



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Dehydrated Okra



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CHAPTER 1

INTRODUCTION

1.1 About

Lady Finger or Okra, which is also known as ‘Bhindi’, is one of the important vegetable crops of India. It is grown throughout the tropical and sub-tropical regions and also in the warmer parts of the temperate regions. The place of origin is Ethiopia. Okra or Lady Finger (*Abelmoschus esculentum* (L.) Moench.) plant belongs to the family Malvaceae.

Local Names

Ladies Finger, Okra (English), Bhindi (Hindi), Belendri (Manipuri), Vendaikkaai (Tamil), Bendakaya in (Telugu), Vendakka (Malayalam), Bende kaayi (Kannada), Bhinda/Bhunda (Gujarati), Dherasa (Bengali), Bindu (Kashmiri), Bhendi (Marathi, Oriya).

Popular varieties

Punjab no. 13, Punjab Padmini, Punjab 7, Punjab 8, Punjab Suhavani, Arka Anamika, Pusa Mahakali:, Parbhani Kranti, Pusa Sawani

Harvesting

The fruits are ready to harvest after 60 to 70 days of sowing. Small and tender fruit should be harvested. The fruits should be harvested in the morning and evenings. Delay in harvesting may make the fruits fibrous and they lose their tenderness and taste. Rainy season crop gives 120 -150 quintal/ha. Summer crop gives 80 -100 quintal/ha. Duration is 100 & 90 days respectively.

Post-harvest

Okra has short shelf life and cannot be stored for longer time. The okra fruit should be stored at 7-10°C and 90% relative humidity to increase the shelf life. For local markets the fruits are filled in jute bags, whereas for distant markets the fruits are packed in perforated paper cartons.

1.2 Okra Production

World Scenario

The total area and production under okra is reported to be 1148.0 thousand ha and 7896.3 thousand tons. It is mainly grown in India, Nigeria, Sudan, Pakistan, Ghana, Egypt, Benin, Saudi Arabia, Mexico and Cameroon. Largest area and production is in India followed by Nigeria. Highest productivity is reported from Egypt (12.5 tons/ha) followed by Saudi Arabia (13.3 tons/ha).

Indian Scenario

There is a slight increase in area and production from 2006-07 to 2010-11. The area has increased from 396.0 thousand ha to 498.0 thousand ha and the production has increased from 4070.0 thousand tons to 6176.0 thousand tons in the year 2018-19.

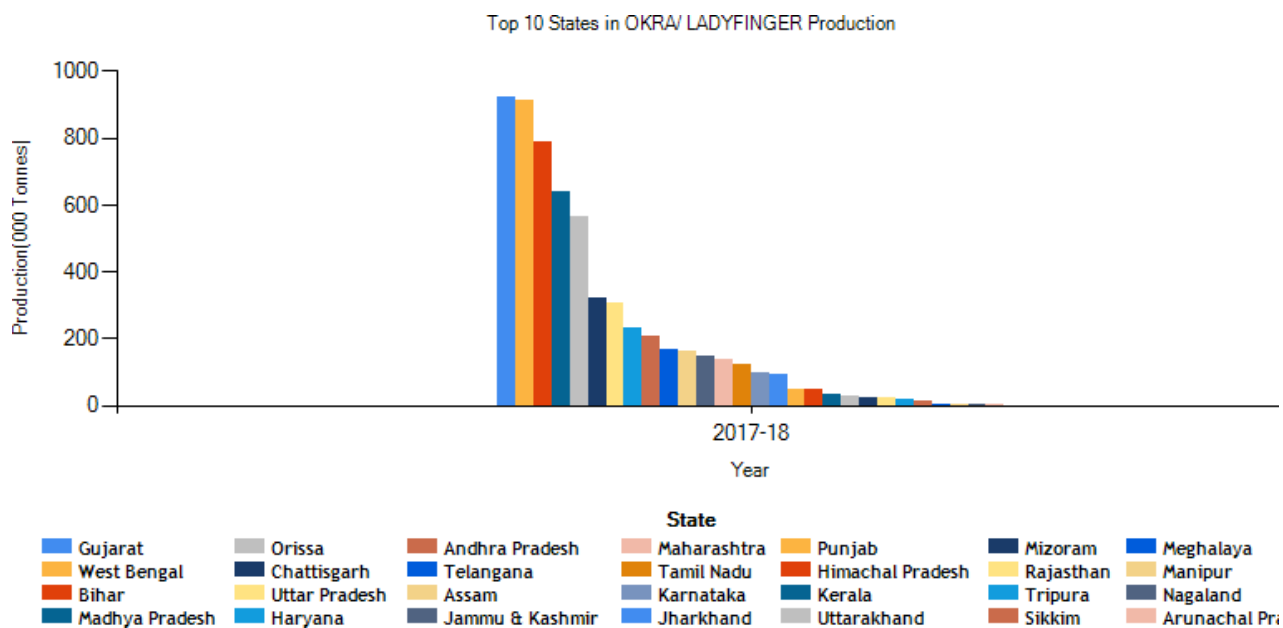
Area and production of okra in India

Years	Area in (000'ha)	Production in (000''mt)
2018-19	513	6176
2019-20 (1 st Advance Estimate)	526	6460
2019-20 (2 nd Advance Estimate)	519	6351

Source: Horticulture crops for 2018-19, Indian Horticulture Database (NHD)

Major producing states

Gujarat is the leading okra producing state which has production of around 921.72 thousand tons followed by West Bengal (914.8.1 thousand tons). Then comes Bihar (787.3 thousand tons).



Area, production and share of okra in different states is given in table:

Production (000 tonnes)			
2017-18			
S.no	State	Production	Share (%)
1.	Gujarat	921.72	15.17
2.	West Bengal	914.86	15.06
3.	Bihar	787.78	12.97
4.	Madhya Pradesh	638.34	10.51
5.	Orissa	566.88	9.33

6.	Chhattisgarh	323.24	5.32
7.	Uttar Pradesh	307.29	5.06
8.	Haryana	233.96	3.85
9.	Andhra Pradesh	205.91	3.39
10.	Telangana	167.26	2.75

Source: National Horticulture Board (NHB) 2017-18

Post-Harvest

Okra has short shelf life and cannot be stored for longer time. The okra fruit should be stored at 7-10°C and 90% relative humidity to increase the shelf life. For local markets the fruits are filled in jute bags, whereas for distant markets the fruits are packed in perforated paper cartons.

1.3 Dehydrated okra

Okra chips are a dehydrated version of Okra which can be preserved by drying. It can easily be added into the diet or can be consumed as a low-calorie snack, anywhere, anytime. Many commercial brands today add ingredients such as salt, spices and vegetable oils not only to boost its flavour but also to lengthen its shelf life. Okra's suitability for drying is fair to good. Modern research shows that its nutritional content may benefit the health. Since drying process reduces the effects of some nutrients, like vitamin C, most other nutrients are retained and are concentrated.

Nutrition Information

One cup of fresh okra contains:

- Calories: 31
- Protein: 2 grams
- Fat: 0 grams
- Carbohydrates: 7 grams

- Fiber: 3 grams
- Sugar: 1 gram

Okra chips are a good source of:

- Potassium
- Magnesium
- Vitamin A
- Calcium
- Folate

Okra chips also contain vitamin K1, which helps maintain good bone strength and may contribute to preserving your blood vessels, reducing the risk of coronary heart disease.

Potential Health Benefits of Okra Chips

Okra chips are a potential source of vitamins and minerals. These nutrients offer a variety of health-boosting effects, and research continues to study other potential benefits.

Reduced Risk of Chronic Disease

Studies show that dehydrating okra preserves most to all of its high antioxidant content and activity. Antioxidants help minimize cell damage caused by environmental factors like pollution, harmful lifestyle behaviours like smoking, and aging. This cell damage is associated with a higher risk of developing chronic diseases like cancer, diabetes, and cognitive decline.

1.4 Market Status of Dehydrated Okra

The surplus demand for healthy food products among the consumers has been creating lucrative growth opportunities. In order to cater to the increasing demand for natural and healthy food ingredients, food manufacturers are emphasizing to include dehydrated vegetables in their product line.

Dehydrated vegetables retain 100% of the nutrition content of fresh vegetables while it only takes half of the space, which offers manufacturers with better convenience to transport food items from

one place to another. Apart from convenience in transportation, dehydrated vegetables are rich in nutrients and dietary fibre content which have been helping the market gain traction.

India is the world's 2nd largest producer of vegetables in the world next only to China. But the fruit and vegetable processing industry in India is highly decentralized. A large number of units are in the small-scale sector, having small capacities up to 250 tonnes per annum though big Indian and multinational companies have capacities in the range of 30 tonnes per hour or so. Hence India now ranks only third in the production of Dried and Preserved vegetables.

In Dried and Preserved vegetable market high return is usually in the export market, especially Europe. The export customers are mostly ready-to-eat food manufacturers and hotel chains in those countries. Any economic slowdown in Europe or other export markets would negatively affect the businesses of export customers which in turn would affect the order quantity and hence the Dried and preserved vegetable market.

The dried and preserved vegetables market of India is expected to grow at a CAGR of 16% by the year 2020. The supportive agro-climatic conditions, potential domestic market, cost competitiveness, and government support are some of the key factors which will drive the growth of this industry.

CHAPTER 2

PROCESSING OF DEHYDRATED OKRA

2.1 Dehydration

Drying or dehydration is one of the most effective means to extend the shelf life of perishable fruits and vegetables. The main purpose of dehydration in preserving fruits and vegetables is to remove moisture so that water activity of the dehydrated products is low enough of a_w less than 0.6 for preventing the spoilage and the growth of pathogenic microorganisms and subsequently to reduce the spoilage reactions. Dehydration is also used in combination with other preservative factors such as initial heating of vegetable in boiling water and salt solution to extend the shelf life of vegetables. Dehydration significantly reduces the cost of transportation and storage due reduced weight and volume of dehydrated vegetables. Unlike fresh vegetables, dehydrated vegetables do not require refrigeration during storage.

Different techniques

Sun drying has been used since ancient times to produce dehydrated vegetables. This method is expensive but the effectiveness of drying depends on bright sunshine and longer drying times.

The dried vegetables with sun drying are not widely acceptable due to unhygienic quality.

Another dehydration technique, viz., **osmo-air drying** is a simple process and has potential advantages for preservation of vegetables for longer duration. The inclusion of osmotic process in conventional dehydration has major objectives of quality improvement and energy savings. This process also resulted in quality improvement in terms of colour, flavour, texture, product stability, nutrient retention and prevention of microbial spoilage during storage. Different factors such as pre-treatment, nature and concentration of osmotic solution, raw material characteristics, stage of maturity, size of slices, duration of osmosis, ratio of slice to brine concentration and agitation influence the quality of dried vegetables. Osmo air-drying has greater potential for drying of large quantities of vegetables with good sensory properties. This drying can be adopted as a rural based simple technology by small entrepreneurs, home-scale industry and also by self-help group in close association with NGOs. Small entrepreneurs can adopt this process on large scale.

Principles of Dehydration

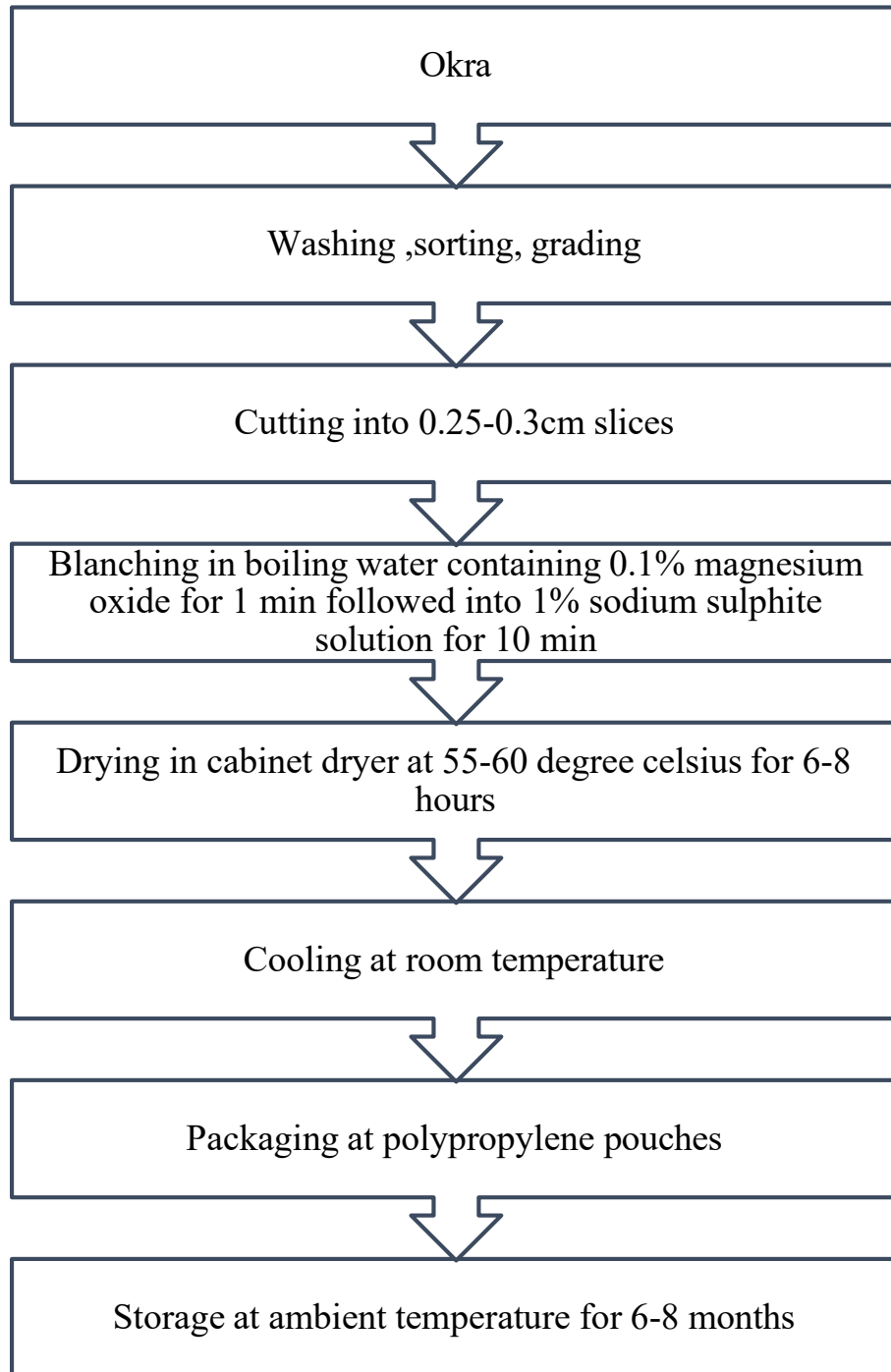
The principle involved during dehydration involves removal of moisture by application of heat under controlled conditions of temperature, humidity and air flow. In this process, single layer of sliced and shredded vegetables after blanching treatment is spread on trays in the dryer. The initial dryer temperature in cabinet or tray dryer is normally adjusted to 60-65°C for 4-5 hrs and afterwards the dryer temperature is reduced to 50-55°C for completion of drying with final moisture content to less than 2%. However, various factors such as composition of vegetables, size, shape and arrangements of vegetables in the tray, temperature and movement of hot air across the trays, heat transfer from vegetable surface such as conductive and convective rate of heat transfer.

Newer innovative drying processes have significantly improved the sensory qualities and retention of nutrients in dried vegetables. The use of additives improves in retaining green colour, ascorbic acid and bioactive compounds in dried vegetables. Drying process also improves the rehydration quality and thus improves the aesthetic quality in dried vegetables. Vegetables during drying process behaves constant and falling drying rate of moisture removal from vegetables. Constant drying rate refers to removal of moisture in proportion to the application of heat. Higher heating temperature initially removes the moisture from faster rate during constant drying rate. However, during the course of drying, the moisture content is reduced to much lower level as a result moisture removal is not proportional to the application of heat to vegetable surface. The reduced level moisture removal refers to falling drying rate in vegetables.

This drying can be adopted as a rural based simple technology by small entrepreneurs, home scale industry and also by self-help group in close association with NGOs. Small entrepreneurs can adopt this process on large scale. There is ample scope for cost reduction through the use of solar energy for brine concentration and dehydration process.

2.2 Processing

FLOW CHART



Pre-processing of okra

Pre-drying processing means to prepare the raw product for drying or dehydration and include raw product preparation and colour preservation. Okra preparation includes selection and sorting, washing, cutting into the appropriate form, and blanching. Okra is selected; sorted according to size, maturity, and soundness; and then washed to remove dust, dirt, insect matter, mold spores, plant parts, and other material that might contaminate or affect the colour, aroma, or flavour. Next, the product is cut into the appropriate shape or form (i.e., halves, slices, cubes, etc.). Okra is blanched by immersion in hot water (95 to 100 °C [203 to 212 °F]) or exposure to steam. Then they are treated with sulphite solutions to retard enzymatic browning. Sulphites and Sulphur dioxide. Sulphur dioxide gas and sodium or potassium sulphite, bisulphite or metabisulphite are the most common forms used. Commonly used levels: 0.005-0.2% In addition to colour preservation, the presence of a small amount of sulphite in blanched, cut okra improves storage stability and makes it possible to increase the drying temperature during dehydration, thus decreasing drying time and increasing the drier capacity without exceeding the tolerance for heat damage.

Post-dehydration treatments

These treatments may include sweating, screening, inspection, instantiation treatments, and packaging. Sweating involves holding the dehydrated product in bins or boxes to equalize the moisture content. Screening removes dehydrated pieces of unwanted size, usually called "fines". The dried product is inspected to remove foreign materials, discoloured pieces, or other imperfections such as skin, carpel, or stem particles. Instantiation treatments are used to improve the rehydration rate of the low-moisture product. Packaging is common to all most all dehydrated products and has a great deal of influence on the shelf life of the dried product. Packaging of dehydrated vegetables must protect the product against moisture, light, air, dust, micro flora, foreign odour, insects, and rodents; provide strength and stability to maintain original product size, shape, and appearance throughout storage, handling, and marketing; and consist of materials that are approved for contact with food. Cost is also an important factor in packaging. Package types include cans, plastic bags, drums, bins, and cartons, and depend on the end-use of the product.

Schedule for dehydrating okra

Vegetable	Preparation and pre treatment	Time of Sulphuring (minimum)	Drying Temp. (°C) & Time	Drying Ratio
Okra (sliced)	Remove both ends with stainless steel knife and cut into 6 mm. thick slices	Blanch in boiling water for 4-5 minutes and sulphite in 0.25 % KMS solution for 10 minutes using 0.5 kg. solution per kg. of slices	50-55 °C 12-14 hrs	18:1

CHAPTER 3

PACKAGING OF DEHYDRATED OKRA

3.1 Packaging

It can be defined as a method to protect and contain foods with the aim of minimizing the environmental impact of our consumption. The Packaging Institute International (PII) defines packaging as the enclosure of products, items or packages in a wrapped pouch, bag, box, cup, tray, can, tube, bottle or other container. It is the most vital steps for the success of the dehydration industry. It protects the dried food from oxygen, moisture (gain or loss), light, microorganisms, and pests. Good packaging and storage techniques are crucial. After the dehydrated okra are checked and found to be thoroughly dry and cool, they are packed immediately for storage.

Functions of packaging

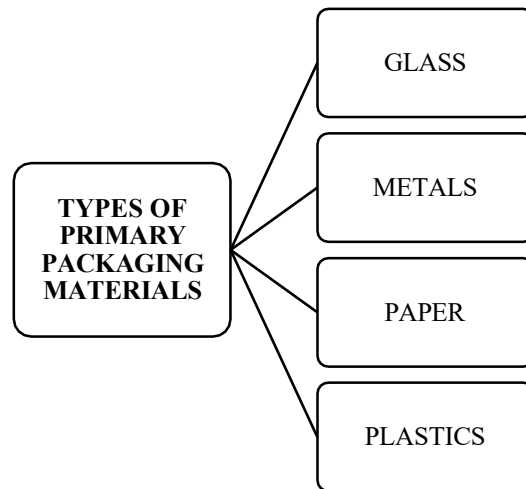
- Containment, protection, preservation, communication, utility and performance.
- If the container performs one or more of these functions, it is considered a package.
- Traceability, convenience, and tamper indication are secondary functions of increasing importance.
- Protection/preservation since 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.

Types 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.



GLASS-Glass possesses very good barrier properties, so it maintains product freshness for a long period of time without impairing the taste or flavor, visibility of product, the ability to withstand high processing 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. Aluminum and Tin are the most predominantly used metals in food packaging.



PAPER-Paper are sheet materials 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.



PLASTICS- Plastics that have a high melting point, or thermo-sealable packages can be used for making use of plastics with a low melting point and to develop very flexible structures (sachets and wrappings), semirigid structures (trays and tubs) and rigid structures (bottles, closures and tanks). Polyolefins and polyesters are the most common.



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.

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, fiber 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.



3.2 Ideal packaging materials

Dehydrated Okra can be easily and conveniently can be stored in any of the mentioned packaging materials such as glass jars, polypropylene pouches, tin jars with air tight lids/packing. It can be stored at ambient temperature of 20-25 degree Celsius for 6-8 months.

Another method which is VACCUM PACKAGING can be used which air is drawn out of the package prior to sealing but no other gases are introduced.

Vacuum packaging

Vacuum packaging is another way to increase the shelf life of food products. 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.



3.3 Possible process defects & control

- Improper maturity, improper harvest and post-harvest practices will affect the final product quality.
- Poor quality raw materials (okra) will yield poor quality product. - Use only spices of good quality and free of mould or adulteration.
- Uncontrolled blanching may cause undesirable taste and colour of the product. Improper stirring will result in charred product. - Monitor this stage to ensure a consistent product from each batch.
- Inconsistent process control will result in highly variable and non-standard products. Weight all ingredients to the correct formulation
- It is necessary to cool down the product before filling.
- Improperly sterilised containers will result in product spoilage, shortening shelf life. If using re-usable bottles pay special attention to their quality.

3.4 Equipments and Machinery

S.NO	MACHINERY
1	Roller Brush Washer
2	Universal slicer for slicing of Okra
3	Blanching tank
4	Tray Dryer electric
5	Impulse heat sealer electric power
6	Vacuum Packaging Machine

1. ROTARY FRUIT AND VEGETABLE WASHING MACHINE

- Suitable to peel/clean wash various vegetables like ginger /carrot / potato/ turnip/ radish etc. Robust structure
- Energy-efficient
- Clean washing of fruits and vegetables
- Easy to operate
- Less noise making
- High strength
- The washer is fitted with water spray jet arrangement which simultaneously washes/cleans the vegetables.



2. UNIVERSAL VEGETABLE SLICER

- It is composite and multifunctional cutter, which is designed simulating the principle of hand cutting and adopting the advanced technique of variable speeds.
- These machines can be used for cutting root and stem vegetables and fruits into slices, strips, cubes, and lozenge.
- The thickness and the length can be easily adjusted as per the requirement



3. BLANCHING TANK

- Batch blanchers are stainless steel tanks in which the product is added to hot water.
- The product is blanched for the desired time and is removed from the tank in a sieve and is cooled.
- Tank blanchers are uncommon at modern food processing facilities where they have been replaced by more efficient, continuous technologies.
- The water in the tank is heated by the addition of steam to the tank.
- Unlike tubular or screw conveyor blanchers, tank blanchers are not amenable to automatic operation.



4. TRAY DRIER ELECTRIC/GAS

- designed for uniform circulation of hot air to maintain same temperature in the drying cabinet.
- Constructed with rigid framework, double walled, heavily insulated with glass wool.
- Fresh air inlet with filter and moist/hot air outlet provided at suitable position.
- Application specific design
- High strength, easy to install, longer life



5. IMPULSE HEAT SEALER ELECTRIC POWER

- A heat sealer machine (sometimes referred to as bag sealer) is a device used to seal various types of packaging and thermoplastic materials (such as lay-flat tubing).
- There are different designs for different sealing requirements.
- The materials that can be used with impulse sealer include: Polyethylene, Polyvinyl-chloride, Polypropylene, Polyflex, Polyurethane, Polyvinyl, Foil & Florist Cellophane.
- Heat seal bags are hermetically sealed ensuring that your products are tamper proof, airtight, water resistant and hygienically enclosed.



6. VACUUM PACKAGING MACHINE

- Vacuum Packaging machine not can do the process of sealing, but also vacuum extraction or inert gas flushing after vacuum cycle.
- This packaging is used to prevent oxidation, going of molds, insects or getting damp after vacuum packing in order to keep the item fresh and enhances life for long storage.
- It is pneumatically operated and comes with double sealing element in order to seal the layer type bags.



CHAPTER 4

FOOD SAFETY REGULATIONS AND STANDARDS

These regulations may be called **the Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011.**

Regulation 2.3.36 Dehydrated Vegetables:

1. Dehydrated Vegetables means the product, prepared from edible portions of suitable variety of sound vegetable, free from insect or fungal infection, free from blemishes, suitably prepared, from which moisture has been removed under controlled conditions of temperature, humidity & airflow, to the extent that the product is preserved.
2. It may be whole, sliced, quarters, pieces, flakes, kibbled granules or powdered. The finished product shall have uniform colour and shall be free from discolouration due to scorching or enzymatic reaction. It shall be free from stalks, peels, stems and extraneous matter. When in powder form, it shall be free flowing and free from agglomerates.
3. The product may contain food additives permitted in these regulations including Appendix A. The product shall conform to the microbiological requirements given in Appendix B. It shall meet the requirements as given in the Table below

Name of Vegetable	Moisture not more than percent	Sulphur dioxide not more than ppm	Total ash not more than percent	Ash insoluble dilute HCL not more than percent	Peroxidase Test
Okra	8	2000 ppm	-	-	Negative

Regulation 4.2.2.2 Dried vegetables (including mushrooms and fungi, roots and tubers, pulses and legumes, and aloe vera), seaweeds, and nuts and seeds

Products in which the natural water content has been reduced below that critical for growth of Microorganisms without affecting the important nutrients. The product may or may not be intended for rehydration prior to consumption. Includes vegetable powders that are obtained from drying the juice, such as tomato powder and beet powder etc such as dried potato flakes, dehydrated carrots or peas or cabbage or mushroom or spinach leaf or lentil etc.

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.
6. 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.
7. 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.

8. 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.
9. 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.
10. 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).
11. 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.
12. All equipments shall be placed well away from the walls to allow proper inspection.
13. There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.
14. The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.
15. 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.
16. 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.
17. 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.

18. Eating, chewing, smoking, spitting and nose blowing shall be prohibited within the premises especially while handling food.
19. All articles that are stored or are intended for sale shall be fit for consumption and have proper cover to avoid contamination.
20. The vehicles used to transport foods must be maintained in good repair and kept clean.
21. Foods while in transport in packaged form or in containers shall maintain the required temperature.
22. Insecticides / disinfectants shall be kept and stored separately and away from food manufacturing / storing/ handling areas.

ANNEXURE: Manufacturers list of food processing machineries

S.no	Name of the company	Machineries
1	Bombay Engineering Works, 1 Navyug Industrial Estate 185 Tokersey Jivraj Road Opposite Swan Mill, Sewree (W) Mumbai 400015 India Tel: +91 22 24137094/24135959 Fax: +91 22 24135828	Dryer
2	Planters Energy network (PEN) No 5, Power House 3rd Street N R T Nagar Theni 625531 Tamil Nadu India Tel: +91 4546 255272 Fax: +91 4546 25527	Dryer
3	Premium Engineers Pvt Ltd Plot No 2009, Phase IV, GIDC Vatva, Ahmedabad 382445 India Tel: +91 79 25830836 Fax: +91 79 25830965	Dryer; Milling & grinding machinery
4	Central Institute of Agricultural Engineering, Nabi Bagh Berasia Road Bhopal 462 038 Madhya Pradesh India Tel: +91 755 2737191 Fax: +91 755 2734016	Slicing machinery; Cleaning machinery; Milling & grinding machinery
5	Soorya Kitchen Equipments Thammanam, Kochi, Ernakulam, Kerala 08045329361	Peeler
6	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

7	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, Vacuum Packaging Machine
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	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
10	Slicing machinery; Cleaning machinery; Milling & grinding machinery; Packaging and labelling machines	Packaging and labelling machines



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