



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Coconut Milk



AATMANIRBHAR BHARAT

**National Institute of Food Technology, Entrepreneurship and
Management (NIFTEM) - Thanjavur**

(an Institute of National Importance under Ministry of Food Processing Industries, Government of India)

Pudukkottai Road, Thanjavur – 613005

<https://niftem-t.ac.in/>

Ph : 04362-228155, Fax:04632-227971

TABLE OF CONTENTS

Page No.

Chapter 1: Introduction		
1.1	About Coconut	3
1.2	Market Status	4-6
1.3	Health Benefits Coconut	6-7
1.4	Value Addition	8
1.5	Coconut Milk	8
Chapter 2: Processing of Coconut Milk		
2.1	Processing	9-11
2.2	Flow Chart	12
2.3	Machines Required	13-16
Chapter 3: Packaging		
3.1	Factors affecting quality of Coconut Milk	17
3.2	Packaging Criteria	17
3.3	Role of Packaging Material	18
3.4	Major Classification of Packaging	18-21
Chapter 4: FSSAI Food Regulations and Standards		
4.1	Food Safety and Standards Food Product Standard and Food additive regulations	22-24
4.2	Food Safety and Standards (Contaminants, Toxins and Residues) Regulations	25-26
4.3	Food Safety and Standards (Packaging and Labelling) Regulations	26-31
4.4	Sanitary and Hygiene Requirements	32-33

CHAPTER 1

INTRODUCTION

1.1 ABOUT COCONUT

The term **coconut** refers to the fruit of the coconut palm, which consists of a fibrous husk (mesocarp) encasing a large seed or inner stone. The coconut palm is species of palm tree, *Cocos nucifera*, that grows to about 30 meters tall and is extensively cultivated in tropical climates. The term coconut also is used to refer to the entire large seed with its covering of hard, green, fibrous endocarp, or to the edible, commercially important, white and fleshy part of the seed (the coconut "meat" or endosperm), which in turn surrounds the hollow, fluid-filled, central cavity. The hollow centre is generously filled with a clouded yet translucent, flavoured liquid (liquid endosperm) slightly thicker in consistency than water.

The coconut palm today is grown throughout the tropical world, for decoration as well as for its many culinary and non-culinary uses. Virtually every part of the coconut palm has some human use. For example, the white, fleshy part of the seed provides food; the coconut water provides a nutritious drink; the fibre left over from coconut milk production is used as livestock feed; the apical buds are edible ("heart-of-palm"); and the nectar is used to make a drink. Furthermore, the fibre from the husks is used to make ropes, brushes, and other items; the leaves are used for baskets and roofing thatch; the palmwood is used for furniture and construction; the trunk is used to make drums, containers and small canoes; and the roots provide a dye and medicine; among many other uses.



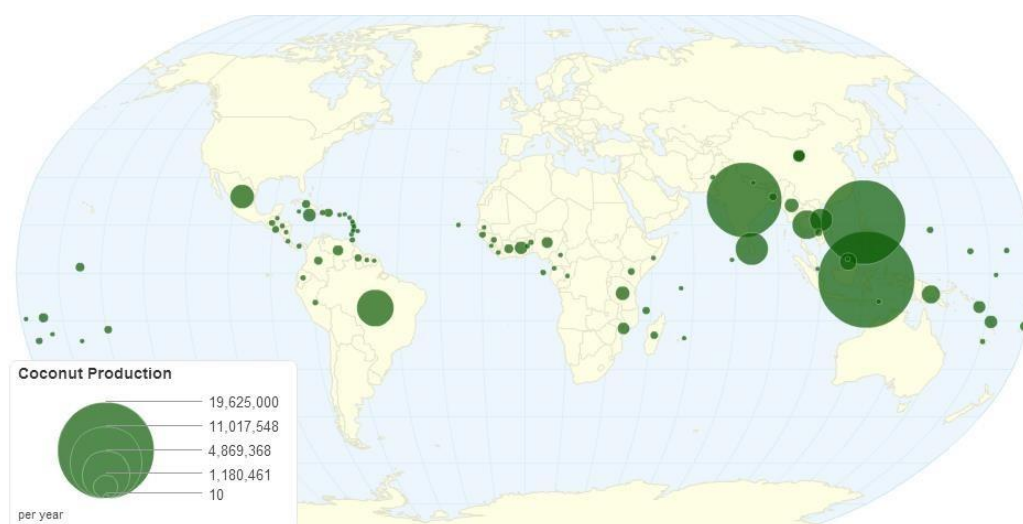
Varieties

The tall varieties are extensively grown throughout India while dwarf is grown mainly for parent material in hybrid seed production and for tender coconuts. The tall varieties generally grown along the west coast is called West Coast Tall and along the east coast is called East Coast Tall. Benaulim is the tall variety grown in Goa and coastal Maharashtra. Laccadive Ordinary, Laccadive Micro, Tiptur Tall, Kappadam, Komadan and Andaman Ordinary are some of the tall varieties. Chowghat Dwarf Orange, Chowghat Dwarf Yellow, Chowghat Dwarf Green, Malayan Yellow Dwarf and Malayan Orange Dwarf are some of the dwarf varieties grown in India. Gangabondam is a semi tall type grown in certain tracts of Andhra Pradesh.

1.2 MARKET STATUS

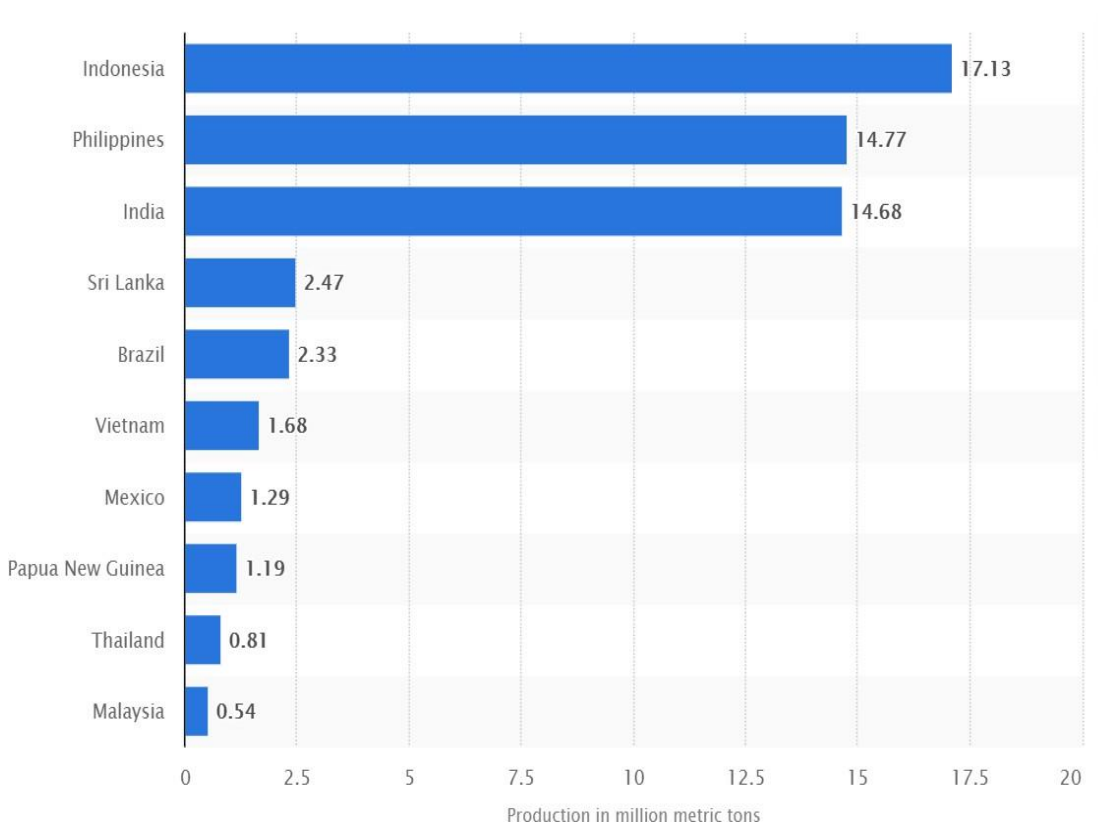
World Scenario

Coconut is grown in more than 93 countries of the world and Indonesia, Philippines, India are the major producing countries of the world.



World's Coconut Producing Countries, 2020

Leading producer of Coconut in the year 2019-2020 was Indonesia, Philippines, India, Sri Lanka and others. (Source: USDA, 2020)



Leading Coconut producing countries worldwide in 2019/2020 (in million metric tons)

Indian Scenario

As per Second Advance Estimates 2019-20, India's coconut output has been pegged at 14695 metric tonnes from the total land under Coconut of 2153000 Hectare.

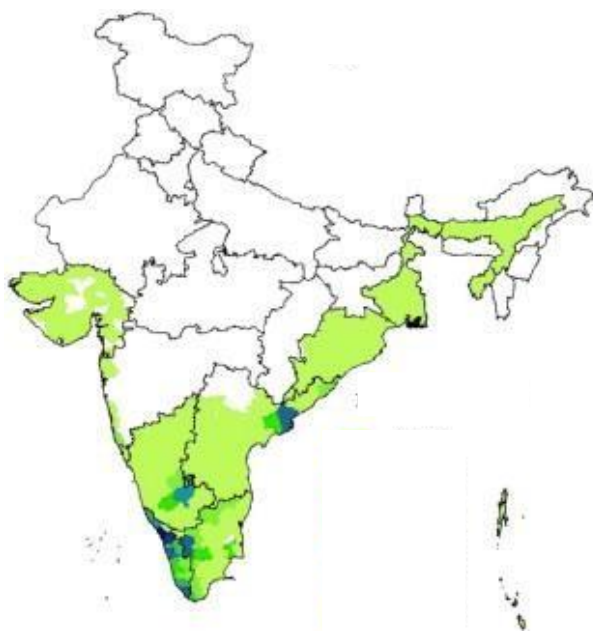
There is slight declining trend in coconut production in the country, as may be seen in the table below.

Production in '000 MT			
	2018-2019	2019-2020 (1 st Advance Estimate)	2019-2020 (2 nd Advance Estimate)
All India Production	14682	14733	14695

(Source: National Horticulture Board, 2020)

Traditional areas of coconut in India are the states of Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Orissa, Goa, West Bengal, Pondicherry, Maharashtra and Islands of Lakshadweep and Andaman and Nicobar. However, several states like Assam, Gujarat, Madhya Pradesh, Bihar, Tripura, Manipur, Nagaland and Arunachal Pradesh have emerged as non-traditional areas for the cultivation of coconut.

Tamil Nadu tops the list in the productivity of coconut, but production is high in Karnataka and Kerala tops in the area.



Major Coconut Producing Areas in India, 2020

Export

According to the data of Directorate General of Commercial Intelligence and Statistics (DGCIS), value of exports of coconut products (excluding coir and coir products) significantly decreased from 2,045.4 crore in 2018-19 to 1,762.2 crore in 2019-20. Total exports of coconut and coconut products have increased at an annual growth rate of 6 percent during the last five years but with large inter-year variations.

Import

Imports increased from 977.2 crore to 1,196.1 crore, about 22 percent increase, during the corresponding period.

1.3 HEALTH BENEFITS OF COCONUT

1. High in Nutrition

Coconuts provide mostly fat. The meat provides carbs and protein alongside many essential minerals, like manganese, copper, iron, and selenium.

2. May benefit heart health

Eating coconut may improve cholesterol levels and may also help decrease belly fat, which in long term proves to be a risk factor for heart condition.

3. May promote blood sugar control

Coconut is low in carbs and rich in amino acids, healthy fats, and fibre, which makes it a great choice for blood sugar control.

4. Contains powerful antioxidants

Coconuts contain polyphenol antioxidants that can protect the cells from damage, which may reduce the risk of diseases.

5. Easy to add in diet

Coconut is versatile in the kitchen and works well in both sweet and savoury foods. It's an excellent choice for those on low-carb, paleo, gluten-free, or nut-free diets.

Nutritional content- Coconut Milk

Sl. No.	Nutrient	Amount (100 gm)
1.	Energy	150 kcal
2.	Protein	1.67 gm
3.	Fat	15 gm
4.	Carbohydrate	1.67 gm
5.	Sodium	25 mg
6.	Cholesterol	0 mg
7.	Sugars	1.67 gm

(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.

Coconut water is a refreshing drink which also hygienic and nutritive. The white flesh is a calorie rich extensively used for cookery in South India. From grated wet coconut kernel good quality oil as well as protein and carbohydrate can be extracted to prepare coconut honey. The residual cake after the oil has been extracted is used as cattle food. The dried coconut meat is known as copra and is the source of coconut oil, which is used in enormous quantities for making fats for baking and confectionery. An important product used in the chocolate and confectionery industry is desiccated coconut. The nut is removed from the hard shell and the thin brown rind pared off. Other value addition products of coconut are coconut chips, coconut crisps, roasted young coconut, dehydrated sweet coconut, dehydrated coconut chutney, coconut syrup, flour, Jaggery, vinegar etc.

1.5 COCONUT MILK

Coconut milk refers to the milky fluid, freshly extracted from the coconut kernel with or without adding water. Coconut milk comes from the white flesh of mature brown coconuts. The milk has a thick consistency and a rich, creamy texture. Coconut milk has recently become very popular. It's a tasty alternative to cow's milk that may also provide a number of health benefits. Unlike coconut water, the milk does not occur naturally. Instead, solid coconut flesh is mixed with water to make coconut milk, which is about 50% water. In traditional cuisines, thick coconut milk is used in desserts and thick sauces. Thin milk is used in soups and thin sauces.



CHAPTER 2

PROCESSING

Coconut milk is produced from 10-13 months old mature coconuts when the kernel is hard and thick. They are natural oil-in-water emulsions extracted from the mature coconut kernel (Source: Coconut Handbook-Tetra pak). When the kernel is hard and thick, it is full of carbohydrates, oil and aromatic compounds. This is suitable for coconut milk extraction, imparting a unique flavour profile and creamy texture to coconut milk and cream. It is important to categorize coconut milk products according to fat content. The Codex Standards for Aqueous coconut products states that coconut milk should contain at least 10% fat, 2.7% non-fat solids, and 12.7-25.3% total solids. The composition of coconut milk is generally depending on that of the coconut meat used for extraction. The efficiency of extraction and composition of coconut milk from coconut meat are governed by operation parameters such as the temperature of added water and the pressing condition.

Following are the steps involved in extraction of coconut milk.

1. Coconut reception

Mature Coconuts are delivered in trucks that discharge their loads at the reception area. Then follows pre grading by manual inspection to remove any unsuitable/broken/contaminated coconut. Sound coconuts are conveyed to storage bins. Damaged ones go directly to the feed mill or are discarded.

2. Dehusking and Deshelling

Coconut dehusking involves removing of the husk from the coconut. Traditional dehusking is time consuming and difficult process. Dehusking with traditional hand tools like machete or a spike depends on the skill of worker and involves training. Traditional tools and techniques such as Pedal operated dehusking, Hydraulic operated dehusking or Pneumatic operated dehusking are commonly used. Today, Semi-automatic dehusking machines are widely used. Deshelling means remove coconut brown shell from coconut fruit. For this coconut deshelling machine is used which detaches the hard coconut shell from dehusked coconut fruit via a rotating disc cutter. Use of machines not only reduce human efforts but increases continuous work capacity and are more efficient than conventional systems.

3. Coconut Water Collection

Freshly dehusked and deshelled coconuts are cut opened to collect coconut water which can be further used for any other purpose. Coconut opener tools like mallets, sharp knives are used.

4. Coconut Meat Removal

Meat removing is an important operation during the process of making coconut milk. For this operation, Testa removing machine also called as coconut scraping machine or coconut paring machine is used which effectively removes the shell from the coconut meat. Although this operation can be done manually but use of machine saves the time and labour.

5. Blanching and sorting

Blanching is a method to kill fungus and bacteria which may contaminate the final product. For blanching coconut meat, the meat is dipped in water of 95-100 °C in blanching tank for about 2-3 min to soften it and to retain its flavour. After being blanched by hot water, it is then sprayed with cold water so that cooking process can be stopped. The coconut meat is then allowed slowly to move on sorting machine's conveyor belt so that any undesirable and damaged coconut kernels can be removed and can be cut into small pieces.

6. Coconut Milk extraction

The coconut meat is then grated into smaller flakes (3-5mm) using hammer mill before extracting the milk. Next, grated coconut flakes go into a series of screw presses to extract coconut milk. The residual kernel from the first press is then mixed with potable water before it passes again to increase its extraction yield. The double screw type milk extraction is used which has higher yield rate which is about 55%-60%. The kernels are fed into the hopper and coconut milk is pressed out. The extracted milk is discharged out, collected and immediately next unit operation which is preheating is done.

7. Preheating

There are two pasteurization processes used during coconut milk processing. The first process uses plate-type pasteurizers to do pre-pasteurization. It is done at 55 °C for 15-20 seconds (when extracting out the coconut milk) and then cooled and immediately it is stored into batch tanks for the process for homogenization. Plate Heat Exchangers are incredibly efficient for energy usage in coconut milk pasteurisation. During pasteurisation coconut milk is heated to a high temperature and then quickly cooled (about 2-4 degree Celsius) before going into homogenization tank to keep it fresh for longer. This process makes the coconut milk safer to drink by killing the bacteria.

8. Homogenization

Coconut milk extracted is a white, opaque protein-oil-water emulsion. For coconut milk, fat content is the important criteria for categorization. According to Codex Standards for Aqueous coconut products (CODEX STAN 240-2003), coconut milk should contain at least 10% fat, 2.7% non-fat solids, and 12.7-25.3% total solids. This is achieved by homogenisation. It is important in order to avoid phase separation of water and fat during storage. Homogenization reduces both the effective and primary particle sizes of coconut milk by about 50% to 75%. Typically, the use of emulsifiers and thickening agents (stabilizers) such as guar gum at levels less than 2% (w/v) with homogenization can improve emulsion stability of coconut milk. Emulsifier such as phospholipids like cephalin and lecithin is used. Homogenization temperatures normally applied are 55 – 80 °C, and homogenization pressure is between 100 – 250 bar, depending on the product (Light coconut milk or coconut milk).

Emulsifiers are amphiphilic, surface-active substances that help to retard the phase separation. This is done by absorbing to the oil- water interface, thereby lowering the interfacial tension. For commercial production, emulsifiers can be added to improve the stability for longer product shelf life.

Thickening agents or stabilizers are hydrocolloid materials that provide stabilization for emulsions, suspensions and general thickening properties. They stabilize the emulsions by thickening or increasing the viscosity of the product. This lowers the rate of separation between the oil and water layers.

9. Filtration

The extracted coconut milk is filtered using a vibrating screen with a stainless filter of 100 mesh or finer. This process removes any pulp, oversize residue and any solid contamination and impurities found in coconut milk.

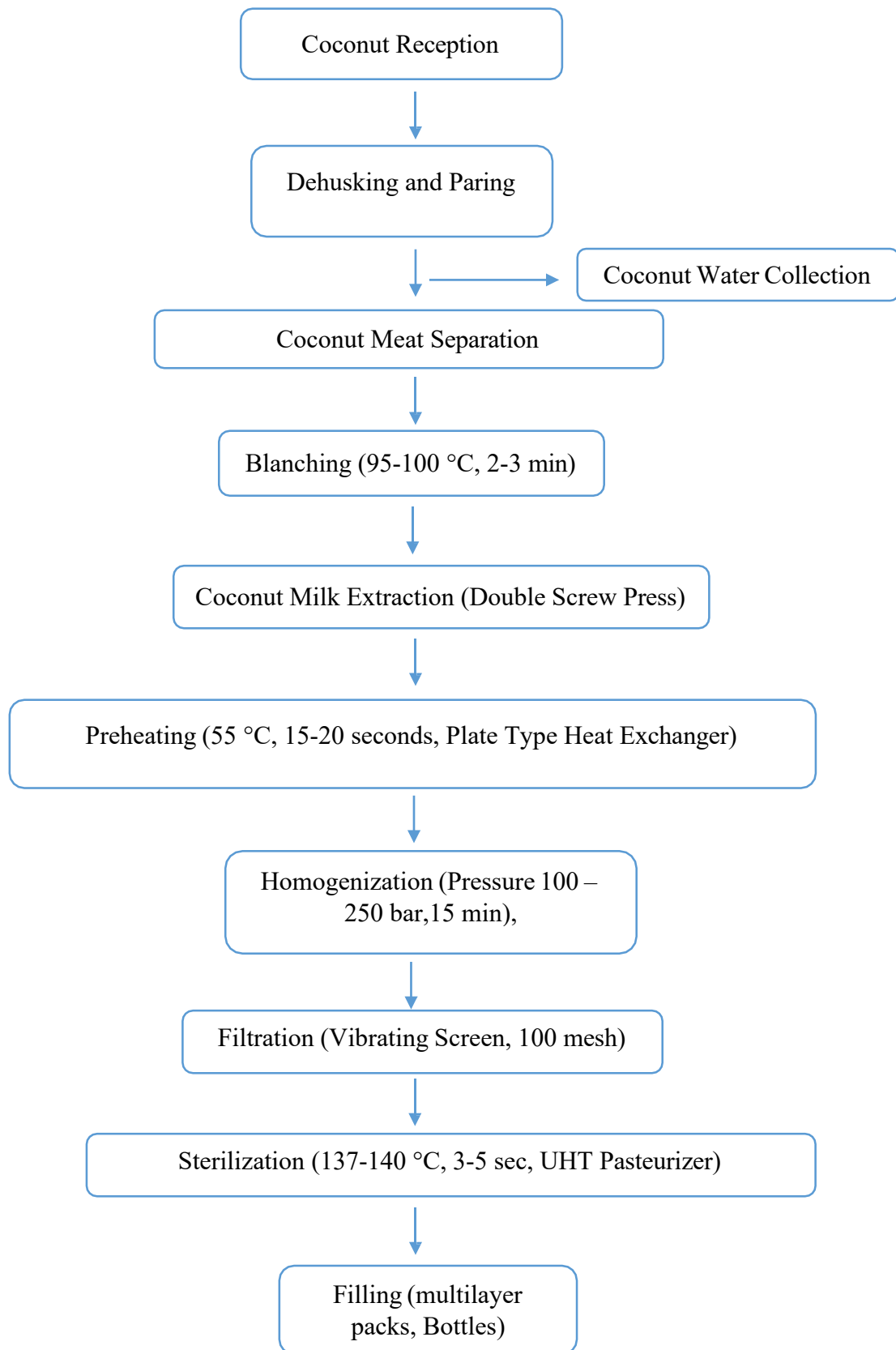
10. 2nd Sterilization

The second process of sterilization is done before filling. For this, tubular type UHT sterilizer is used to kill any bacterial endospores present in coconut milk. It is usually done for 3-5 seconds at 137-140 °C. Ultra-pasteurization, safely heats the coconut milk to a higher-than-usual temperature without affecting its physical and chemical properties

11. Filling

After pasteurization, coconut milk is packed via aseptic filling into multilayer pack, cartons or hot filling is done into bottles or tin cans.

2.3 FLOW CHART



2.4 MACHINES REQUIRED

1. Coconut Dehusking Machine



2. Coconut Deshelling Machine



3. Coconut Meat Scraper



4. Coconut Meat Grinder



5. Double Screw Press



6. Blanching Tank



7. High Pressure Homogenization Machine



8. Plate Pasteurizer



9. UHT Pasteurizer



10. Vibrating Sieve Machine



CHAPTER 3

PACKAGING

3.1 FACTORS AFFECTING QUALITY OF COCONUT MILK

The properties of coconut milk are affected by extraction, formulation, processing and storage. Its flavour profile is built up from acids, protein, sugars, phenolic compounds, mineral content and oil content. Its appearance is mainly affected by colour reactions and the amounts and size of the oil globules.

1. Chemical deterioration (mainly lipid autoxidation and lipolysis) and microbiological degradation are the two major reactions that affect the quality of coconut milk.
2. Coconut milk is also affected by browning reactions. As a result, the white milky colour turns slightly greyish.
3. Objectionable taste and odours caused by oxidative rancidity which occurs when unsaturated fatty acids are oxidized.
4. Discolouration reactions in coconut meat are caused by enzymatic reactions. This results in discolouration of the coconut milk. Discolouration reactions in coconut milk are also non-enzymatic browning.
5. Coconut milk separates into two layers. When left to stand, coconut milk tends to separate into an oil-rich top and a water-rich bottom.
6. The breakdown of carbohydrates in coconut milk results in the production of lactic and acetic acids leading to a drop in the pH levels. As a result, a sour taste develops in coconut milk.

3.2 PACKAGING CRITERIA

The packaging material used for Coconut Milk should fulfil following requirement:

- Absolutely leak-proof and prevent contamination
- Protects the contents against chemical deterioration
- No pick up of external flavours
- Be hygienic and safe
- Economical, easy to use and dispose process
- Maintain product composition & quality at full shelf-life
- Pack size, printing options, display etc
- Satisfy legislation requirement

3.3 ROLE OF PACKAGING

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

- Protect the relevant flavour compounds
- Protection against rancidity
- 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	

3.4 MAJOR CLASSIFICATION OF PACKAGING

- Primary packing
- Secondary packing
- Tertiary packing

Types of Packing Available for Coconut Milk in Market

1. Carton based Packages

The material used in carton based aseptic packages is normally made up of a barrier layer, and layers of paperboard coated internally and externally with polyethylene rendering. It is impermeable to liquids. Today, the most commonly used material for the barrier layer is the aluminium foil, which acts as a barrier to oxygen, flavour and light. Other barriers include SiO_x on polyester, ethylene vinyl alcohol (EVOH) and polyamide (PA).



2. Bottles

2.1 High-density polyethylene (HDPE)

As HDPE is relatively oxygen-permeable, plain HDPE bottles are well suited for coconut liquid products with limited shelf lives. As the material is permeable to gases, other polymers can be introduced to improve its ability to block oxygen. Such bottles have up to seven layers for maximum light and gas barrier properties. The most common barrier layers are ethylene vinyl alcohol (EVOH) and polyamide (PA), which allow ambient storage of beverages for more than six months. HDPE bottles are also fairly opaque and often pigmented. In general, HDPE provides reasonable barrier properties, a stiff and strong structure, good resistance to chemicals and moisture, and is easily processed and shaped.



2.2 Polyethylene-terephthalate (PET)

A PET bottle is more robust than glass but is more gas-permeable. Barrier improvement is also possible through the introduction of new compounds, a barrier coating or making several material layers using a preform. For aseptic filling, PET bottles are first sterilized before the coconut milk is added. During sterilization, bottles are treated with hydrogen peroxide or a mixture of hydrogen peroxide and peracetic acid, then rinsed with sterile water. They are usually of lower weight than hot fill bottles and do not require heat setting. As a result, they are cheaper and more flexible in design.



3. Glass bottles

Glass bottles can be used to contain coconut milk with hot or aseptic filling techniques. Over the years, glass has developed into a sophisticated form of packaging. Scuff resistance has been increased through light weighting and surface coating, while plastic coating materials are also used to coat glass. This plastic coating acts as a surface protector and pre-label base, helping to absorb impact, reduce noise and provide insulation. Glass bottles also come in new “wide-mouth” versions with easy-to open caps.



4. Flexible Pouches

Flexible pouches are usually made up of five layers, one tie layer connects the printed polypropylene to a proprietary centre barrier, which acts as a gas and water barrier. Another tie layer comes before an inner polyethylene sealant layer.

A flexible pouch is light and stands by itself. It also allows direct printing onto the package. Sometimes, spouts made out of high-density polyethylene are also attached. However, as the spout can compromise the space inside the pouch, straw holes can be used instead. Alternatively, a flexible pouch of plastic, fibre and aluminium combination with no rigid geometrical shape can be used.



5. Cans

Typically, three-piece cans are two parts made of steel while the third part is fitted with an aluminium easy-open end. Both parts in the three-piece can are soldered, welded or side-seam bonded by adhesive. For two-piece cans, there is an integral body and bottom fitted with an aluminium easy-open end. A three-piece can is made by printing and base-lacquering sheets of tinplate, which are then cut into rectangular shapes of the appropriate size. These rectangles are first shaped and soldered.



Secondary Packaging

Secondary packaging is used mainly for logistical and storage purposes, to protect and collect individual units. Sometimes is also referred to as grouped or display packaging as they are made to display multiple units of products for sale. This facilitates resupply from the warehouse to the store and includes shelf-ready packaging (SRP), retail-ready packaging (RRP) or counter display units (CDU).

Secondary Packing Available for Coconut Milk in market

- Paper boards
- Cartons
- Reusable Plastic Crates

Tertiary packaging

Tertiary packaging is typically not seen by consumers since it is usually removed by retailers before products are displayed for sale. It is one of the three types of wrapping used to protect manufactured goods for shipping or storing. It is used to protect not only the product but also its secondary and primary 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

FOOD SAFETY REGULATIONS AND STANDARDS

4.1 DEFINITION OF STANDARDS

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

2.3.51 COCONUT MILK (NON-DAIRY)

1. Description:

Coconut milk is the product prepared by;

- (a) using a significant amount of separated, whole, disintegrated, macerated or comminuted fresh endosperm (kernel) of coconut palm (*Cocos nucifera* L.) and expelled, where most filterable fibres and residues are excluded;
- (b) reconstituting coconut cream powder with potable water; or
- (c) dispersing finely comminuted dehydrated coconut endosperm with potable water; or
- (d) combining any of the above;
- (e) Coconut water, Maltodextrin and Sodium caseinate may be added. The product shall have characteristic colour, flavour and odour of the products. It may be processed by heat, in an appropriate manner, before or after being hermetically sealed in a container, so as to prevent spoilage.

2. Styles:

- (a) The product shall be any of the following styles: —
 - (i) **Light Coconut Milk**- light coconut milk shall be the product obtained from either the bottom portion of centrifuged coconut milk or by further dilution of coconut milk.
 - (ii) **Coconut Milk**- coconut milk is the dilute emulsion of comminuted coconut endosperm (kernel) in water with the soluble and the suspended solids distributed.

(b) The product shall conform to the following standards, namely: -

S. No.	Characteristics	Requirements	
		Light Coconut Milk	Coconut Milk
1	Moisture % (w/w) (Maximum)	93.4	87.3
2	Total Solids % (w/w)	6.6 - 12.6	12.7-25.3
3	Solids Not-Fat% (w/w) (Minimum)	1.6	2.7
4	Fat % (w/w) (Minimum)	5.0	10.0
5	pH (Minimum)	5.9	5.9

(c) The hermetically sealed container should be well filled with the product, and it should occupy not less than 90 per cent. v/v of the water capacity of the container, which shall be the volume of distilled water at 20⁰ C which the sealed container will hold when completely filled.

Use of food additives in food products

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

Fruits and Vegetables				
Food Category System	Food Category Name	Food Additive	INS No	Recommended maximum level
4.1.2.8	Fruit preparations, including fruit pulp, purees, fruit toppings and coconut milk	Acesulfame potassium	950	350 mg/kg
		Allura red AC	129	100 mg/kg
		Aspartame acesulfame salt	962	350 mg/kg
		Aspartame	951	1,000 mg/kg
		Annatto	160b(i), (ii)	GMP
		Benzoates		1,000 mg/kg
		Brilliant blue FCF	133	100 mg/kg
		Carotenoids		100 mg/kg
		Chlorophylls and Chlorophyllins, Copper Complexes		100 mg/kg
		beta-Carotenes, vegetable	160a(ii)	100 mg/kg
		Caramel III – ammonia caramel	150c	7,500 mg/kg

		Caramel IV - sulfite ammonia caramel	150d	7,500 mg/kg
		Curcumin	100	GMP
		Diacetyltartaric and fatty acid esters of glycerol	472e	2,500 mg/kg
		Fast green FCF	143	100 mg/kg
		Grape skin extract	163(ii)	500 mg/kg
		Hydroxybenzoates Para-		800 mg/kg
		Indigotine (Indigo carmine)	132	100 mg/kg
		Neotame	961	100 mg/kg
		Phosphates		350 mg/kg
		Paprika oleoresin	160c(i)	GMP
		Sorbates		1,000 mg/kg
		Ponceau 4R	124	50 mg/kg
		Propylene glycol esters of fatty acids	477	40,000 mg/kg
		Riboflavins		300 mg/kg
		Saccharins		200 mg/kg
		Sorbates		1,000 mg/kg
		Polysorbates		1,000 mg/kg
		Sulfites		100 mg/kg
		Steviol Glycosides	960	330 mg/kg
		Sucralose (Trichlorogalacto Sucrose)	955	400 mg/kg
		Sunset Yellow FCF	110	100 mg/kg
		Sorbitan Esters of Fatty Acids	5,000 mg/kg	XS314R, XS240
		Sucrose Esters of Fatty Acids	473	1,500 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)
(1)	(2)	(3)
Copper	Pulp and pulp products of any fruit	5
Arsenic	Pulp and pulp products of any fruit	0.2
Tin	Pulp and pulp products of any fruit	250

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
	Dichlorvos (DDVP) (content of di-chloro acetaldehyde (D.C.A.))	0.1
	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

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.



Non-Veg Symbol

Packaged vegetarian food should have a symbol that consist of green colour filled circle inside a green square.



Vegetarian 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 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.



Contact Us

National Institute of Food Technology, Entrepreneurship and Management (NIFTEM) - Thanjavur

(an Institute of National Importance under Ministry of Food Processing Industries, Government of India)

Pudukkottai Road, Thanjavur – 613005, Tamil Nadu, India

Ph: 04362-228155, Fax:04362-227971

Email: director@iifpt.edu.in Web: <https://niftem-t.ac.in/>

