MINISTRY OF FOOD PROCESSING INDUSTRIES
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NIFTEM
THANJAVUR

PM Formalisation of
Micro Food Processing Enterprises Scheme

Processing of Dried Apricot

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CHAPTER 1

INTRODUCTION

1.1. About Apricot

Apricot (*Prunusarmeniaca L.*) belongs to family Rosaceae. In angiosperms, Rosaceae is one of the largest families having about 3,400 species including almonds, peaches, apples, plums, cherries and berries distributed throughout the northern temperate regions of the globe. It is a temperate fruit and grown in climates with well-differentiated seasons. It requires a fairly cold winter and moderately high temperatures in the spring and early summer. The apricot tree is deciduous and needs a relatively cold winter for proper dormancy and flower bud development (400–600 hours below 7.2 °C during winter). The cultivation of apricots is not suitable in areas with a subtropical climate. Apricots are drupe, meaning its fleshy fruit surrounds a single hard seed. Fruits colors pale green while young turning fleshy, succulent, white, yellow or orange colored often tinged red on the side due to exposed to the sun while mature. It is a medium sized fruit which is 4 to 5 cm in diameter and shaped as round to large oval in some modern varieties. The flesh is firm and juicy and peel is smooth with short hair. This fruit is mostly grown in the temperate regions of the world i.e. Western and Central Asia, Europe, North Western Himalaya and Western Tibet. Apricots are believed to have originated in China and possible also Korea and Japan, since then have been grown all over the world. In India it is mostly grown in the Jammu and Kashmir, Himachal Pradesh and parts of Uttrakhand, Ladakh region comprises of two districts (Leh and Kargil) in Jammu and Kashmir. Presently, the main apricot cultivation regions include a strip stretching from Turkey through Iran, the Himalayas, Hindukush to China and Japan. However, the largest production of world apricot is supplied from the Mediterranean countries. According to FAO statistics (2010), the world's largest producers are Turkey and Iran accounting for 21.6% and 14.7% of world apricot production respectively, followed by Pakistan, Uzbekistan, Italy, Algeria, Japan, Morocco, Egypt and Spain.

1.1.1. Socioeconomic Significance

Apricot is considered to be one of the most delectable of tree fruits which has been appreciated and grown for millenia, on the mountain slopes of temperate regions of Central Asia and China. It is often considered a drought resistant species, since apricots will thrive in areas with low humidity, but they are sensitive to lack of soil moisture. In Regions growing the fruit include Jammu and

Kashmir, Lahaul and Spiti of Himachal Pradesh; as well as Kumaon and the Garhwal Hills in Uttar Pradesh. In India apricot is grown in J&K, Himachal Pradesh, Uttarakhand and to a limited extent in North Eastern Hills. In India it ranks second to plum among the stone fruits in area, production and productivity. It is hardy and drought tolerant crop. It is first deciduous fruit tree to produce flowers in spring after almond. India's apricot harvest occurs during the late summer months into early autumn. Apricot lovers would do best to stock up on them when available, as they're highly seasonal. Northerners living in the chilly, temperate regions of India have a veritable bounty of luscious apricots. Unfortunately, they are a rare luxury in the south. Even if apricots appear in local markets, they've probably been plucked prematurely and are thus under ripe and sour. Produce supply chains are anything but reliable and consistent: one batch of apricots may vary substantially in quality from the next.

1.1.2. Commercially Grown Varieties

Apricot Local Names in India: -

- Jardaloo, Khubani, Khumani (Hindi)
- Jaldharupandu (Telugu)
- SaaraParuppu,SarkkaraiBadami (Tamil)
- Jardalu (kannada), MuttaPazham, SheemaPazham (Malayalam)
- Jardaloo (Gujarati)
- Jardaloo (Marathi)

Major Apricot Production States in India: - Himachal Pradesh, Jammu & Kashmir, Uttar Pradesh and some extent of north eastern hill region.

Varieties of Apricot in India: - The following apricot fruit varieties are cultivated in India.

Himachal Pradesh:

- Dry temperate: Kaisha, Suffaida, Shakarpara and Charmagaz.
- Midhills: Shakarpara, New Castle and Early Shipley.
- High Hills: Suffaida, Nari, Charmagaz, Royal, Kaisha and Nugget.

Uttar Pradesh:

- Moorpark, Early Shipley, Kaisha, ChaubattiaMadhu, ChaubattiaKesri,
- ChaubattiaAlankar, Charmgaz, Turkey, Bebeco and Ambroise.

Jammu & Kashmir:

• Kashmir: Shakarapara, Turkey, Rogan, Australian and Charmagaz.

• Ladakh: Narmu, Khante, Rakchakarpa, Margulam, Halman and Tokpopa.

Promising varieties for Midhills:

• Early maturing: Beladi and Baiti.

• Late maturing: Alfred and Farmingdale.

1.1.3. Cultivation Scenario

Apricots tree is a small to medium sized tree 4–8 m tall with a dense, spreading, round shade with grayish brown bark. It is slightly more cold hardy compared to peach. It can tolerate winter temperature nearly about -30oc. Apricot tree prefers well drained soil with pH of 6.0 to 7.0. Leaves are usually oval about 5-9 cm long and 4-8 cm wide with round base and pointed tips. Different cultivars are grown throughout the world with different size, color, and growth characteristics. Normally flowers has white to pinkish petals, are bisexual single or paired about 2-4.5 cm in diameter.

Promising Cultivars of Apricot in Major Production Regions of India

	Jammu & Kashmir	**Himachal Pradesh**	**Uttar Pradesh**
Apricot	Charmagz, Halman, Rachkaikarpo, Nari, Shakarpara	Kaisha, Nugget, Castle, Saffeida, Charmagz	Sharmagz Kaisha, Moorpark, Turkey, St. Ambrose

Apricot Harvesting:

Apricot generally mature in first week of May – June end depending upon variety. Apricot trees start bearing fruits from fifth year and attain maximum fruit bearing stage at 8 to 10 years after planting and continue up to 35 years. Manual harvesting should be practiced. For fresh marketing, fruits should be plucked after they change the surface colour from green to yellowish. Fully ripen fruits can be harvest for, freezing and canning purpose. Extreme care should be taken care after harvesting as these fruits are perishable. As post harvesting practice, fruits are graded based on the size and packed in the wooden boxes. Apricot fruits can be stored at 0 °C for 1 to 2 weeks by maintaining 85 to 95 % relative humidity.

Yield of Apricot:

Yield depends on the variety grown and farm management practices. In apricot farming, yield of 50 to 85 kg/tree or 15-25 tons/ha can be obtained.

1.1.4. Production Status of Apricot

Horticulture is emerged as an important sector of Jammu and Kashmir it is known as back bone of State economy. Its contribution in the state gross domestic product is estimated to about 21.89% for year 2016-2017. India that only apricot covers around 54% that is 707 hectare of total area under fruit crops in leh district and the approximate annual yield is about 2956 metric tonnes per year. As per the report of the Tata Trust Mumbai based company presently working on many apricot project in ladakh region has reported that both the districts Leh and Kargil produce an estimate of 11800 metric tonnes of fresh apricot from an area of 3400 hectares. Out of the total production only about 1200 metric tonne is consumed as a fresh apricot because of its highly perishable nature and some obligations for export beyond the ladakh. According to the report published (2017) in Reach Ladakh Magazine in conversation with district horticulture officer Leh reported that around 200 verities of apricot are growing in ladakh. Some of the verities are Halman, raktsekarpo, Khantey, Narmo, Margolam, Nari, Lila tilli, Qoban, Australian, Amba, within an area of 791.57 hectare with production of 1923.41tons.

Area under Apricot from 2014 to 2017 in Ladkh Region

Year	Area (Hect.)		Total
	District Leh	District Kargil	
2014 – 2015	790	1467	2257
2015 – 2016	792	1503	2295
2016 – 2017	792	1514	2306

Source: Directorate of Horticulture Kashmir, 2018

Apricot production from 2014 to 2017 in Ladakh Region

Year	Area (Hect.)		Total
	District Leh	District Kargil	
2014 – 2015	2400	4876	7276
2015 – 2016	3189	1741	4930
2016 - 2017	1923	3775	5698

Source: *Directorate of Horticulture Kashmir, 2018*

Area Harvested, Production and Yield of Apricot in India

Time	Area harvested Ha	Yield Hg /Ha	Production Tonnes
2014	5000	28236	14118
2015	5011	28254	14158
2016	5414	28369	15359
2017	5511	28381	15640
2018	5620	28393	15958

Source: FAOPRDSC 2020

1.1.5. Composition & Nutritive Value of Apricot

Composition of Apricot (100g edible portion) by fresh weight basis

Nutrients	Quantity per 100g
Water	86.35
Energy	48 kCal
Protein	1.4g
Total lipid	0.39g
Fatty acids	0.027g
Carbohydrate	11.12g
Total fiber	2g
Total sugars	9.24g

Source: *USDA 2009*

1.1.6. Health Benefits of Apricot

Apricots have an abundance of health benefits. Let us take a look at them below.

- Rich in Fiber:
- Strengthen Bones:
- Improve Heart Health:
- Boost Metabolism:
- Anti-Inflammatory Properties:
- Treat Skin Disorders:
- Help Treat Anemia:

1.2. Value Added Products from Apricot

Dried Apricot:

Generally, two types of dried apricots are produced, Sulphured Dried Apricots and Natural Unsulphured Dried Apricots. The Sulphur dried apricots are treated with Sulphur during the drying process in order to provide colour retention and longer shelf life. The natural unsulphured dried apricots are different from sulphured dried apricots. In this type the colour of the apricots changes from light brown to dark brown as they are directly treated under the sunlight. Unsulphured dried apricots are sweeter than sulphured type.

Dried Apricot Powder:

Dried apricot powder is preparing by drying the apricots to minimal moisture content and they pulverized to get the powder. Different drying and pulverizing techniques are used to prepare dried apricot powder.

Apricot Juice:

Apricot juice is a pure form of apricots, while processing standard amount of permitted preservative can be added. The juice is sterilized in retort or by Ultra High Treatment (UHT) and followed by aseptic packaging which helps in extending the shelf life for months even under ambient conditions.

Apricot Oil:

Apricot oil is also known as apricot kernel oil. It is obtained by extraction process. I**t** begins with softening the hard, outer shells of the Kernels. This is done by soaking the Kernels in water between 10 and 20 minutes, which makes it easier for the shells to break open and release the inner Kernel. Then they are cold pressed to extract the oil. The oil is chiefly composed of oleic acid and linoleic acid, both of which are unsaturated fats.

Apricot Juice Concentrate:

It is a product obtained from partial removal of moisture from fruit juice, used in the production of reconstituted juice, beverages and powders.

CHAPTER 2
PROCESSING OF DRIED APRICOT

2.1. Selection of Apricot

Apricot trees start fruiting at the age of 5 years and give economic yield up to 30–35 years. Apricot attains full bearing age at about 8–10 years and yield about 50–80 kg fruits per trees. Change of surface colour and fruit TSS are considered to be the best indices of maturity. The fruits are plucked when surface colour turns green to yellow. Fully ripe fruits are harvested for freezing, canning and drying. In Himachal Pradesh, days from full bloom to harvest and fruit TSS have been standardised for different varieties to judge the optimum time of harvest. All apricots soften extremely quickly, making them vulnerable to bruising and subsequent rotting. So Gently pick the ripened fruits from the tree. The fruits should be harvested in the morning hours.

2.2. Sorting

Sorting is the process of grouping according to size, shape, colour and weight. Sorting covers two main separate processing operations:

a. Removal of damaged fruit and any foreign bodies (which might have been left behind after washing).
b. Qualitative sorting based on organoleptic criteria and maturity stage.

Mechanical sorting for size is usually not done at the preliminary stage. The most important initial sorting is for variety and maturity.

Clean and bright coloured apricots should be preferred. Ruptured or bruised skin with bacterial or fungal infected apricots are not recommended.

2.3. Washing

Washing and sanitizing the fruits is required to remove the pesticide residues, plant debris and other possible contamination as well as microorganisms responsible for quality loss and decay. Generally immersed in tap water whereas sanitizing agents are added to process water to effectively reduce the microbial loads on the fruit surface. apricots, are seldom washed before peeling. Washing with water must be accompanied with brushing, rubbing, and forcing the water against the fruit and into crevices. Detergents are frequently used in the wash or rinse water. Fluming in cold water reduces contact with the air and reduces bruising of soft fruit and is a retardant to oxidation if an antioxidant is used.

2.4. Pre – Treatment

The apricots can be treated before they are dried. This is not essential but does produce a higher quality product. There are several options for pre-treating apricots, the most effective one being sulphuring. If you choose not to sulphur, a good alternative is syrup blanching. Apricots can also be pre-treated by dipping them in a solution of fruit juice. The different pre-treatment methods are described below:

2.4.1 Sulphuring / Sulphiting

Sulphur dioxide will help to maintain the bright orange colour of the apricots. There are two methods of adding sulphur dioxide to the apricots: they can be dipped in a solution of sodium metabisulphite (sulphiting) or they can be placed in a chamber in which sulphur is burnt (sulphuring). Sulphuring is the preferred option because in sulphiting, there is often an uneven penetration of sulphur dioxide, the fruit is made wet which increases the amount of drying needed and some soluble nutrients are lost. The chemicals like sodium or potassium sulphite, sodium or potassium bisulphite or sodium/potassium metabisulphite can be used for sulphiting. Do not use bisulphate. Soak the fruit for 5-15 minutes depending on the size. Drain, rinse lightly under tap water and spread on clean cloth or paper towels to remove the excess moisture and dry.

There are strict limits regarding the amount of sulphur that can be added (or which is residual in the apricots after sulphuring). It is important not to exceed this limit as the apricots will have a sulphurous taste. The colour of dried apricots can be regulated without the addition of chemical preservatives by improving the drying conditions. The apricots need to be placed in a chamber in which sulphur (2-4g sulphur per kg apricots) is burnt for 2-3 hours.

2.4.2 Syrup Blanching

Syrup blanching produces a sweeter product. Prepare a sugar syrup by mixing 1 cup sugar, 1 cup white corn syrup (or liquid glucose or honey) and 2 cups water. Bring the mixture to the boil. Add 750g of prepared fruit. Simmer for 10 minutes. Remove fruit from the heat and leave in the hot syrup 30-45 minutes. Drain the fruit and rinse it lightly with cold water before placing it on dryer trays. Allow the excess syrup to drain off before putting the fruit in the dryer.

2.4.3 Fruit Juice Dips

Soaking fruits in fruit juices that contain high levels of ascorbic acid will help keep the natural colour and prevent darkening. The fruit juices will also add their own flavour to the product. Soak

the fruit pieces for 3-5 minutes in orange, grapefruit, lemon, lime or pineapple juice. Remove and drain well. Only use the juice twice before replacing.

2.5 Drying

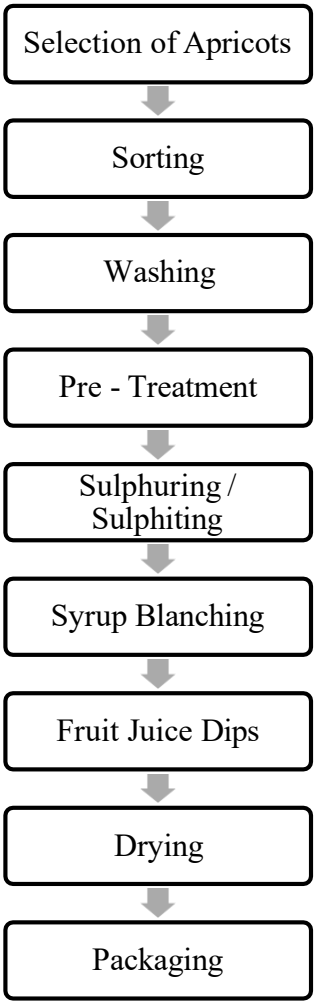
Sun drying produces a dried apricot with a more desirable colour than artificial drying.However, the drying conditions must be carefully monitored to ensure that the dried apricots are of the highest quality possible. The drying apricots should be covered with a light muslin gauze or cheesecloth to prevent contamination by dust, dirt and insects. for the best quality dried apricots, the weather must be hot and dry, with a slight breeze to ensure that the apricots dry in the shortest time possible. If the weather is humid, cloudy or rainy, the drying process will be slowed down and the quality of the apricots reduced.

Other improved drying methods like solar drying, tunnel drying, tent drying and osmotic drying methods are also used. Using a solar dryer will speed up the drying time and reduce contamination from dirt and dust. If the harvest coincides with the rainy season, it may be necessary to use an artificial dryer. the apricots should be placed in the dryer with their cups upwards and dried to a moisture content of 15% (wet basis). Make sure that the apricot halves are close together, but not touching, and that the pieces on a tray are all of the same size so they will all be dry at the same time. there can be several reasons for the spoilage of the fruit - the most likely one being that the drying process takes too long, which results in chemical reactions taking place within the cut fruit. It is important to ensure that good quality fruit is used that is not over-ripe. If the apricots pieces are very large, it may be beneficial to cut them into quarters or into thin slices to speed up the drying time.

2.6 Packaging

Once they are dried, the apricots should be allowed to cool to room temperature. They are packed in moisture proof polythene bags which should be heat sealed and labelled. The packaging must be thick enough to prevent it being damaged by the dried apricots. The use of a polythene sealing machine will produce a more attractive finished product.

Process Flow Chart for Production of Dried Apricot



CHAPTER 3
PACKAGING OF DRIED APRICOT

3.1. Deteriorating Factors Dried Apricot

In order to select a suitable packaging material/ type of package for Dried Apricot, it is essential to know the factors which affect the quality of Dried Apricot.

3.1.1. Moisture Content

Dried Apricot is hygroscopic in nature and picks-up moisture from the atmosphere resulting in sogginess. Pick-up of moisture also results in microbial contamination of the dried apricot.

3.1.2. Loss of Aroma /Flavor

Dried apricot contains volatile oils, which impart the characteristic aroma / flavor to the product. Losses in the volatile oil content or oxidation of some aromatic compounds result in aroma and flavor loss.

3.1.3. Discoloration

Dried apricot contains natural pigments. Light can affect the pigments resulting in loss or fading of colour and deterioration.

3.1.4. Insect Infestation

Dried apricot is prone to spoilage due to insect infestation, which can be further accelerated due to high humidity, heat and oxygen.

3.1.5. Microbial Contamination

In high humidity condition of 65% and above, moisture absorption occurs. Beyond a certain level of moisture content, spoilage due to microbial growth setsin.

3.2. Packaging Requirements for Dried Apricot

In order to maintain the quality of the dried apricot during handling, transportation, storage and distribution, the packaging material to be used is to be selected with care, keeping in mind the functional as well as the marketing requirements.

The packaging requirements for dried apricot, in general, are listed below:

- To protect the product from spillage and spoilage.
- To provide protection against atmospheric factors such as light, heat, humidity and oxygen. The selected packaging materials should have high water vapor and oxygen barriers.
- The packaging material should have a high barrier property to prevent aroma/flavor losses and ingress of external odour.
- The volatile oil present in the product has a tendency to react with the inner/contact layer of the packaging material, at times leading to a greasy and messy package with smudging of the printed matter. The packaging material should therefore be grease and oil resistant and compatible with the product.
- Besides the above functional requirements, the packaging material should have good machinability, printability and it should be easily available and disposable.

3.3. Packaging Materials for Dried Apricot

3.3.1. Factors which need to consider for Selection of Packaging Material

3.3.1.1. Water Vapour Transmission Rate (WVTR)

Water vapor transmission rate, often referred to as “moisture vapor transfer rate” (MVTR), is the standard indicator of how easily moisture can permeate a packaging film. Controlling moisture migration is crucial to maintaining the taste, texture, and overall quality of packaged food products. Dry products require a moisture-free environment to avoid undesirable changes in texture, taste, and microbial stability. Increasing WVTR values indicate greater permeability, and lower ability to keep dry products dry, and moist products moist.

Factors affecting WVTR values include…

- Thickness
- Resin Composition
  - Molecular weight distribution
  - Crystallinity/density
  - Chain-length and chain-length distribution
  - Chain orientation
- Polymer blends
- Additives
- Coatings – PVdC, metalizing

- Processing Parameters – BUR, frost-line height, die gap

When choosing a packaging film, MVTR is often balanced with oxygen transmission rate (OTR) to provide the most appropriate barrier characteristics for a particular product's needs.

3.3.1.2. Oxygen Transmission Rate & Gas Transmission Rate

Oxygen transmission rate, also referred to as "OTR," is the steady state rate at which oxygen gas can permeate through a film. OTR is expressed as a volume of oxygen that penetrates a given area in a one-day period, measured at a standard temperature of 73°F (23°C), and 0% relative humidity (RH). Oxygen is a major cause of the reactions associated with food spoilage. Oxidative degradation can affect the delicate color, flavor, and microbial stability of a variety of foods.

As the oxygen and water vapour barrier properties, the carbon dioxide barrier property is of particular importance on food packaging applications. The carbon dioxide barrier is quantified by the carbon dioxide permeability coefficient (CO_2PC) which indicates the amount of carbon dioxide that permeates per unit of area and time in a packaging material ($kg.m/(m^2.s.Pa)$).

Vacuum packaging, removing the air from a package, and modified atmosphere packaging (MAP), replacing the air in a package with nitrogen or carbon dioxide, are the two primary approaches to avoid undesirable oxygen-induced reactions through shelf life. Maintaining product quality using either approach relies on the packaging film's ability to act as a barrier, overcoming the natural drive created by the difference in oxygen partial pressures inside the package (0-2%) vs. outside the package (21%).

3.3.2. Types of Packaging Material

The following is a brief overview of all three types of packaging, which together typically form a complete packaging line.

3.3.2.1 Primary Packaging

The options available to the traders/exporters of dried apricot in the selection of a consumer pack for domestic and export market are quite wide. However, the selection/choice of the packaging material/ system depends upon a number of factors, which are broadly listed below:

- Shelf-life period i.e. the degree of protection required by the product

against moisture pick-up, aroma retention, discolouration etc.

- Climatic conditions during storage, transportation and distribution
- Type/ sector of market
- Consumer preferences
- Printability and aesthetic appeal

The package types generally used as consumer packs are:

- Glass bottles of various sizes and shapes with labels and provided with metal or plastic caps. The plastic caps have added inbuilt features of tamper evidence, dispensing, grinding etc.
- Printed metal plate container with/without dispensing systems
- Plastic containers with plugs and caps with dispensing and tamper evidence features
- Printed flexible pouches – pillow pouch, gusseted pouch, stand-up

pouch.

3.3.2.1.1. Plastic / Flexible Packaging

The printed flexible pouches have recently become very popular due to their easy availability, excellent printability, light weight, machinability and cost-effectiveness. Also, depending upon the functional and marketing requirements, the laminate/film can be tailor made to serve a specific need.

The printed flexible pouches are generally laminates of various compositions. Some of the commonly used laminates are:

- Polyester/ metallised polyester/LDPE
- BOPP/LDPE
- BOPP/ metallised polyester/LDPE
- Polyester/Al foil/LDPE

3 ply laminates such as 12µ PET/ Print/ 12µ Met. PET/ PE can avoid delamination and prevents smudging and de-figuring of the print. Polyester and BOPP based laminates are generally more popular for powder packaging due to certain advantageous characteristics of each of these two films. Polyester used for lamination is generally 10 or 12 µ thick. The film is highly transparent with excellent clarity, gloss and printability thus enhancing the sales appeal. The film has very low moisture and gas permeability and, therefore, ensures prolonged shelf life of the contents with aroma, flavour and taste retention. The very high mechanical strength (tear, puncture, burst and

flex) minimizes damage to the contents during handling and transportation. The film has good machinability as well as printability. The latest printing technologies help in improving sales promotions. The film is free from additives and, therefore, does not impart any odour or taint to the sensitive spice product that is packed.

BOPP films may be heat sealable or non-heat sealable. The film has high yields, is stable under climatic changes and has excellent moisture barrier. This film is smooth, glossy, crystal clear and has high mechanical strength and non- contamination property for food contact applications.

The types of sealing of pouches from flexible plastic based materials could be variable:

- Centre seal formation
- Three sides seal formation
- Four sides seal formation
- Strip pack formation

The vital link in the performance of the pouch is the seal integrity. The performance of the heat seal layer is very important. Even if the film structure has been designed with exceptional properties, with excellence in interlayer lamination, if the sealing of the pouch fails, the product may get contaminated and in some cases become unfit for consumption.

3.3.2.1.2. Glass Containers

- The glass used for food packaging is soda-lime glass.
- Glass bottles / jars play a vital role in food packaging.
- Glass containers can be reused or recycled.
- Most bottles and jars are tailor-made specifically for one product or one manufacturer.
- Closures for glass containers are more standardized.
- Eliminates the risk of potential harmful chemicals found in some plastics that can leach into food.
- Slowly being replaced because of the disadvantages like fragility.

3.3.2.1.3. Paper / Kraft Packaging

- These are produced from an interlaced network of cellulose fibers.
- The fibers are then pulped, bleached and treated with chemicals and strengthening agents to produce the paper product.

- Has good strength printability and appearance
- Other advantages are its low cost, wide ability and low weight.
- Currently very popular material in food packaging
- Made by sulphate pulping process
- Polyamide or polyamine resin is used to coat or laminate to improve barrier properties.

3.3.2.2. Secondary Packaging

This type of packaging is used outside of primary packaging to group a certain number of products to create a stock – keeping unit, commonly referred to as a SKU. It facilitates the handling of smaller products by collating them into a single pack. This type of packaging also provides supplementary protection to help maintain the integrity of the primary packaging. In addition, it can serve as a shipping container for small shipments, making it highly useful in e-commerce. Secondary packaging is frequently made up of multiple components (box, padding, separators, reinforcements, bags, paper, etc.)

3.3.2.3. Bulk Packaging

In bulk packaging, the current trend is to use Flexible Intermediate Bulk Containers (FIBCs) commonly known as Jumbo bags. These bags have a capacity of up to 1 tonne. In general, these bags are made from cloth, but at present mainly from plastic (PP) fabric, which can be laminated or provided with an inner plastic liner bag. The PP fabric is stabilized against UV degradation. The bags are provided with filling and discharge spouts and slings for hanging during loading/ unloading operations.

The FIBCs offer various advantages such as:

- Bags are flexible, collapsible and durable
- Can be used for packaging of granules, powder, flakes and any free flowing material
- Product wastage/ spillage and tampering can be avoided
- Since the handling is mechanised, less labour is required.
- Saving in time for loading and unloading
- Bags are light in weight and, therefore, freight costs are reduced.

CHAPTER 4
FOOD SAFETY REGULATIONS & STANDARDS

4.1 Definition and Standards

According to the FSSAI standards, (2.3: Fruit & Vegetable Products) (2.3.53: Dried apricots) under food safety standards and additives 2011. Dried apricots mean product prepared from sound ripe fruit of varieties of *Armeniacavulgaria Lam.* (*Prunusarmeniaca L.*) and processed by sun drying or by other methods of dehydration. The product shall have the colour characteristics of the variety and the type of the treatment and shall have flavor and odour characteristic of the product. The product shall be free from living insects or mites and reasonably free from extraneous vegetable matter, insect debris and other objectionable matter.

The Standards of Dried Apricot:

S.no	Moisture content % (w/w) (maximum)	Requirements
1.	Dried apricots not treated with any preservatives	20.0
2.	Dried apricots treated with permitted preservatives	25.0

Styles:

The product shall be presented in one of the following styles: -

(i) Whole, Unpitted;

(ii) Whole, Pitted;

(iii) Halves; or

(iv) Slabs - consisting of portions of sound, ripe apricots of characteristic colour, irregular in shape, size and thickness and excluding whole fruit.

S.no	Defects for styles	Requirements

1.	Slabs % (w/w) (maximum)	10.0
2.	Damaged fruits% (w/w) (maximum)	10.0
3.	Broken fruits % (w/w) (maximum)	10.0
4.	Insect damaged and dirty fruits% (w/w) (maximum)	5.0
5.	Immature fruits% (w/w) (maximum)	10.0

(from point 1 to 4) – total shall be not more than 15.0 percent (w/w)

Microbial parameters for Dried Apricot

S.no	Parameter	Requirement
1.	Mouldy fruit % (w/w) (maximum)	1.0

4.2 Food Safety

Part I - General Hygienic and Sanitary practices to be followed by Petty Food Business Operators applying for Registration (See Regulation 2.1.1(2))

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.

4.3 Labelling

Labeling Requirements

All food products sold in India that are prepackaged 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. In this article, we look at the regulations pertaining to food labelling in India.

Applicability of Food Labelling Regulations

The food labelling regulations require all “Prepackaged” or “Pre-packed food” to comply with the labelling regulations in India. As per the rules, prepackaged 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 prepackaged 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;

4.4 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 square with green.

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 bet 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 of 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.

Manufacturers List of Food Processing Machineries

S.no	Name of the company	Machineries
1.	MMM Buxabhoy& Co 140 Sarang Street 1st Floor, Near Crawford Market Mumbai India Tel: +91 22 2344 2902 Fax: +91 22 2345 2532 Email: yusufs@vsnl.com; mmmb@vsnl.com; yusuf@mmmb.in	Packaging and labelling machines
2.	Acufil Machines S. F. No. 120/2, Kalapatty Post Office, Coimbatore - 641 035 Tamil Nadu, India Tel: +91 422 2666108/2669909 Fax: +914222666255 Email: acufilmachines@yahoo.co.in	Dryer; Packaging and labelling machines
3.	Bombay Engineering Works, 1 Navyug Industrial Estate 185 Tokersey Jivraj Road Opposite Swan Mill, Sewree (W) Mumbai 400015 India Tel: +91 2224137094/24135959 Fax: +91 22 24135828	Dryer
4.	Planters Energy network (PEN) No 5, Power House 3rd Street N R T Nagar Theni 625531 Tamil Nadu Tel: +91 4546 255272 Fax:+91 4546 25527	Dryer
5.	Premium Engineers Pvt Ltd Plot No 2009, Phase IV, GIDC Vatva, Ahmedabad 382445 India Tel: +91 7925830836 Fax: +91 7925830965	Dryer; Milling & grinding machinery
6.	Central Institute of Agricultural Engineering, Nabi Bagh Berasia Road Bhopal 462 038 Madhya Pradesh Tel: +91 755 2737191 Fax: +91 755 2734016	Slicing machinery; Cleaning machinery; Milling & grinding Machinery

7.	Gardners Corporation 158 Golf Links New Delhi 110003 India Tel: +91 11 3344287/3363640 Fax: +91 11 3717179	Slicing machinery; Cleaning machinery; Milling & grinding machinery; Packaging and labelling machines
8.	Rajan Universal Exports Post Bag no 250 162 Linghi Chetty Street Chennai 600 001 India Tel: +91 44 25341711/25340731/25340751 Fax: +91 44 25342323	Cleaning machinery; Milling & grinding machinery
9.	Gurdeep Packaging Machines Harichand Mill compound LBS Marg, Vikhroli, Mumbai 400 079 India Tel: +91 22 2578 3521/577 5846/579 5982 Fax:+91 22 2577 2846	Packaging and labelling machines
10.	Rank and Company A-p6/3, Wazirpur Industrial Estate Delhi – 110 052 India Tel: +91 11 7456101/ 27456102 Fax: +91 11 7234126/7433905 E-mail: rank@poboxes.com	Dryers
11.	Soorya Kitchen Equipments Thammanam, Kochi, Ernakulam, Kerala 08045329361	Peeler

Contact Us

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