 g
4.	Fat	0.68 g
5.	Carbohydrate	17.71 g
6.	Dietary Fibre	3 g
7.	Sugars	12.87 g
8.	Calcium	10 mg
9.	Vitamin C	12.6 mg
10.	Potassium	287 mg

(Source: USDA, FDC 2019)

1.4 VALUE ADDITION

Value addition of fruit creates the opportunity for turning perishable fruit into a product that can store for longer periods of time. This can result in increased income for farmers, availability of nutritious fruit for a longer part of the year, and less fruit wasted. For Custard Apple, this includes number of value-added products like juice, jam, jelly, nectar, fermented beverage, ice cream, squash, and toffee which can be prepared to exploit the nutritional potential and adding a new flavour/taste in the market.

1.5 CUSTARD APPLE READY-TO-SERVE BEVERAGE

Demand for the natural fruit juice beverages is continuously increasing over the synthetic beverages. Ready to serve beverages are popular among every age group because of their refreshing nature and taste. As a result, consumer demand for convenient and easily available product is continuously increasing. Custard Apple Ready to Serve Fruit Beverages means an unfermented product which is prepared from Custard Apple Pulp/ Puree or concentrated juice or pulp of sound mature Custard Apple and shall contain total soluble solid not less than 10.0% and fruit juice content not less than 10.0% (FSSR 2011). It is not diluted before serving; hence it is known as ready to serve beverage.



CHAPTER 2

PROCESSING

RTS and RTS products represent a very important segment of the total processed fruit industry. RTS products are being marketed as refrigerated, shelf-stable, and frozen, in a variety of packages with increased emphasis on functionality, health attributes, new flavours or blends, and in some cases fortified with vitamins and minerals. This is a type of fruit beverage which contains at least 10 per cent fruit juice and 10 per cent total soluble solids besides about 0.3 per cent acid. It is not diluted before serving; hence it is known as ready-to-serve (RTS). High-quality RTS operations are dependent upon a source of high-quality raw material. Fruit RTS is regarded as source of energy due to their rich carbohydrate content. The organic acids present in the fruit RTS plays a significant role in the maintenance of the acid-base balance in the body.

2.1 INGREDIENTS USED FOR PREPARATION OF CUSTARD APPLE RTS BEVERAGES

- **Custard Apple juice/Pulp**
- **Sugar-** Sugars are added primarily as flavouring additive to impart the sweetness in the beverages. They also act as mild preservative, modify the osmotic pressure and check spoilage.
- **Citric Acid as acidulants-** Acidulant are acids that either occur naturally in fruits are used as additives in beverage formulation. It provides sourness to product. Citric acid is the most versatile and widely used food acidulant. Its useful characteristics include excellent solubility, extremely low toxicity, chelating ability and pleasantly sour taste. It acts as a mild preservative by regulating pH.
- **Flavourings-** To enhance, extend, round out or increase the potency of flavours already present.

- **Colourings-** The colours are permitted additives in beverage to provide different shades and improve the aesthetic quality of beverage. For product identification as majority of fruit beverages are characterized by the colour of fruit which is used in its formulation
- **Pectin** -Pectin is a hydrocolloid obtained commercially from the citrus peel or apple pomace. Major application of pectin is in stabilization of acidified drinks. It prevents crystallization in high sugar containing beverages.
- **Potassium Metabisulfite as preservative** -Potassium Metabisulfite (KMS) is a white crystalline powder used as an antioxidant and sanitizer. It is most commonly used as a food preservative, which preserves the natural colour of food and protects food against bacteria.

2.2 PROCESSING OF CUSTARD APPLE RTS

1) Selection of Fruits

All fruits are not suitable because of difficulties in extracting the juices or due to poor quality juice. The variety and maturity of the fruit and locality of cultivation influence the flavour and keeping quality of its juice. Only fully ripe fruits are selected. Over ripe and unripe fruits adversely affect the quality of the juice.

2) Sorting and Washing

Diseased, damaged or decayed fruits are rejected or trimmed off. Dirt and spray residues of arsenic, lead etc are removed by washing with water or by using dilute hydrochloric (HCl) acid solution (0.5%) followed by washing in water.

3) Pulp Extraction

Extraction of pulp is a major constraint in processing of custard apple fruits. Development of enzymatic browning within an hour of pulp extraction, bitterness, unpleasant repulsive off-flavour in the pulp on heating beyond 65°C and presence of gritty cells are problems encountered during processing of fruits. For purpose of Pulp extraction, pulping machine is used. The machine has two parts. First part scoops out the pulp with seed from fruit leaving behind the peel (i.e., pulp extraction). The second part separates the seed from the pulp which can be used for RTS preparation.

4) Addition of Water and Preservatives

Water, acid, stabilizer, coloring, flavoring agent, acidity regulator, anti-oxidant, preservative is added to the juice and are mixed in a mixing tank to get a homogenised juice pulp mixture.

5) Addition of sugars: All juices/Pulp are sweetened by adding sugar. Sugar can be added directly to the pulp or as syrup made by dissolving it in water. RTS are made by adding appropriate quantity of sugar into the pulp or juice using cane sugar. After that, homogenisation is done to obtain a smooth product.

7) Clarification

Un-clarified fruit RTS contain varying amounts of suspended matter consisting of broken fruit tissue, seed, skin, pectic substances and protein in colloidal suspension. Seeds and skin which adversely affect the quality of RTS are removed by straining through a muslin cloth or sieve. The fruit RTS are strained or screened by muslin cloth or stainless-steel mesh sieves manually to remove coarse particles in a small-scale industry. But in large industries power operated screening system or filter press is used.

8) Preservation

RTS are preserved by pasteurization or by using chemical preservatives.

i) Pasteurization

Preservation of fruit RTS by application of heat is the most common method. Pasteurization is a process in which RTS mix is heated to 80⁰C-90⁰ C in bottle or slightly below for a 20-30 min to inactivate/kill the micro-organisms, or in continuous juice pasteurizer for few seconds to one minute and cooled immediately.

ii) Aseptic processing and packaging of RTS

Aseptic processing and packaging are defined as the process in which a commercially sterile product is packed into pre-sterilized container in a sterile environment. The system makes use of high temperature short time (HTST) sterilization in the temperature range of 90-110⁰C for acid products (pH4.6). The commercial aseptic sterilization process takes place in a continuous, closed system. Aseptic processing may produce products with better retention of nutrients and excellent sensory quality. Custard Apple RTS in tetra pack are processed commercially using aseptic processing and packaging system.

iii) Preservation with chemical

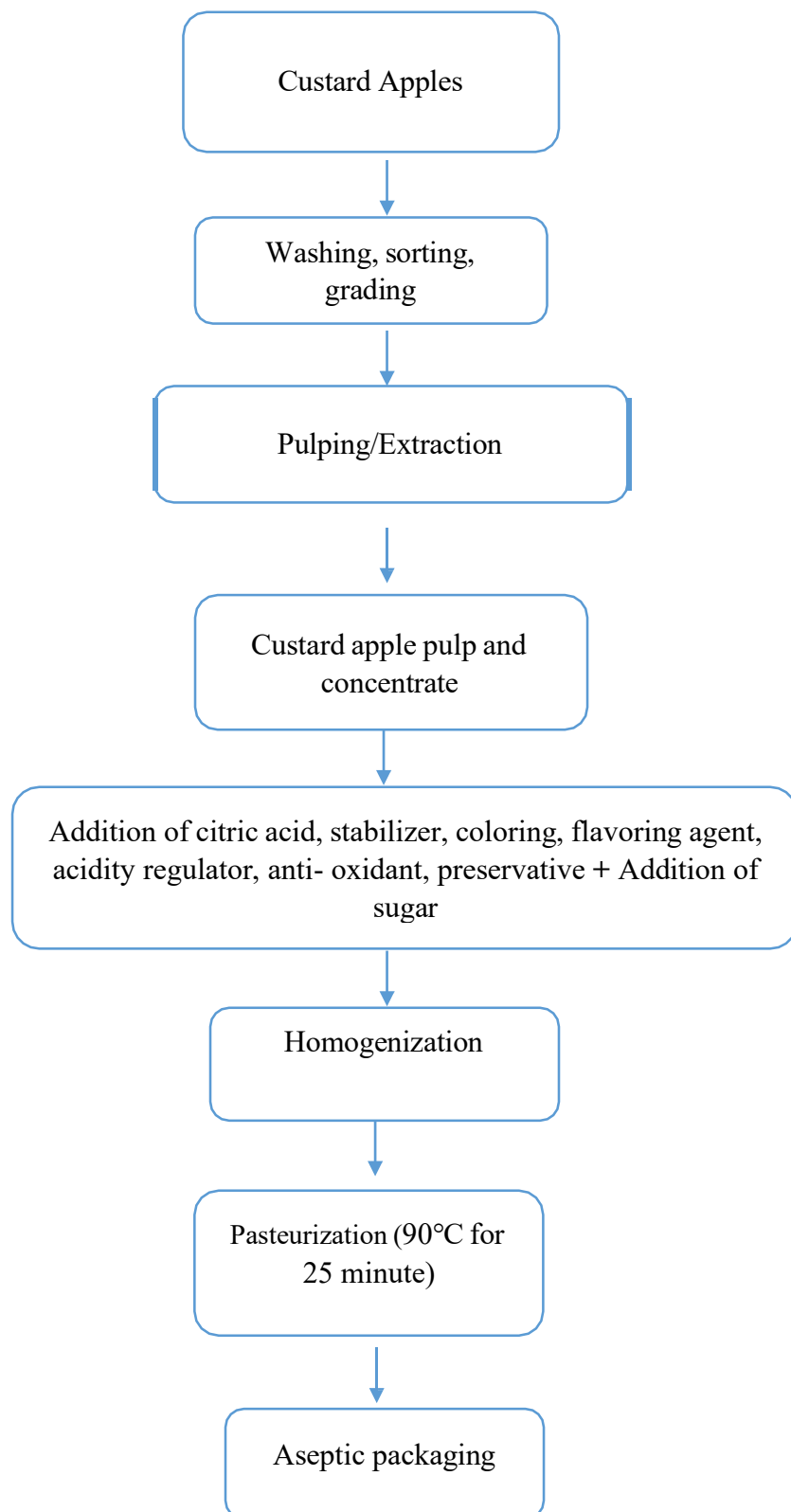
RTS drinks etc, are preserved with chemical preservatives. Fruit juice and pulps in bulk are preserved with chemical preservatives. Two chemical preservatives most commonly used in preservation of fruit products are: -

- i. **Benzoic acid:** Benzoic acid is the effective agent but sparingly soluble in water, thus its sodium salt, which is water soluble, is generally used. Benzoic acid is more effective against yeast as compared to moulds. However, it does not stop lactic acid and acetic acid fermentation. The quantity of sodium benzoate required depends on the nature of the juice, its acidity and type of microbial infection.
- ii. **Sulphur dioxide:** Potassium meta-bi-sulphite is commonly used as a source of sulphur dioxide. On addition to fruit juice or beverage it reacts with acid of the juice and form potassium salt and sulphur dioxide, which is liberated and form sulphurous acid with the water of the juice. Sulphur dioxide is more effective against mould spores and bacteria than yeast and also inhibits enzymes etc. It acts as antioxidant and bleaching agent thus help in the retention of ascorbic acid, carotene and other oxidisable compounds. It also retards nonenzymatic browning or discoloration of the product. Its effectiveness depends on the acidity, pH, temperature and other substances present in the fruit juice.

9. Filling

Bottles are thoroughly washed with hot water and filled leaving 1.5- 2.5 cm headspace. The bottles meant for heat processing are sealed by using crown corks while those preserved by using chemical preservative can be sealed by using PP (pilfer proof) caps.

2.3 FLOW CHART



2.4 MACHINES USED

1. Industrial bubble washing machine



To remove adhering dirt, to remove latex strains, to remove surface organism if any, wash with 50 ppm chlorine to prevent the microbial contamination. Fruit bubble washing machine is equipped with bubble generation device, which can generate high pressure water and bubbles to scatter, and make the fruits to roll continuous in order to wipe off the pesticide residue, dirt and dust.

2. Peeler/ Pulper



Graded custard apples are washed in the bubble washing machine then transferred through the conveyer belt for peeling, fruits passed to pulping machine to remove the seeds and get the pulp.

3. Filter Press



The main operation of filter press is to filter the impure liquid. Arriving on top of each horizontal plate with increasing pressure, the filter media holds back the impurities and allows the filter to pass through centre by interlocking cups, which takes the filtrate to the outlet of the filter.

4. Homogenizer



The Custard Apple RTS will be homogenized under 20-25 MPa pressure for 2-3 times in a homogenizer. Then the big particles in Custard Apple RTS are crushed to under the size of 1-5 μm . Homogenization can unify the particles in fruit juice, regulate sediments and improve drink taste.

5. Pasteurizer



A pasteurizer performs heat-treatment process that destroys pathogenic microorganisms in certain foods and beverages. The treatment also destroys most of the microorganisms that cause spoilage and so prolongs the storage time of food. The sterilization temperature can be adjusted from 60°C to 100°C for variable number of minutes. It can eliminate bacteria, yeast and inhibit enzyme activity in fruit juice and beverages.

6. Manual Crown Capping Machine



The manual crown capping machine is used for affixing standard crown caps to glass bottles. It is intended for use in where small production batches are required. The crown cork is placed into the stainless-steel die and is held in place by a magnet. The crown is then secured by applying pressure manually by pushing the handle down. It is highly portable due to light weight, has flexibility in accommodating various kinds of bottle types. It is very easy to use with negligible set up time and is not

electricity dependent and therefore production can continue even during a power outage

7. Semi-Automatic volumetric liquid filling machine



A volumetric filling machine fills containers and bottles with a consistent volume of the RTS through a time-based filling principle. Regardless of the discrepancies in containers' interior volumes, volumetric fillers will make sure that each container is filled with the same amount of product. It is used for easy and hassle-free aseptic filling of RTS into the bottles.

8. Packaging machine



Packaging Machine adopts frequency converter to automatically complete all process of measuring, filling, counting, date printing. It is used for filling and sealing, pouches, flexible packaging. The pouches are fed into the machine where they are opened, filled with RTS, and sealed shut.

CHAPTER 3

PACKAGING

3.1 DETERIORATING QUALITY FACTORS THAT AFFECT RTS

- High storage temperatures combined with oxygen are the main factors involved in quality deterioration over time.
- The results are loss of nutritional value concerning vitamin C, unpleasant colour changes, and off-flavour formation, which is caused predominantly by chemical changes in the RTS matrix and, to a lesser degree, by changes in the volatile flavour fraction.
- Almost all changes can occur under anaerobic storage conditions and are greatly accelerated by oxygen (headspace and dissolved oxygen, and oxygen permeating through the package).

In general, packaging for Custard Apple RTS should contain an aroma barrier to prevent aromas permeating out through the package.

3.2 ROLE OF PACKAGING

In addition to its most obvious function of containing the product, a consumer package must protect the specific quality parameters of Custard Apple RTS. Therefore, these quality parameters should be protected during a given shelf life.

- Protect the relevant flavour compounds
- Protect the high vitamin C content
- Prevent colour changes
- Prevent microbial growth

Package properties	Storage conditions
Barrier against	Protection against
1. Time	1. Temperature
2. Light	2. Non-aseptic
3. Flavour losses	3. Oxygen
4. Microorganisms	

3.3 MAJOR CLASSIFICATION OF PACKAGING

- Primary packing
- Secondary packing
- Tertiary packing

Types of Primary Packing Available for RTS in Market

Primary Packing – is the material that first envelops the product and hold it. This Usually is the smallest unit of distribution or use and is the package which is in direct contact with the contents. For Custard Apple RTS, primary packaging available in the market are:

1. Glass
2. Metal Containers
3. Flexible packaging
4. HDPE bottles
5. PET bottles
6. Carton Based Packages

1. Glass Containers



The use of glass bottles for the packaging hot-fill/hold/cool process. Glass bottles are preferred packaging medium for high quality fruit beverages. More care needed to avoid breakage of the containers.

Surface coating to increase abrasion resistance

Use of wide mouth containers fitted with easy-open-caps

2. Metal Containers



Tinplate cans made of low carbon mild steel of 99.75% purity, coated with tin with easy open ends are used. These tinplate containers are either 3 piece or 2-piece containers. They are lacquered internally to prevent corrosion.

Advantages

- Light weight
- Metals like aluminum are very easy to sterilize
- The durability and high barrier protection.
- Convenient

3. Flexible packaging



Flexible packaging minimizes the permeability to oxygen. Flexible laminated pouches like metallized polyester/polyester/ polyethylene are used for hot fill packaging method without retorting for acidic fruit juices. These are used either as flat pouches or stand-up pouches.

- Provides resistance to moisture, vapors, dust, and even UV light.
- Modern printing techniques that create crisp, clear imagery.
- Promotes recycling and helps keep used pouches or bags out of landfills

4. HDPE Bottles



As HDPE has a poor oxygen barrier, plain HDPE bottles allow relatively high oxygen ingress and are used for chilled RTS of short shelf life only (about three weeks). The oxygen barrier can be improved by adding intermediate layers of polymers with superior barrier properties. The most common barrier layers in HDPE bottles for Custard Apple RTS are ethylene vinyl alcohol (EVOH) and polyamide (PA). These also provide an aroma barrier and can allow ambient storage for six months or longer, depending on the choice and thickness of the barrier layer.

5. PET bottles



Custard Apple RTS packaged in PET bottles is found in both the chilled and ambient segments; ambient RTS is either filled aseptically or hot filled. The bi-oriented material gives the bottle high tensile strength and an increased gas barrier, which allows for lightweight bottles.

6. Carton-based packages/Tetra Packs



The laminated carton material normally consists of layers of paperboard coated internally and externally with polyethylene, and a barrier layer. The most commonly used barrier layer today is Al-foil. Other barriers include ethylene vinyl alcohol (EVOH) and polyamide (PA). Depending on the packaging system used, the packaging material is delivered to the RTS packer as prefabricated carton blanks or printed and creased in rolls. Oxygen-barrier properties of a laminated carton package depend not only on the barrier properties of the packaging material itself, but also on the barrier properties of strips and closures and the tightness of seals.

Types of Secondary Packing Available for RTS In Market

- It is outside the primary packaging perhaps used to group primary packages together.
- Provides extra protection and transport strength.
- Commonly used materials are: -
 - Corrugated Fibreboard
 - Cartons
 - Reusable Plastic Crates



Tertiary packaging



- Used for handling of bulk during storage and transport.
- Carton palletized unit of secondary package. Package for any product is selected based on their characteristics and stability

CHAPTER 4

FSSAI FOOD REGULATIONS AND STANDARDS

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

2.3.10: Thermally Processed Fruit Beverages / Fruit Drink/ Ready to Serve Fruit Beverages

1. Thermally Processed Fruit Beverages / Fruit Drink/ Ready to Serve Fruit Beverages (Canned, Bottled, Flexible Pack And/ Or Aseptically Packed) means an unfermented but fermentable product which is prepared from juice or Pulp/Puree or concentrated juice or pulp of sound mature fruit. The substances that may be added to fruit juice or pulp are water, peel oil, fruit essences and flavors, salt, sugar, invert sugar, liquid glucose, milk and other ingredients appropriate to the product and processed by heat, in an appropriate manner, before or after being sealed in a container, so as to prevent spoilage.

2. The product may contain food additives permitted in these regulations including Appendix A. The product shall conform to the microbiological requirements given in Appendix B. The product shall meet the following requirements: —

(i) Total Soluble solid (m/m): Not less than 10.0 percent

(ii) Fruit juice content (m/m)

(b) All other beverage/drink: Not less than 10.0 percent

3. The container shall be well filled with the product and shall occupy not less than 90.0 percent of the water capacity of the container, when packed in the rigid containers. The water capacity of the container is the volume of distilled water at 20°C which the sealed container is capable of holding when completely filled.

Microbiological Requirements for Non-Carbonated Water Based Beverages (Non-Alcoholic)

S.No.	Parameters	Limits
1.	Total Plate count per ml.	Not more than 50 CFU per ml.
2.	Yeast and mould count per ml	Not more than 2 cfu per ml.
3.	Coliform count	Absent in 100 ml.

Note: - Non-carbonated beverages shall be free from pathogens]

Use of food additives in food products

Food products may contain additives as specified in these regulations and in the following Tables.

Food Category System	Food Category Name	Food Additive	INS No	Recommended maximum level
14.1.4.3	Concentrates (liquid or solid) for water-based flavoured drinks (synthetic syrups for dispensers, sharbat (synthetic syrup)*, squashes, crushes, fruit syrups, cordials and barley water	Canthaxanthin	161g	5 mg/kg
		Ferric ammonium citrate	381	10 mg/kg
		Lauric arginate ethyl ester	243	50 mg/kg
		Polyvinylpyrrolidone	1201	500 mg/kg
		RIBOFLAVINS	50 mg/kg	200 mg/kg
		SACCHARINS	300 mg/kg	200 mg/kg

4.2 FOOD SAFETY AND STANDARDS (CONTAMINANTS, TOXINS AND RESIDUES) REGULATIONS, 2011

CONTAMINANTS, TOXINS AND RESIDUES

METAL CONTAMINANTS

1. Chemicals described in monographs of the Indian Pharmacopoeia when used in foods, shall not contain metal contaminants beyond the limits specified in the appropriate monographs of the Indian Pharmacopoeia for the time being in force.
2. Notwithstanding anything contained in clause (1) above, no article of food specified in column (2) of the table below shall contain any metal specified in excess of the quantity specified in column (3) of the said table:

Name of metal contaminant	Article of food	Parts per Million (mg/kg or mg/L)
TIN	Canned beverages	2.5

CROP CONTAMINANTS AND NATURALLY OCCURRING TOXIC SUBSTANCES

Name of naturally occurring toxic substances (NOTS)	Article of food	Maximum limits (ppm)
Saffrole	Non-Alcoholic Beverages	10

RESIDUES

Restriction on the use of insecticides:

(1) The expression “insecticide” shall have the meaning assigned to it in the Insecticide Act, 1968 (46 of 1968).

(2) Subject to the provisions of clause (3), no insecticides shall be used directly on articles of food: Provided that nothing in this regulation shall apply to the fumigants which are registered and recommended for use as such on articles of food by the Registration Committee, constituted under section 5 of the Insecticides Act, 1968 (46 of 1968).

Food	Name of the Insecticide	Maximum Residue Limit (MRL) in mg/kg
Fruits	2,4-Dichlorophenoxy Acetic Acid	2
	Sum of benomyl and carbendazim expressed as carbendazim	5
	Captan	15
	Carbendazim	5
	Carbofuran (sum of carbofuran and 3-hydroxy carbofuran expressed as carbofuran)	0.10
	Chlorpyrifos	0.5
		0.1

	Dichlorvos (DDVP) (content of di- chloroacetaldehyde (D.C.A.)	
	Dicofol	5
	Dimethoate	2
	Ethylene bis- dithiocarbamates	3
	Ethion	2
	Malathion	1
	Monocrotophos	1
	Paraquat dichloride	0.05
	Phorate	2.0
	Thiometon	0.5
	Trichlorfon	0.1

4.3 FOOD SAFETY AND STANDARDS (PACKAGING AND LABELLING) REGULATIONS, 2011

2.1.3 PACKAGING REQUIREMENT FOR FRUIT AND VEGETABLES PRODUCTS

- Fruit product is packed shall be so sealed that it cannot be opened without destroying the licensing number and the Lot number to be displayed on the top or neck of the bottle.
- For Canned fruits, juices and vegetables- sanitary top cans made up of suitable kind of tin plates shall be used.
- For Bottled fruits, juices and vegetables, only bottles/ jars capable of giving hermetic seal shall be used.

Provided further that in case of any bottle containing liquid milk or liquid beverage having milk as an ingredient, soft drink, carbonated water or ready-to-serve fruit beverages, the

declarations with regard to addition of fruit pulp and fruit juice shall invariably appear on the body of the bottle.

FSSAI 2.1: Packaging 2.1.1: General Requirements

1. A utensil or container made of the following materials or metals, when used in the preparation, packaging and storing of food shall be deemed to render it unfit for human consumption:— (a) containers which are rusty; (b) enamelled containers which have become chipped and rusty; (c) copper or brass containers which are not properly tinned (d) containers made of aluminium not conforming in chemical composition to IS:20 specification for Cast Aluminium & Aluminium Alloy for utensils or IS:21 specification for Wrought Aluminium and Aluminium Alloy for utensils.

2. Containers made of plastic materials should conform to the following Indian Standards Specification, used as appliances or receptacles for packing or storing whether partly or wholly, food articles namely: —

(i) IS: 10146 (Specification for Polyethylene in contact with foodstuffs);

(ii) IS: 10142 (Specification for Styrene Polymers in contact with foodstuffs);

(iii) IS: 10151 (Specification for Polyvinyl Chloride (PVC), in contact with foodstuffs);

(iv) IS: 10910 (Specification for Polypropylene in contact with foodstuffs);

(v) IS: 11434 (Specification for Ionomer Resins in contact with foodstuffs);

(vi) IS: 11704 Specification for Ethylene Acrylic Acid (EAA) copolymer.

(vii) IS: 12252 - Specification for Poly alkylene terephthalates (PET).

(viii) IS: 12247 - Specification for Nylon 6 Polymer;

(ix) IS: 13601 - Ethylene Vinyl Acetate (EVA);

(x) IS: 13576 - Ethylene Metha Acrylic Acid (EMAA);

(xi) Tin and plastic containers once used, shall not be re-used for packaging of edible oils and fats; Provided that utensils or containers made of copper though not properly tinned, may be used for the preparation of sugar confectionery or essential oils and mere use of such utensils or containers shall not be deemed to render sugar confectionery or essential oils unfit for human consumption.

Labelling Requirements

All food products sold in India that are pre-packaged are required to comply with the Food Safety and Standards (Packaging and labelling) Regulations, 2011. The Food Safety and Standards Regulation, 2011 is a notification issued by the Food Safety and Standards Authority of India under the Ministry of Health and Family Welfare.

Applicability of Food Labelling Regulations

The food labelling regulations require all “Pre-packaged” or “Pre-packed food” to comply with the labelling regulations in India. As per the rules, pre-packaged food means food, which is placed in a package of any nature, in such a manner that the contents cannot be changed without tampering it and which is ready for sale to the consumer.

General Labelling Requirements

The following labelling requirements must be complied with by all pre-packaged food sold in India:

- The label must be in English or Hindi or Devnagri language. In addition to the above, the label can contain information in any other language, as required.
- The label must not contain information about the food that could be deemed to be false, misleading, deceptive or otherwise create an erroneous impression regarding the product.
- The label must be affixed to the container in such a manner that it would not easily be separated from the container.
- The contents or information presented in the label should be clear, prominent, indelible and readily legible by the consumer.
- If the container is covered by a wrapper, then the wrapper must contain necessary information or make the label of the product inside readily legible by not obscuring.
- The name of the food must be mentioned along with the trade name and description of the food contained. In case the food contains more than one ingredient, then a list of ingredients must be presented in descending order of their composition by weight or volume, as the case may be, at the time of its manufacture;

Nutritional Information

- Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product must be given on the label along with the following information:

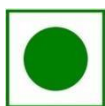
- energy value in kcal;
- the amounts of protein, carbohydrate (specify the quantity of sugar) and fat in gram (g) or ml;
- the amount of any other nutrient for which a nutrition or health claim is made:

It is important to note that any “health claim” or “nutrition claim” or “risk reduction” claim made in the label will be thoroughly scrutinized by the FSSAI authorities. Hence, any such claim must be validated by test data. As per the rules, the following is the definition for “health claim”, “nutrition claim” and “risk reduction” claim:

- **“Health claims”** means any representation that states, suggests or implies that a relationship exists between a food or a constituent of that food and health and include nutrition claims which describe the physiological role of the nutrient in growth, development and normal functions of the body, other functional claims concerning specific beneficial effect of the consumption of food or its constituents, in the context of the total diet, on normal functions or biological activities of the body and such claims relate to a positive contribution to health or to the improvement of function or to modifying or preserving health, or disease, risk reduction claim relating to the consumption of a food or food constituents, in the context of the total diet, to the reduced risk of developing a disease or health-related condition;
- **“Nutrition claim”** means any representation which states, suggests or implies that a food has particular nutritional properties which are not limited to the energy value but include protein, fat carbohydrates, vitamins and minerals;
- **“Risk reduction”** in the context of health claims means significantly altering a major risk factor for a disease or health-related condition

Veg or Non-Veg Symbol

All packaged food that is “Non-Vegetarian” must have a symbol that is a brown colour filled circle inside a square with a brown outline. If a food contains only egg as a non-vegetarian ingredient, then the manufacturer may provide a declaration that the product contains only egg and add the non-vegetarian symbol



Veg Symbol



Non-Veg Symbol

Information Relating to Food Additives, Colours and Flavours

Food additives contained in the food product must be mentioned along with class titles along with the specific names or recognized international numerical identifications. Addition of colouring matter should be mentioned on the label along with certain statements like “CONTAINS PERMITTED NATURAL COLOUR(S)”, just beneath the list of the ingredients on the label. In case of addition of extraneous flavouring agent, then it should be mentioned in a statement like “CONTAINS ADDED FLAVOUR” just beneath the list of ingredients on the label.

Name and Complete Address of the Manufacturer

The name and complete address of the manufacturer must be mentioned on every package of food. In the case of imported food, the package must contain the name and complete address of the importer in India.

Net Quantity

All packaged food must carry the net quantity by weight or volume or number, as the case may be. The net quantity of the commodity contained in the package must exclude the weight of the wrappers and packaging materials.

Lot Number or Batch Identification

A lot number or batch number or code number must be mentioned on all packaged food so that it can be traced while manufacturing and distribution. Only bread and milk including sterilised milk are not required to comply with this regulation.

Date of Manufacture or Packing

The date, month and year in which the commodity is manufactured, packed or pre-packed must be mentioned on the label. In the case of food products having a shelf life of more than three months, then the month and the year of manufacture can be given with the “Best Before Date”. In case of products having a shelf life of fewer than three months, the date, month and year in which the commodity is manufactured or prepared or pre-packed must be mentioned on the label with best before date.

Country of Origin for Imported Food

For imported food, the country of origin of the food should be declared on the label of the food. In case a food product undergoes processing in a second country which changes its nature, the country in which the processing is performed should be considered to be the country of origin for the purposes of labelling.

Instructions for Use

Instructions for use, including reconstitution, should be included on the label, if necessary, to ensure correct utilization of the food.

4.4 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 equipment 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 equipment 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.



Contact Us

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