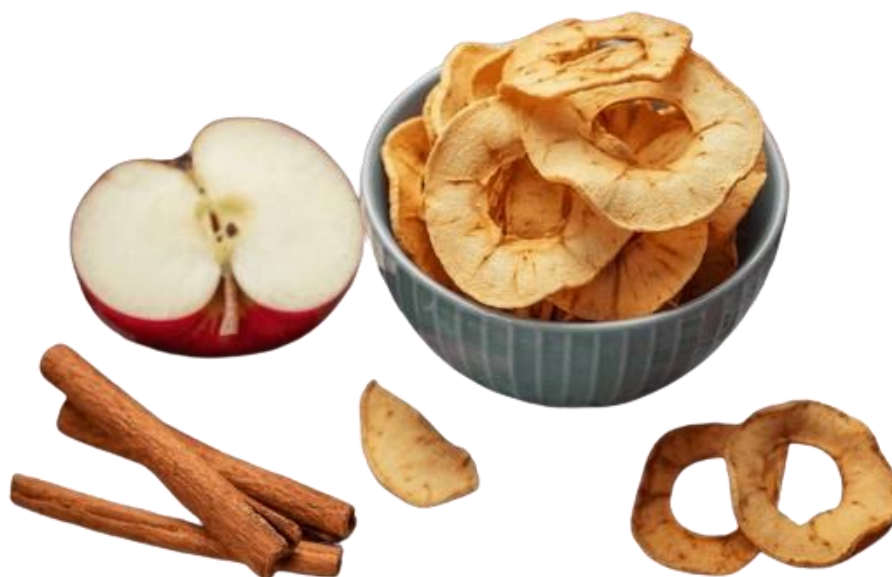




PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Dehydrated Apple Slices



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CHAPTER 1

INTRODUCTION

1.1 ABOUT

Apple, (*Malus domestica*), fruit of the domesticated tree *Malus domestica* (family Rosaceae), one of the most widely cultivated tree fruits. The apple is a pome (fleshy) fruit, in which the ripened ovary and surrounding tissue both become fleshy and edible. The apple flower of most varieties requires cross-pollination for fertilization. When harvested, apples are usually roundish, 5–10 cm (2–4 inches) in diameter, and some shade of red, green, or yellow in colour; they vary in size, shape, and acidity depending on the variety.

Since the apple requires a considerable period of dormancy, it thrives in areas having a distinct winter period, generally from latitude 30° to 60°, both north and south. Northward, apple growing is limited by low winter temperatures and a short growing season. The soils in which apple trees grow must be well drained; fertilizers can be used if the yield is not high enough. Apple varieties, of which there are thousands, fall into three broad classes: (1) cider varieties; (2) cooking varieties; and (3) dessert varieties, which differ widely but tend to emphasize colour, size, aroma, smoothness, and perhaps crispness and tang. Many varieties are relatively high in sugar, only mildly acidic, and very low in tannin.

The Apple has come a long way. From a wild fruit today, it is almost a life-saving element. Apart from its daily use as a raw fruit and juice, apple fruit health benefits have made it amongst the highest exported fruits in demand. Nearly 8000 varieties of apples are grown across the world. In US alone, it constitutes about 90% of the fruit cultivation and makes for a flourishing industry. Apple will continue to enjoy the queen's place in the fruit basket of world and will reap returns in the years to come.



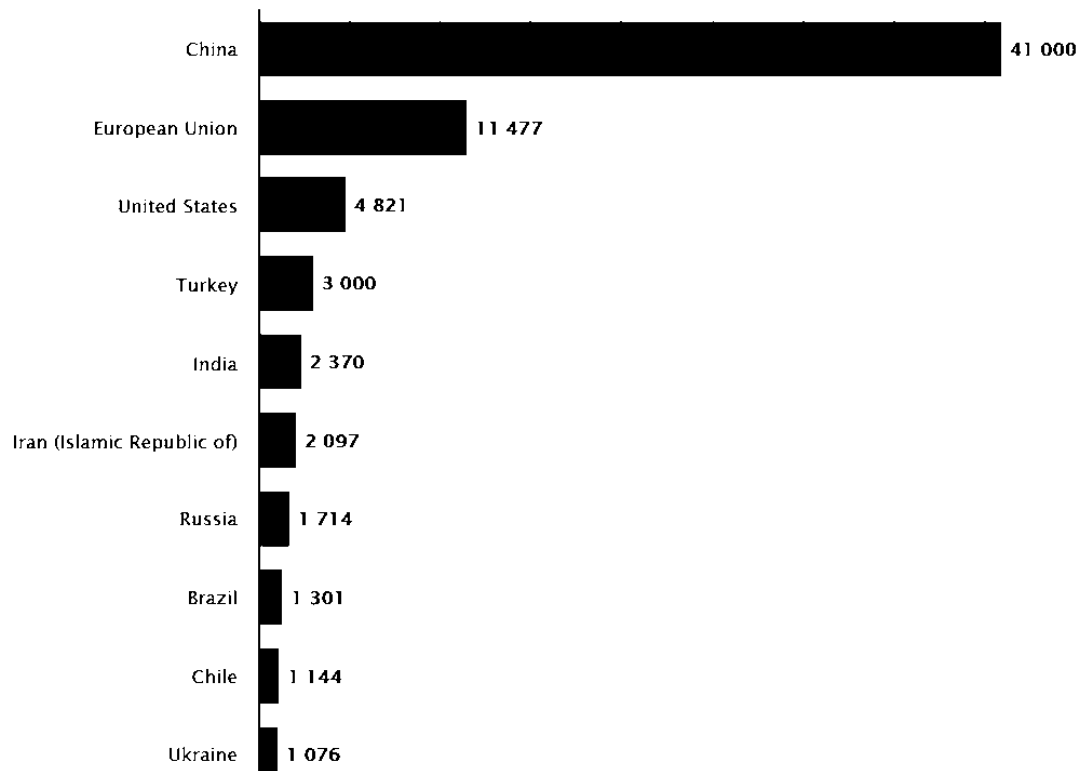
Varieties in India

There are many different types of varieties of apple found in India, few of them are: Ambri, Lal Ambri, Red Delicious, Kodaikanal-1, Royal Delicious, Starking Delicious, Granny Smith, McIntosh, Golden Delicious, Honey Crisp, Sunehari, Firdous, Winter Banana etc.

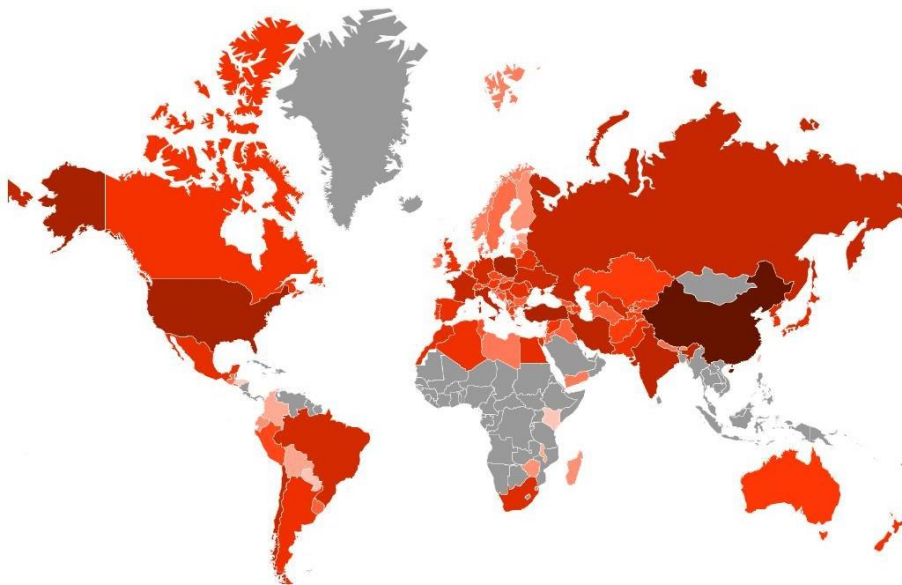
1.2 MARKET STATUS

World Scenario

Total production quantity of Apples in the world in the year 2019 was 87236221 tonnes. (Source: FAOSTAT). China is top producer of Apples followed by European Union. United states stands third in the production. Total area under apple cultivation in the world was 4717384 ha.



Global leading apple producing countries in 2019/2020



Apple producing countries in the world

China stands at first position in terms of apple export, followed by US in the year 2019.

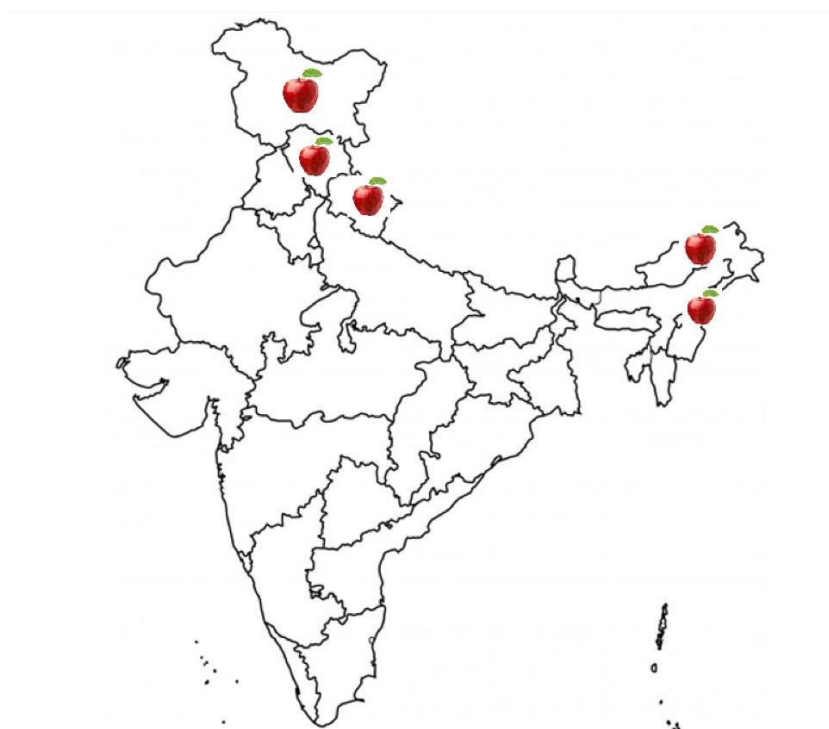
Indian Scenario

India produced 2316000 tonnes of apple in 2019 with 308000 hectares of area under its cultivation (Source: FAOSTAT).

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
	308	2316	308	2734	308	2734

(Source: NHB)

In India, Apples are majoring grown in Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Arunachal Pradesh, Nagaland etc. Jammu & Kashmir is the leading producer of Apples in India.



Major Apple producing states in India

Export: India export its apples to Nepal, Bangladesh, New Zealand, UAE, Turkey, Qatar etc.

(Source: APEDA 2019)

1.3 HEALTH BENEFITS

1. Good for Diabetics and Blood Sugar regulation

The fructose (a class of sugar) and antioxidant polyphenols in apples improve the metabolic balance and slow the rate at which sugar is absorbed in the body. This property of apples is especially effective for diabetics, who have to keep their blood sugar spike in check. Experts have also suggested that apples lower risk of developing type 2 diabetes because of a class of antioxidants called Anthocyanin.

2. Aids Weight Loss

Pectin fibre helps lower the body's absorption of excess dietary fats. The rich quantum of fibre found in apples also helps feeling full for longer. Fibre takes the longest to digest, which helps you keep satiated and prevents from bingeing on other fattening and sugar laden foods. In the long run, this aids in weight loss.

3. Enables Smoother Digestion

A number of health benefits of apples are derived from the wonder fibre pectin it contains. This soluble fibre works wonders for your digestion. Pectin a form of soluble fiber, draws water from your digestive tract and forms a gel, helping to slow digestion and pushing stool through your intestines. Apples also contain malic acid, which is again a useful digestive aid.

4. Helps Relieve Constipation and Diarrhoea

The high concentration of pectin fibre not only aids digestion but also regulates smoother bowel movements. Pectin has an amphoteric action. Paradoxically, it can prove relief from both constipation and diarrhoea depending on body's needs.

5. Protecting bones

Apples are also effective in strengthening bones and can play a crucial part in overall bone health. A certain flavonoid phlorizin, found in apple skin, may help prevent bone loss associated with menopause, as it fights the inflammation and free radical production that leads to bone degeneration.

6. Reduces Cholesterol

Pectin fibre and other constituents, such as antioxidant polyphenols have been linked to reducing the levels of “unhealthy” (LDL) cholesterol, and slow down its oxidation. This further helps reduce the risk of hardening of arteries, damaging heart muscles and blood vessels.

7. Boost Brain Power

Apples have also been linked to enhancing brain power. Apples up the acetylcholine production, which helps build a stronger communication between nerve cells and brain that further improve your memory and lower your chances of developing Alzheimer's.

8. Brighter Smile and Stronger Gums

Apples a great source of water and fibre that act as cleansing agents. It contains malic acid that boosts saliva production, hence removing bacteria from the mouth. They are also packed with vitamin and minerals that promote healthy teeth. The fibrous texture of apples also helps improving the health of gums.

Nutritional content

Sl. No.	Nutrient	Amount (100 gm)
1.	Water	85.56 gm
2.	Energy	52 kcal
3.	Protein	0.26 gm
4.	Fat	0.17 gm
5.	Carbohydrate	13.81 gm
6.	Dietary Fibre	2.4 gm
7.	Sugars	10.39 gm
8.	Calcium	4.6 mg
9.	Vitamin C	12.6 mg

10.	Potassium	107 mg
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(Source: USDA)

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 Apples, 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 DEHYDRATED APPLE SLICES

Drying apples is a great way to preserve the fresh harvest. Drying or dehydrating apples is a method of food preservation that removes most of the moisture from the fruit. This makes the apples shelf stable, and they can be stored long-term in airtight containers in a cool, dark location. Dried apples can be used in so many ways, including crumbled on morning oatmeal, re-hydrated for baked goods, and as a sweet snack right out of the jar.



CHAPTER 2

PROCESSING OF DEHYDRATED APPLE SLICES

2.1 RAW MATERIALS REQUIRED

Apples	Raw, bruise free
Sodium bisulphite (per 1 litre of water)	3.7 grams to 7.5 grams
Ascorbic Acid (per 1 litre of water)	9.5 grams

2.2 PROCESSING

1. Selection of Fruit

Only fully ripe red apples are selected. Over ripe and unripe apples adversely affect the quality of the final product. Ripe apples are preferred and selected for dehydration purpose. Bruised spots are trimmed and core is removed. Then slices are made into circular or ring form. Apple slices may be peeled or unpeeled, but peeled fruit will dry more quickly.

2. Washing

Selected apples are washed to remove dust, dirt, insect frass, mold spores, plant parts, and filth that might contaminate or affect the colour, aroma, or flavour of the final product.

3. Slicing

Apples are cut into $\frac{1}{8}$ to $\frac{1}{2}$ -inch slices. Thinly sliced apples will dry as apple chips. Uniform pieces allow for even drying across the entire piece. Peeling apples is an option. The skin tends to toughen as it dries and reduces surface area preventing moisture from escaping and increases the drying time. Slices are then pre-treated to prevent browning.

4. Pre-treatment

Pre-treatments prevent fruits from darkening. Many light-coloured fruits, such as apples, darken rapidly when cut and exposed to air. If not pre-treated, these fruits will continue to darken after they have dried.

- **Sulphuring**

Sulphuring is an old method of pre-treating fruits. Powdered sulphur is ignited and burned in an enclosed box with the fruit. The sulphur fumes penetrate the fruit and act as a pre-treatment by retarding spoilage and darkening of the fruit. Fruits must be sulphured out-of-doors where there is adequate air circulation.

- **Sulphite Dip**

Sulphite dips can achieve the same long-term anti-darkening effect as sulphuring, but more quickly and easily. Either sodium bisulphite, sodium sulphite or sodium meta-bisulphite that are food grade or Reagent grade (pure) can be used.

Directions for Use - 3.7 grams to 7.5 grams of sodium bisulphite (per 1 litre of water) is dissolved. (If using sodium sulphite, 6.5 grams to 12.5 grams is used. If using sodium metabisulfite, 4.5 grams to 8.5 grams is used.). Apple slices are then placed in the mixture and are soaked for about 5 minutes. It is then removed and rinsed lightly under cold water and placed on drying trays. (This solution can be used only once.)

- **Ascorbic Acid**

Ascorbic acid (vitamin C) mixed with water is a safe way to prevent fruit browning. However, its protection does not last as long as sulphuring or sulfiting. Ascorbic acid is available in the powdered or tablet form, from drugstores or grocery stores. One teaspoon of powdered ascorbic acid is equal to 3000 mg of ascorbic acid in tablet form.

Directions for Use – 9.5 grams of powdered ascorbic acid is mixed in 1 litre of water. The apple slices are placed in the solution for 3 to 5 minutes. The slices are then removed and excess solution is drained, the slices are then placed on dryer trays. After this, if solution is to be used twice, more acid is added.

5. Dehydration

Sliced Apples can be dried/ dehydrated in the sun, in an oven or in a food dehydrator/tray dryer by using the right combination of warm temperatures, low humidity and air current. In drying, warm temperatures cause the moisture to evaporate. Low humidity allows moisture to move

quickly from the food to the air. Air current speeds up drying by moving the surrounding moist air away from the sliced apples.

- **Sun Drying**

Fruits dried in the sun are placed on trays made of screen or wooden dowels. Screens need to be safe for contact with food. The best screen used is stainless steel, however, polytetrafluoroethylene coated fibreglass (a coated woven fiberglass membrane that is extremely durable and tolerant of even the most extreme weather elements and is chemically inert) is also commonly used.

Trays are placed on blocks to allow for better air movement around the food. Because the ground may be moist, it is best to place the racks or screens on a concrete driveway or if possible, over a sheet of aluminium or tin. The reflection of the sun on the metal increases the drying temperature. The trays are covered with cheesecloth to help protect the fruit from birds or insects. Fruits dried in the sun must be covered or brought under shelter at night. The cool night air condenses and could add moisture back to the food, thus slowing down the drying process.

- **Tray Drying**

Tray drying refers to dehydrating apple slices by exposing them to hot dry air until dry enough to store at ambient temperature with minimal spoilage.

Method-The initial temperature of the tray dryer is set to 62.5°C when there is surface moisture on the apple slices. After one hour, the temperature is reduced to 57 to 60°C to finish drying the slices.

(Note: If the fruit is dried at too high a temperature, the outer surface will harden preventing moisture from escaping from the centre of the slice; this is called case hardening.)

Apple slices are allowed to dry in tray dryer for 6-12 hours depending upon the moisture level required in the final product. Generally, for dehydrated apple slices, it is 20 %.

Test for dryness- Few slices of apples are removed from the dryer and cooled for few minutes. Apples are considered dehydrated if they are crisp and moisture is left when pressed between the fingers.

- **Oven Drying**

Oven drying uses a conventional gas or electric oven. However, it is good for occasional drying and not for commercial drying.

Method-The slices are placed in a single layer on a tray and is placed in oven preheated to 70°C for 30 minutes. If still some moisture is left, it can be heated for few more minutes. It is made sure that apple slices do not overlap each other. Slices are then removed and cooled at room temperature. After this treatment the dehydrated apple slices are ready to be conditioned and stored.

Post Dehydration

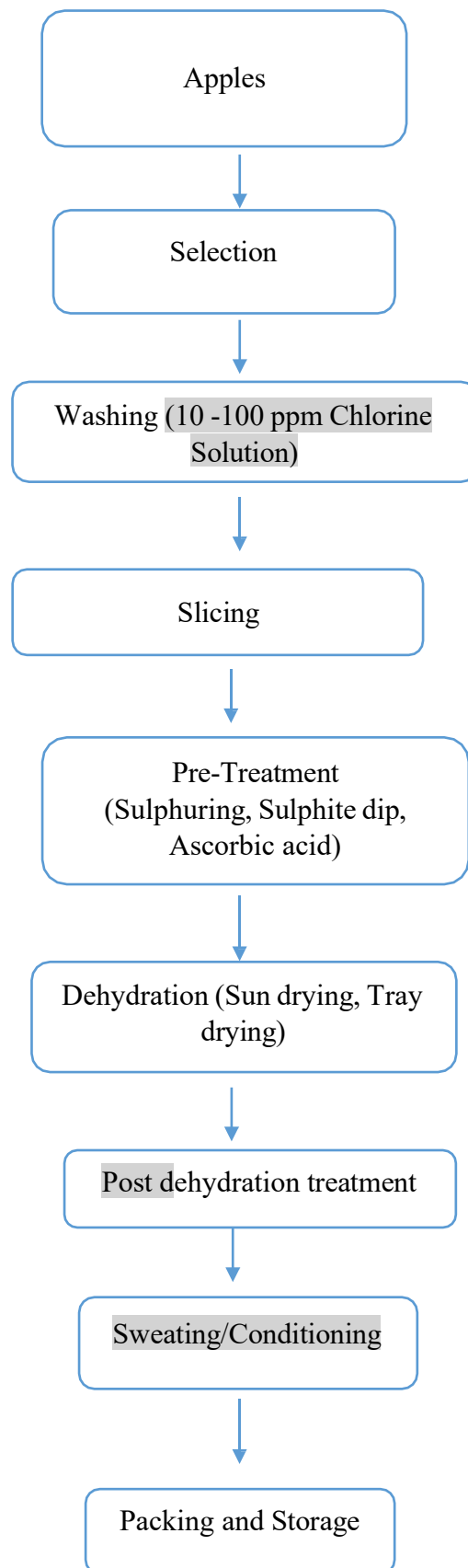
6. Sweating/Conditioning

Conditioning is the act of bringing the humidity level of dehydrated Apple slices to a balanced percentage throughout the container. It helps alleviate the risk of mold growth during storage. For conditioning, cooled slices are loosely packed into a glass or PET container for several days (7-10 days) to evenly distribute remaining moisture. Jar is shaken daily to separate the pieces. The excess moisture in some pieces will be absorbed by drier pieces ensuring equal distribution of moisture throughout the product.

7. Packaging and Storage

Completely dehydrated slices can be stored in sealed plastic bags, containers etc of desirable size and further can be marketed as and when required. Most suitable packaging method is Vacuum Packaging.

2.3 FLOW CHART



2.4 MACHINES USED

1. Industrial bubble washing machine



To remove adhering dirt, latex strains, surface organism if any, wash with 50 ppm chlorine to prevent the microbial contamination.

2. Commercial Apple Peeling, Corer and Slicer Machine



This machine is suitable for Apple peeling, core removal and split operation. The machine is multifunctional, can complete peeling, coring and cutting in one machine.

3. Tray dryer



The basic working principle of this machine is the continuous circulation of hot air. In the tray dryer, moisture is removed from the solids that are placed in the tray by a forced convectional heating. The moist air removal is conducted partially but in a simultaneous fashion.

4. Vacuum Packaging Machine



A vacuum packaging machine puts product in a film bag, de-aerates the bag by decreased pressure in a vacuum chamber, and seals the bag. It prevents discoloring of product and heightens display effect. Only by placing a product in bag on a belt, the machine automatically fulfills series of vacuum packaging processes from vacuum-packaging, sealing, cooling and discharging

CHAPTER 3

PACKAGING OF DEHYDRATED APPLE SLICES

3.1. DETERIORATING FACTORS FOR DEHYDRATED APPLE SLICES

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

- **Moisture Content**

Dehydrated Apple Slices are hygroscopic in nature and picks-up moisture from the atmosphere resulting in sogginess. Pick-up of moisture also results in microbial contamination of the Dehydrated Apple Slices.

- **Loss of Aroma /Flavour**

Dehydrated Apple Slices contains volatile oils, which impart the characteristic aroma / flavour to the product. Losses in the volatile oil content or oxidation of some aromatic compounds result in aroma and flavour loss.

- **Discoloration**

Dehydrated Apple Slices contains natural pigments. Light can affect the pigments resulting in loss or fading of colour and deterioration.

- **Insect Infestation**

Dehydrated Apple Slices are prone to spoilage due to insect infestation, which can be further accelerated due to high humidity, heat and oxygen.

- **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 sets in.

3.2 FUNCTIONS OF PACKAGING

- Containment, protection, preservation, communication, utility and performance.

- If the container performs one or more of these functions, it is considered a package.
- Traceability, convenience, and tamper indication are secondary functions of increasing importance.
- Protection/preservation since packaging can retard product deterioration, retain the beneficial effects of processing, extend shelf-life, and maintain or increase the quality and safety of food. In doing so, packaging provides protection from 3 major classes of external influences: chemical, biological, and physical.
- Biological protection provides a barrier to microorganisms (pathogens and spoiling agents), insects, rodents, and other animals, thereby preventing disease and spoilage.

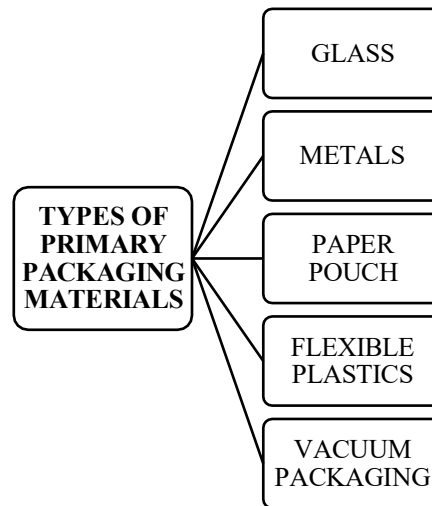
3.3 MAJOR CLASSIFICATION OF PACKAGING

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

1. Primary packaging

- Primary packaging is the packaging in direct contact with the product itself and is sometimes referred to as a consumer unit.
- The main purpose of primary packaging is to contain, protect and/or preserve the finished product, particularly against contamination.
- This type of packaging is often intended for the end user or consumer.

The Primary packaging for dehydrated apple slices available in the market are: -



- **GLASS**

Glass possesses very good barrier properties. It maintains dehydrated apples slices' freshness for a long period of time without impairing the taste or flavour, visibility and has ability to withstand high variability of temperatures.

Disadvantages: Brittle, heavy and non-degradable



- **METAL**

Metals are the most versatile of all forms of packaging. They offer the combination of excellent physical protection and barrier properties, formability, decorative potential, recyclability, and consumer acceptance. Aluminium and Tin are the most predominantly used metals in dehydrated apple slices' packaging.



- **PAPER POUCHE/BAG**

Paper is a thin sheet material produced by mechanically and/or chemically processing cellulose fibres derived from wood. The fibres are then pulped, bleached, and treated with chemicals and strengthening agents to produce the paper product. However, dehydrated apple slices packed in paper bags are more likely to get, moisture and may lose their crispness since paper does not provide absolute protection from air and moisture.



- **FLEXIBLE PLASTICS**

The majority of snacks today are in flexible bags. For snack food in the Indian market, a range of flexible materials are used depending on the product and the market segment.

Low value, typically traditional dried fruit slices may be branded or nonbranded. Non – branded dried fruit slices are packed for shorter shelf-life in unprinted low-density polyethylene (LDPE) and polypropylene (PP) pouches. For branded dried fruit slices, laminated structures are used.

Some of the typical structures are:

- BOPP / LDPE
- BOPP / Polyester / LDPE

- Metallised Polyester / LDPE
- BOPP / Metallised Polyester / LDPE
- Polyester / LDPE
- Polyester / Al foil / LDPE



- **VACUUM PACKAGING**

Vacuum packaging is another way to increase the shelf life of food products. Now a days, it is most commonly used. Here the product is placed in an air-tight pack, the air sucked out and the package sealed. By removing air from around the product, the levels of oxygen in the packaging are reduced, impeding the ability of oxygen-breathing microorganisms to grow and spoil the product. The lack of oxygen also reduces the amount of spoilage due to oxidation. There are various types of packaging materials that are used for vacuum packaging, such as, polyamide, ethylene vinyl alcohol, and other materials such as packaging films, foils, trays, bags, and lids. An outer layer of nylon for added strength and rigidity.



2. Secondary packaging

- Secondary packaging is used outside of primary packaging of glass, paper pouch, BOPP/LDPE packs to group a certain number of packets to create a stock-keeping unit, commonly referred to as a SKU.
- It facilitates the handling of smaller retail packaging by collating them into a single pack.
- This type of packaging also provides supplementary protection to help maintain the integrity of the primary packaging.

PAPERBOARD

Paperboard is thicker than paper, with a higher weight per unit area, and is often made in multiple layers. It is commonly used to make containers for shipping, such as boxes, cartons and trays and is seldom used for direct food contact. There are several different types of paperboard, including white board, solid board, fibre board and chipboard.



3. Tertiary packaging

- Often also referred to as bulk or transit packaging, this type of packaging is used to group larger quantities of SKUs to transport them from point A to point B (e.g. from production facility to point of sale).

- During this stage, products are handled as distribution units.
- This type of packaging makes it easier to transport large and/or heavy loads safely and securely.



CHAPTER 4

FOOD SAFETY REGULATIONS AND STANDARDS

4.1 DEFINITION OF STANDARDS - (FOOD PRODUCTS STANDARDS AND FOOD ADDITIVES. REGULATIONS, 2011)

According to FSSAI Standards (Food Products Standards and Food Additives) Regulations, 2011) **2.3.35 Dehydrated Fruits:** means

- The product, prepared from edible part of suitable variety of sound fruit, free from blemishes, insect or fungal infection, of appropriate maturity, from which, moisture has been removed, under controlled conditions of temperature, humidity and airflow, to the extent that the product is preserved.
- It may be whole, sliced, quarters, pieces or powdered.
- The finished product shall have uniform colour and shall be free from extraneous matter.
- The product shall have moisture content not more than 20 percent m/m.

Table: Microbial Standards for Fruits and Vegetables and their Products – Process Hygiene Criteria

Product Category	Aerobic Plate Count		Yeast and Mold Count		<i>Escherichia coli</i>		<i>Staphylococcus aureus</i> (Coagulase +ve)	
	Limits (cfu/g)		Limits (cfu/g)		Limits (cfu/g)		Limits (cfu/g)	
	m	M	m	M	m	M	m	M
Dehydrated or dried	4x10 ⁴ /g	1x10 ⁵ /g	1x10 ² /g	1x10 ⁴ /g	1x10 ²	1x10 ³ /g	10/g	1x10 ² /g

Table: Microbiological Standards for Fruits and Vegetables and their Products-Food Safety Criteria

Product Category	Salmonella	Listeria monocytogenes	Sulphite Clostridia Reducing		E. Coli 0157 and Vero or Shiga toxin producing E coli	Vibrio cholerae
	Limits (cfu/g)	Limits (cfu/g)	Limits (cfu/g)		Limits (cfu/g)	Limits (cfu/g)
	m M	m M	m	M	m M	M
Dehydrated or dried	Absent/25 g	Absent/25 g	NA	NA	Absent/25 g	Absent/25 g

Use of food additives in food products

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

	Fruits and vegetables			
Food Category System	Food Category Name	Food Additive	INS No	Recommended Maximum Level
4.1.2.2	Dried fruits, nuts and seeds	ASCORBYL ESTERS		80 mg/kg
		BENZOATES		800 mg/kg
		ETHYLENE DIAMINE TETRA ACETATES (EDTA)		265 mg/kg
		Diacetyltartaric and fatty acid esters of glycerol	472e	10,000 mg/kg
		HYDROXYBENZOATES, PARAS		800 mg/kg
		Lauric arginate ethyl ester	243	200 mg/kg
		Mineral oil, high viscosity	905d	5,000 mg/kg
		Mineral oil, medium	905e	5,000 mg/kg

		viscosity, class I		
		Calcium phosphate	341(i)	20,000 mg/kg
		Magnesium phosphate	343(ii)	20,000 mg/kg
		SORBATES		500 mg/kg
		SULFITES		1,000 mg/kg
		Tartaric acid, L (+)	334	GMP

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

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
Apple	Bifenthrin	0.5
	Bitertanol	0.4
	Difenoconazole	0.01
	Dithianon	0.1
	Metiram as CS2	0.05
	Dodine	5
	Fenarimol	5
	Fenazaquin	0.2

	Flusilazole	0.05
	Hexaconazole	0.1
	Hexythiazox	0.3
	Myclobutanil	0.01
	Penconazole	0.1
	Phosalone	5.0
	Prohexadione calcium	0.01
	Propargite	3
	Propineb	1
	Pyraclostrobin	0.5
	Spiromesifen	0.01
	Tebuconazole	1
	Thiacloprid	0.7
	Thiophanate- Methyl	5
	Trifloxystrobin	0.7
	Fluxapyroxad	0.9

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

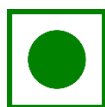
Veg or Non-Veg Symbol

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 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.

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

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