



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Canned Mushroom



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CHAPTER 1

INTRODUCTION

1.1 About Mushrooms



Edible mushrooms are the fleshy and edible fruit bodies of several species of macro-fungi (fungi which bear fruiting structures that are large enough to be seen with the naked eye). They can appear either below ground (hypogeous) or above ground (epigeous) where they may be picked by hand. Edibility may be defined by criteria that include absence of poisonous effects on humans and desirable taste and aroma.

Edible mushrooms are consumed for their nutritional and culinary value. Mushrooms, especially dried shiitake, are sources of umami flavor from guanylate. Mushrooms consumed by those practicing folk medicine are known as medicinal mushrooms. While psychedelic mushrooms are occasionally consumed for recreational or entheogenic purposes, they can produce psychological effects, and are therefore not commonly used as food. There is no evidence from high-quality clinical research that "medicinal" mushrooms have any effect on human diseases. Edible mushrooms include many fungal species that are either harvested wild or cultivated. Easily cultivated and common wild mushrooms are often available in markets, and those that are more difficult to obtain (such as the prized truffle, matsutake and morel) may be collected on a smaller scale by private gatherers. Some preparations may render certain poisonous mushrooms fit for consumption.

Before assuming that any wild mushroom is edible, it should be identified. Accurate determination and proper identification of a species is the only safe way to ensure edibility, and the only safeguard against possible accident. Some mushrooms that are edible for most people can cause allergic reactions in some individuals, and old or improperly stored specimens can

cause food poisoning. Great care should therefore be taken when eating any fungus for the first time, and only small quantities should be consumed in case of individual allergies. Deadly poisonous mushrooms that are frequently confused with edible mushrooms and responsible for many fatal poisonings include several species of the genus *Amanita*, in particular, *Amanita phalloides*, the death cap. It is therefore better to eat only a few, easily recognizable species, than to experiment indiscriminately. Moreover, even normally edible species of mushrooms may be dangerous, as mushrooms growing in polluted locations can accumulate pollutants such as heavy metals.

1.2. Canned Mushrooms

Mushroom, a fungus fruit body, is considered a delicious food all over the world because of its taste aroma and structure. It is full of nutrients, low in calories, high in proteins, Vitamins, Minerals and a rich source of folic acid.

It is an alternate choice for weight conscious people and anaemic patients. It has 4.9% protein content which is more than cow milk, green vegetables such as beans, etc. Mushrooms are highly perishable commodity and should be marketed and consumed as soon as possible after harvest because of their high moisture content (90.92%). However, its shelf-life can be enhanced for a larger period by way of processing. Generally mushrooms are processed-frozen, dried and canned. The *Agricus bisporus* (White button) type of mushroom is suitable and preferred for commercial canning.

1.3. Major component of Mushrooms

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1.4. Importance



Canned mushrooms have the same nutritional content as fresh mushrooms. However, the added sodium from the canning brine (saltwater) is something to consider if you are trying to limit how much sodium you have.

➤ The phosphorus in canned mushrooms helps red cells deliver oxygen and may give you more energy.

➤ Help give you stronger bones and healthier teeth. Although bone health is primarily related to calcium, minerals such as phosphorus are also important to supporting healthy bones.

- Mushrooms contain a fair amount of phosphorus to promote greater bone and teeth health.
- Improve your digestion. The fiber in canned mushrooms contributes to a healthy digestive system. The body needs fiber to bulk up stool so it can pass more easily through your digestive tract. Adding fiber to your diet also helps if your stool is thin or watery.

1.5. Statistics

1.5.1 Global scenario

The canned food market size was valued at \$91.4 billion in 2018, and is estimated to reach \$124.8 billion by 2026, registering a CAGR of 3.9% from 2019 to 2026. In 2018, the canned meat & seafood segment accounted for more than one third of the total canned food market share.

It has been estimated that the export market of canned mushrooms in the world trade is about US \$1000 million. The world trade of mushroom is expected to reach a staggering figure of US \$ 15

billion by next 5 years. The present global demand of mushroom is about 115,000 tonnes per annum. It is also estimated that the gap between the demand and supply of mushroom in the world market is around 25 lakh tonnes. The consumption of mushroom is going up at the rate of around 10% in international market.

At present, China, Taiwan and Indonesia are the main producers of mushroom products which also capture the major share of world market. Over 50% of the total world production of the mushroom is sold in fresh form, mainly in producers' domestic markets. The balance is processed i.e. dried, frozen, canned etc. The consumption of mushroom is going up at the rate of around 10% in international market. It has also been estimated that 50% of the mushrooms for processing are canned. The major importing countries are Germany, USA, Canada, Japan, Australia, etc. In India present production is around 30000 M.T.

1.5.2 National scenario

Mushroom production in the country started in the 70s but with the development of the technologies for environmental controls and understanding of the cropping systems, mushroom production shot up from mere 5000 tonnes in 1990 to about 1,20,000 tonnes at present. Today, commercially grown species are button and oyster mushrooms, followed by paddy straw, milky mushroom, etc. Two to three crops of button mushroom are grown seasonally in temperate regions; while one crop is raised in Northwestern plains of India seasonally with minor adjustment in climate parameters in growing rooms. Marketing of fresh mushrooms is always done in the nearby city, especially Delhi, Bombay, Madras, Chandigarh and others. Most of the produce from big commercial farms is canned in brine and exported to destinations outside India, especially USA. The quality of the mushrooms exported is excellent as most of the big commercial farms are growing hybrid strains of *A.bisporus* made available to them by multinational spawn companies like Sylvan, Amycel and others. The export market for India is chiefly the USA, with some quantities going to UAE, Russia, The Netherlands, Germany, UK, Switzerland, Denmark, Israel, Sweden and other countries. There is no quota available from EU for India, and Indian exporters have to sell processed mushrooms in the EU with additional taxes levied as per the laws of the EU, which makes it difficult for the Indian exporters to compete in the EU market.

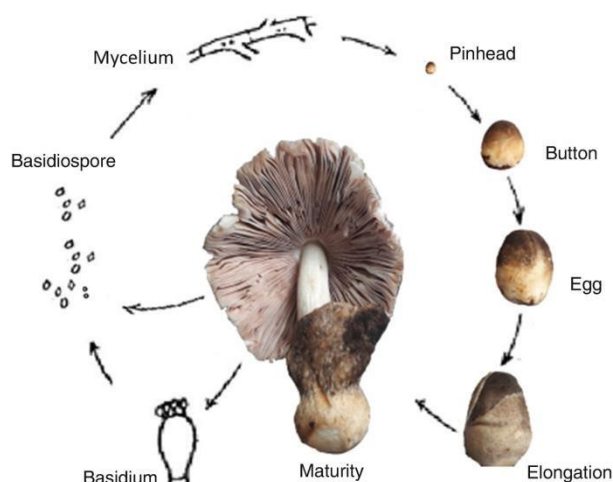
1.6. Value Added Products from Mushroom

The focus of Indian mushroom industry is predominantly on trade of the fresh produce rather than the real value-addition. Almost entire domestic trade is in the fresh form while most of the export is in the preserved form (canned or steeped). Current era is characterized by greater awareness about quality and, above all, with the demand for the readymade or ready-to-make food products. As mushrooms contain high moisture and are delicate in texture, these cannot be stored for more than 24 hours at the ambient conditions of the tropics. This leads to weight loss; veil opening, browning, liquefaction and microbial spoilage of the product making it un-saleable. Effective processing techniques will not only diminish the post harvest losses but also result in greater remuneration to the growers as well as processors. Value can be added to the mushrooms at various levels, right from grading to the readymade snacks or the main-course item. Improved and attractive packaging is another important but totally neglected area in mushrooms- it is still unprinted plain poly pouches whereas attractive and labeled over-wrapped trays are in vogue in the developed countries. Real value-added product in the Indian market is the mushroom soup powder. Technologies for production of some other products like mushroom based biscuits, nuggets, preserve, noodles, papad, candies and readymade mushroom curry in retort pouches have been developed but are yet to be popularized. Attractive packaging of the value-added products is yet another area which may be called the secondary value-addition. Some of the products are:

- Mushroom soup powder
- Mushroom Biscuit
- Mushroom nuggets
- Mushroom ketch-up
- Mushroom candy
- Mushroom preserve (*Murabba*)
- Pickle
- Mushroom chips

1.6.1 Pretreatments prevent Vegetables from darkening during long-term storage

The method is simple, economical and mushrooms can be preserved for periods ranging from 3-6 months by steeping them in concentrated solutions of salts and or acids.



➤ **Steeping preservation** of mushrooms helps to extend shelf life as well as retain whiteness. Cleaned mushrooms are washed in plain water or chemical-added water and filled in large plastic containers.

➤ Five minutes **blanching in brine solution** is sometimes done before filling them in containers. Brine solution is then added into the cans or containers. The steeped button and oyster mushrooms.

- Various researchers have tried different **chemical cocktails** for steeping preservation. Solution consisting of 2 % sodium chloride, 2 % citric acid, 2 % sodium bicarbonate and 0.15 % KMS and of 2 % salt, 2 % sugar, 0.3 % citric acid, 0.1 % KMS and 1 % ascorbic acid (Singh et al., 1995) were used for steeping preservation of the blanched button mushrooms for 8-10 days at 21- 280C.
- **Dipping of mushroom in dilute solutions of hydrogen peroxide** for half an hour and then steeping in 0.25 per cent citric acid solution containing 550 ppm sulphur dioxide had significant effect on the whiteness of mushroom demonstrated that cream white colour of button mushroom can be retained and their shelf life extended up to 375 days under the ambient conditions by steeping preservation.
- Washed mushrooms for one min in water, blanched them for 3 min in boiling 2 per cent NaCl and steeped in a solution of 5 per cent NaCl + 1 per cent sugar + 0.3 per cent citric acid + 0.5 per cent ascorbic acid + 1000 ppm KMS.

This type of preservation can be done by two methods.

- **Unexhausted steeping preservation-** Fresh mushrooms were washed and blanched in 0.05 per cent of KMS for 5 min. After draining off, mushrooms were washed with cold water for 4-5 times and then filled in the bottles or cans. Steep preserved button and oyster mushroom R.D. Rai & T. Arumuganathan 30 20 % NaCl and 0.1 % citric acid was filled in the bottles. After proper lidding, the bottles were kept for storage at room temperature. This method of steeping preservation is known as unexhausted steeping preservation and was good for storing mushrooms upto 3 months.
- **Exhausted steeping preservation-** Upto filling of the brine solution in the bottles, the procedure is same as described above. After filling the brine+acid solution, the bottles are kept in hot water bath until the temperature of brine reaches 80 to 85°C in the center. After maintaining the brine temperature at 85°C for 10 min, the bottles are sealed and kept for storage (NRCM, Annual Report 2000-01). Only water-blached mushrooms impart yellow colour to lesser degree and whiteness is maintained excellently in the treated mushrooms.

1.7 Scope of Canned Mushroom Industry

Canned mushrooms, means the product prepared from the sound, succulent, fresh mushroom by proper trimming, washing, and sorting and is packed with the addition of water in hermetically sealed containers and sufficiently processed by heat to assure preservation of the product. Salt, or monosodium glutamate, or both may be added in a quantity sufficient to season the product. Ascorbic acid (Vitamin C) may be added improve the shelf life.



Global giant manufactures mainly distributed in china and Europe. The manufacturers in Zhangzhou of China have a long history and unshakable status in this field. Most of Chinese manufactures locate in Fujian, Jiangsu and Zhejiang province. As to France, Bonduelle has

become as a global leader. The key consumption markets locate at Europe and North America. The Europe and China takes the market share over 70%, followed by US with 10%. In the international market, the marketing channels characteristic differ from company to company. The international leading companies such as Bonduelle who prefer setting up factories directly into aimed market, and taking own sales department to expand market. The giant companies are more likely to set their own big agents in some major countries and regions taking charge of regional business building their international market position.



Companies in developing countries such as China and India, in contrast, put more effort on direct selling business. They can act as exports at the same time, and it is a common phenomenon in this industry. As they do not have that much international brand influence, their product quality is not good enough when comparing with leading companies, however, they have price advantage. They like to expand their market share in developing

countries and low-end international market. The global Canned Mushroom market is anticipated to rise at a considerable rate during the forecast period, between 2019 and 2025.

CHAPTER 2

PROCESSING OF CANNED MUSHROOM

2.1 Canned Mushroom Processing

Management

Canned mushrooms is the food properly prepared from the caps and stems of succulent mushrooms conforming to the characteristics of the species *Agaricus (Psalliota) bisporus* or *A. bitorquis*, in one of the optional style, packed with a suitable liquid medium which may include water; and may contain one or more safe and suitable optional ingredients. The food is sealed in a container and, before or after sealing, is so processed by heat as to prevent spoilage.



2.1.1 Proper processing technologies are given below:

Control Parameter:

There are several parameters which control the input, process & output of the canned food production plant, some of the important parameters are discussed below:

1. Production Rate:

Production rate, in terms of manufacturing, refers to the quantity of goods that can be produced during a given period of time. Alternatively, the production rate is also the amount of time it takes to produce one unit of a good.

Companies often strive for high production rates to help lower the time and cost of a project or the production process. However, a higher production rate can also lead to a decrease in quality if more mistakes are made as employees push to have more units produced or more of a building completed.

2. Pore Size:

Filtration is a physical, biological or chemical operation that separates solid matter and fluid from a mixture with a filter medium that has a complex structure through which only the fluid can pass. Solid particles that cannot pass through the filter medium are described as oversize and the fluid that passes through is called the filtrate.

3. Cooking Temperature:

It's simply the temperature at which given food item is to be cooked, Any processed food product has an optimum range of cooking temperature at which it must be cooked to obtain the desired product.

Low temperature results in insufficient cooking, while the high temperature results in localized burning and the improper cooking temperature also corrodes taste. Therefore it's essential to maintain cooking temperature.

4. Cooling Temperature:

It simply refers to the temperature at which the given food product is being cooled, which is usually followed after cooking, heating and during pasteurization. The improper cooling may also affect taste and moisture.

5. Moisture Content:

Moisture is the presence of a liquid, especially water, often in trace amounts. Small amounts of water may be found, for example, in the air, in foods, and in some commercial products.

It can be indirectly controlled via other parameters like various temperature and sometimes balance is maintained by adding extra water during certain process.

6. Mixing Speed:

The speed at which the given raw material constituents are being mixed is called as mixing speed. In food processing industry it's an extremely important parameter.

For most food products, start mixing on low speed and gradually raise it to the speed indicated in the recipe. The gradual increase keeps ingredients from jumping out of the mixing bowl. Never overload your mixer bowl's capacity because you will ruin the gears of your mixer.

7. Mixing Time:

The time duration for which the given raw material constituents are being mixed is called as mixing time. In food processing industry it's an extremely important parameter as it defines consistency and texture of the final product especially in case of baked food items.

Mixing with a mixer for 2 minutes is equivalent to mixing 10 - 12 minutes by hand. It's not recommend mixing bread dough for more than 2 minutes at Speed 2, and that the total mixing and mixing time does not exceed 4 - 6 minutes.

8. Cutter Speed:

The speed at which the cutting operation is being performed is rotating is called as cutter speed, it can be defined as speed of cutter blades or drum or simply reciprocating speed of slicer; it defines the rate of extraction of required shaped product from the given continuous material.

In case of food processing industry it's extremely important parameter to control the production rate as well as limit rejection, depending on product it has a huge range of variation.

9. Cooking Time:

The time duration for which the given food item is cooked at given cooking temperature so as to obtain required food product is called as cooking time.

With high temperatures using various cooking methods; cooking food can be tricky to get just right. If you're not careful, food loses its required colour and taste. The final dish

may end up dried or in case of less cooking time soggy, hence it's an important parameter.

10. Sterilization Temperature:

Sterilization refers to any process that removes, kills, or deactivates all forms of life and other biological agents like prions present in a specific surface, object or fluid, for example food or biological culture media.

A common process to do so is heating the given item at a given temperature for required time duration, this temperature is called sterilization temperature, it's simply temperature required for sterilization.

11. Sterilization Time:

Sterilization refers to any process that removes, kills, or deactivates all forms of life and other biological agents like prions present in a specific surface, object or fluid, for example food or biological culture media.

The time duration for which sterilization process is executed utilizing various techniques for various items, so as to achieve effective sterilization is called sterilization time.

12. Pasteurization Temperature:

Pasteurization is a process of heat processing a liquid or a food to kill pathogenic bacteria to make the food safe to eat. It involves heating the food to kill most harmful microorganisms. Producers pasteurize dairy and other foods to make them safe to eat.

The temperature upto which the given food item is heated and maintained at for given duration of time so as to achieve effective pasteurization is called as Pasteurization Temperature.

13. Pasteurization Time:

Sterilization refers to any process that removes, kills, or deactivates all forms of life and other biological agents like prions present in a specific surface, object or fluid, for example food or biological culture media.

The time duration for which pasteurization process is executed at a given temperature which is different for different pasteurization methods and food items, so as to achieve effective pasteurization is called pasteurization time.

2.2 Current trends in Canned Mushroom Processing

2.2.1 Canned Mushroom Processing

White button mushrooms (*agaricus bisporus*) are preferred over other types of mushrooms for canning. Commercially, mushrooms are canned in brine, The process involves the following steps:

- **PICKING** – Mushrooms are picked at button stage (cap. Diameter 2-2.5 cm) by gentle hand twisting. The soil and portion carrying any microbial flora is then cut off/removed with the help of a sharp edge stainless steel knife/blade. The stalk length should preferably be kept 0.5-1 cm. long.
- **SORTING AND GRADING** – Diseased, damaged / bruised, shriveled and browned mushrooms are discarded and only the healthy white and tight buttons are selected and separated into two grades i.e. cap. Diameter up to 2.5 cm with compact head as A and cap. Diameter beyond 2.5 cm as B grade.
- **WASHING** – Graded mushrooms are thoroughly washed 3-4 times in cold running water to remove adhering dirt, soil etc. without damaging or rubbing them excessively.
- **BLANCHING** – To inhibit enzymatic activity, blanching is necessary. It also inactivates micro-organisms and removes the air from the raw materials to achieve a satisfactory and uniform pack. Mushrooms are blanched in boiling water for 203 minutes followed by immediate cooling in cold water. However, to reduce leaching losses, steam blanching is preferred because the leaching losses in boiling water had been estimated to be about 30 %.

- **FILLING OF CANS**– Mushrooms are commercially packed in two can sizes i.e. A-1 tall can A-2.5 A-1 tall cans are preferred by retailers while A-2.5 cans are liked by hoteliers, exporters and other establishments. The blanched mushrooms are filled into cans with declared drain weight i.e. 440 gms in A-2.5 can.
- **BRINING**- After filling the cans with mushrooms strained hot brine solution of 2 % common salt, 1 % sugar and 0.05% citric acid is added upto the brim of the can. Brining adds flavor to the product, reduces processing time and enhances the shelf life of canned mushrooms.
- **EXHAUSTING**- After brining cans are exhausted to remove any entrapped air and other accumulated gases from the product to ensure a longer shelf life.
Cans filled with brine solution are fed to the exhaust box for a specified period of time depending upon the length of exhaust tunnel and size of container. The shorter the tunnel, the longer will be the exhausting can also be performed by placing the filled cans in boiling water till temperature of the centre of can reaches 85 – 90c for 1-2 mts.
- **SEAMING / CAN CLOSING**- Immediately after exhausting, cans are sealed with the help of a double seamer to get hermetically sealed container. Sealed cans are then placed in upside down position to sterilize the closed lids.
- **PROCESSING / STERILIZATION**- Processing also designated as sterilization, is an indispensable unit operation in canning. This is accomplished by processing the hermetically sealed cans at a pressure of 15 lbs psi for a specified period of time depending upon the size of can and altitude of processing place. However, for areas like shimla, processing time for A-2.5 size cans is recommended to be 45 minutes.
- **COOLING**- Cooling of cans is done immediately after sterilization in cold running water to room temperature in order to give an abrupt shock to the micro-organisms to get rid of their adverse activities.
- **LABELLING AND STORAGE**- The cooled cans are stored in a cool dry place and smeared with grease to remove any adhering moisture from the can body to avoid rusting. Cans are kept at ambient temperature for 8-10 days to check any swell, leakage, puffing and other disorders before labeling.

Before the cans are exposed for sale, proper labeling is done to meet statutory requirements of fruit products order, 1955 Prevention of Food Adulteration Act, 1954 and packed commodities (Regulation) Act 1975.

Foods should be stored in the right way so that they do not become hazardous to health and their quality does not deteriorate.

There are two kinds of storages:

1. Dry Storage Rooms: (For Dry Ingredients)

Meant for non-perishable foods like cereals, pulses, legumes, sugars, spices, fats and oils, packaged and canned foods; and for semi – perishables like under ripe fruits and vegetables, potatoes and onions, bread and eggs. Temperature conditions – 20-25°C (room temperature). If the outside temperatures are too high, then the store temperatures have to be brought down by air cooling the store.

The storage should be dry cool well ventilated and free from infestation to maintain quality of food. Good ventilation will counteract the effort of humidity and high temperature.

- While most non-perishables can be stored together in a storeroom, some semi – perishables require separate ventilated storage facilities, slightly cooler than the rest of the store.
- Foods which need to be held only for 2-3 days require a temperature of 10- 15.5°C. Like breads, bakery products.
- If space allows, fats and oils should be stored away from the rest of the food.
- As far as possible, the non-perishables should be stored in air tight covered bins, cartons, polythene packs and cans.
- Transparent glass jars may be used for pulses and spices.
- Eggs may be kept in cardboard trays and cartons and consumed in 2-3 days.
- Cleaning supplies which include detergents, brushes, mops, and antiseptic solutions should be stored in separate section.
- Trash is always stored away from the store.

2. Low Temperature Storage:

The principle is to maintain temperatures at levels which will inhibit the growth of micro-organisms, and thus preserving food. Perishable foods have a high content of moisture, providing suitable humidity for microbes to thrive and for spoilage to occur.

They are two types:

1. Refrigerated Storage:

Temperatures between 0 – 10 deg. Celsius. This is necessary for perishables like milk and its products. All foods must be kept covered.

2. Freezer Storage:

Freezer storage may be in the form of a free standing cabinet or a separate cabinet in the refrigerator where the temperature is maintained from -20 to 0 deg. Celsius.

2.3 Vegetable Preservation

Vegetable preservation is the process of treating and handling food to stop or slow down spoilage, loss of quality, edibility or nutritional value and thus allow for longer storage. Preservation usually involves preventing the growth of bacteria, fungi (such as yeasts), and other micro-organisms as well as retarding the oxidation of fats which causes rancidity. Preservation can also

include processes which inhibit visual deterioration, such as the enzymatic browning reaction in apples after they are cut, which can occur after fruit cutting.



Many processes designed to preserve food will involve a number of preservation methods. Preserving fruit by turning it into jam, for example, involves boiling (to reduce the fruit's moisture content and to kill bacteria, yeasts, etc.), sugaring (to prevent their re-growth) and sealing within an airtight jar (to prevent recontamination). Maintaining or creating nutritional value, texture and flavor is an important aspect of fruit preservation.

2.3.1. Preservation methods

Quality Parameter:

There are several parameters which control the quality of end product, some of these important parameters are discussed below:

1. Appearance:

The most important attribute of any food's appearance is its color, especially when it is directly associated with other food-quality attributes. Other attributes include shape, surface profile and visible texture. Food presentation is just as essential to the success of a food product as its taste and flavour.

2. Taste:

The gustatory system or sense of taste is the sensory system that is partially responsible for the perception of taste (flavor). Taste is the perception produced or stimulated when a substance in the mouth reacts chemically with taste receptor cells located on taste buds in the oral cavity, mostly on the tongue.

The various food products have their unique tastes; any deviation from them will lead to deviation in the final dish, hence it's essential to maintain uniform taste in processed food products.

3. Nutritional Content:

Nutritional value or nutritive value as part of food quality is the measure of a well-balanced ratio of the essential nutrients carbohydrates, fat, protein, minerals, and vitamins in items of food or diet in relation to the nutrient requirements of their consumer.

Higher the nutritional content of a product, higher is its quality, as appropriate ingredients must have been added along with the base ingredient to elevate nutritional value.

4. Shelf Life:

Shelf life is the length of time that a commodity may be stored without becoming unfit for use, consumption, or sale. It comes into play after appearance, taste and nutrition, given a choice in products with same nutritional content and taste, one tends to opt for the product with more shelf life.

5. Packaging:

It also defines the quality of the product, apart from essentials like food grade packaging material, the type of process and technology further elevates the quality of product, for example anti-microbial packaging adds to product value thus quality.

- Protecting food from risk of contamination, i.e. preventing objectionable matter getting into food, including harmful bacteria, poisons, and foreign bodies.
- Preventing any bacteria present multiplying to a level which would result in the illness of consumers or the early spoilage of food.
- Destroying any harmful bacteria in the food by thorough cooking, processing or irradiation.
- Discarding unfit or contaminated food.

Hands should be washed thoroughly with plenty of soap and water – preferably rinsed in running water or water stored in clean covered containers with a tap fixed on them. If soap cakes are used, they should be kept dry. Liquid soap is more hygienic and economical to use. Hands must be thoroughly dried by using a roller towel, disposable paper, towels or a hot air dryer. Exposed wounds, cuts, burns can harbor bacteria. They need to be covered with a waterproof dressing. Pus formation, inflammation indicates infection. Such people should not be allowed to handle food for some time.

2.3.2. Importance of Preservatives in Mushroom Preservation

Always store the preserved food in a cool place, at a temperature below 20°C. Keep glass bottles and jars out of light. The storage area has to be dry and with a consistent temperature. Moisture will make tins rust.

- Frozen Fruits/Fruit Products: 1. Frozen Fruits/Fruit Products means the product frozen in blocks or individually quick frozen and offered for direct consumption, if required. Frozen Fruits/Fruit products are prepared from fresh, clean, sound, whole, fruits of suitable maturity, free from insect or fungal infection, which are washed, sufficiently blanched to inactivate

enzymes, if required, and are subjected to a freezing process in appropriate equipment. Freezing operation shall not be regarded as complete unless and until the product temperature has reached (minus) - 18°C at the thermal center after thermal stabilization. It may be prepared in any style appropriate for the respective Fruits/Fruit product in normal culinary preparation. It may contain salt, nutritive sweeteners, milk solids, spices and condiments and any other ingredient suitable to the product. 2. The product may contain food additives permitted in these regulations. The product shall conform to the microbiological requirements.

- It shall have normal colour characteristic of the individual Vegetable. It shall have taste & flavour characteristic of the kind & variety of the vegetable used & shall be free from sand, grit & other foreign matter.

2.4 Formulation of Canned Mushroom

- Harvested Fresh Mushroom- 95%
- Brine Solutions- 5%
- Packaging Materials



2.4.1 Flow chart for Canned Mushroom Processing



2.4.2 FPO Specification:

Fruit Products Order -1955, promulgated under Section 3 of the Essential Commodities Act - 1955, aims at regulating sanitary and hygienic conditions in manufacture of fruit, vegetable products. It is mandatory for all manufacturers of fruit, vegetable products to obtain a license

under this Order. To ensure good quality products, manufactured under hygienic conditions, the Fruit Product Order lays down the minimum requirements for:

1. Sanitary and hygienic conditions of premises, surrounding and personnel.
2. Water to be used for processing.
3. Machinery and equipment.
4. Product standards.

Besides this, maximum limits of preservatives, additives and contaminants have also been specified for various products. This order is implemented by Ministry of Food Processing Industries through the Directorate of Fruit & Vegetable Preservation at New Delhi. The Directorate has four regional offices located at Delhi. The Directorate has four regional offices located at Delhi, Mumbai, Calcutta and Chennai, as well as sub-offices at Lucknow and Guwahati. The officials of the Directorate undertake frequent inspections of the manufacturing units and draw random samples of products from the manufactures and markets which are analyzed in the laboratories to test their conformity with the specifications laid under FPO.

The Central Fruit Advisory Committee comprising of the officials of concerned Government Departments, Technical experts, representatives of Central food Technology Research Institute, Bureau of Indian standards, Fruits and Vegetable Products and processing Industry, is responsible for recommending amendments in the Fruit Product Order, In view of the demands of the industry, and the liberalized economic scenario, major amendments were made in FPO during 1997.

- **FOOD LAWS:**

- **Prevention of Food Adulteration Act (Ministry of Health)**
The Act lays down specifications for various food products and is mandatory. The Ministry of Health in 1995 had constituted a Task Force under the chairmanship of Shri E.S. Venkataramaiah, Chief Justice of India (retired). The Task Force recommended that there should be emphasis on good manufacturing practices instead of detection of adulteration and prosecution. It also expresses concern about lack of

laboratory equipments and quantified persons. In addition it also suggested that the name of PFA Act be changed to Food Safety Act.

- Agriculture Produce (Grading & Marking) Act (Ministry of Rural Development)
This Act is commonly known as AGMARK and is voluntary. The Act lays down the specifications for various agricultural commodities including some processed foods.
- Laws being operated by Bureau of Indian Standards (BIS)
BIS is the largest body for formulating standards for various food items. These standards are also voluntary.
- Essential Commodities Act- A number of quality control orders has been issued under Essential Commodities Act such as FPO, MMPO, Meat Product Order and Vegetable Oils Control Order. These orders are mandatory and primarily meant for regulating the hygienic conditions. They need to be clubbed under one order which may call Food Products Order.
- Harmonization of Food Laws- The review of multiple laws is necessary to have a uniform and logical approach for regulating the quality of food. The following action is being taken by various Ministries:-
 - The Ministry of Civil Supplies & Consumer Affairs has brought out a paper for consideration of Committee of Secretaries (COS). The paper recommends that BIS should formulate standards for all food items in the country. This will be a major step towards harmonization of food laws and is still under consideration of COS for finalization.
 - The Task Force constituted by the Prime Minister under the chairmanship of Shri N. L. Wadia has submitted its report which is under the consideration of the Government. The Task Force had advocated promotion of food safety and quality. The Task Force has further made following suggestions:-
 - Food Regulation Authority (FRA) is set up to formulate and update food standards for domestic and export market.
 - FRA should replace the PFA to conform to international standards. The Task Force has given ten specific recommendations such as provision of storage simplicitor, simplification of sampling procedure, simplification of procedure for nominee, time limit for prosecution, standard methods of analysis to be prescribed, penalty should

graded according to the gravity of offences and provision of adequate/infrastructure and laboratories.

- Harmonization of Indian standard with quality norms of Codex and WTO.

2.4.3 Equipments involved

1. Machine:

- Boiler: Boiler is steam generating device which simply produce stem from appropriate feed water utilizing appropriate heat generated using appropriate fuel.



- Vegetable and Fruit Washing Machine: its water washing class machine which utilizes water to clean the given product, they come in various arrangements and mechanism.



- Can Sterilizer: These are simply machine designed to sterilize contents of cans by utilizing appropriate temperature in order to prevent any microbial growth. There are to widely employed versions, Exhausting Conveyor type and Retort type sterilizers.



- Can Seamer: These machine simply seal the cans with lids in order to produce an air tight seal, for many canned foods vacuum seamer are preferred as they reduce possibility of entrapped air and thus microbial growth.



- Can Washing Machine: Can Washing Machine is used to wash the can in which canned food is to be stored and packed. Before packaging process takes place the cans or tins are washed in can washing machine.



- Can Filling Machine: As the name suggests this machine simply fills the can with the required product which is to be canned in appropriate quantity.



- **Blanching Machine:** This machine is basically a blanching tank attached to material handling equipments, heating arrangement and flow control equipments. It's essentially used for blanching process.



- **Mushroom Grading Machine:** This machine utilizes a rotating perforated drum to sort the mushrooms based on their sizes, the perforation diameter varies along the cylinder length to accomplish effective sorting and these sorted mushrooms are collected separately.



- **Canned Food Exhausting Machine:** This machine utilizes steam to heat and expand the food items, so as to expel the air and other gases present within the food item thus, creating a sort of partial vacuum, which in turn increases its shelf life.

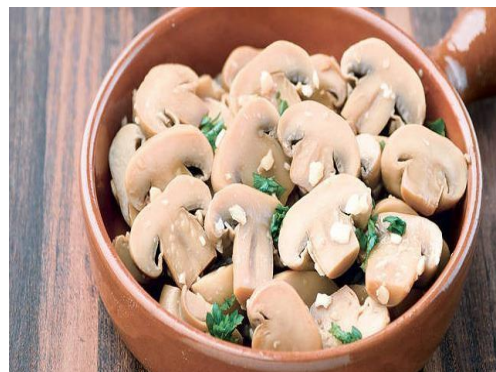


CHAPTER 3

PACKAGING OF CANNED MUSHROOM

3.1 Characteristics of Canned Mushroom

Canned mushrooms refers to the product prepared from the sound, succulent, fresh mushroom by proper trimming, washing, and sorting and is packed with the addition of water in hermetically sealed containers and sufficiently processed by heat to assure preservation of the product.



3.1.1. The factors that lead to spoilage/defects in Canned Mushrooms are highlighted as below:

- (a) Blemishes - Scars, discoloration, sunburn, dark spots, black nose or similar abnormalities in surface appearance affecting an aggregate area greater than that of a circle 7 mm in diameter.
- (b) Damaged- (Un-pitted mushrooms only) - affected by mashing and/or tearing of the flesh exposing the pit or to such an extent that it significantly detracts from the visual appearance of the mushroom.
- (c) Dirt - Having embedded organic or inorganic material similar to dirt or sand in character and affecting an aggregate area greater than that of a circle 3 mm in diameter.
- (d) Insects and mites- Mushrooms damaged by insects or mites or contaminated by damage and contamination the presence of dead insects or mites, fragments of insects or mites or their excreta.
- (f) Scouring- Breakdown of the sugars into alcohol and acetic acid by yeasts and bacteria.
- (h) Mould- Presence of mould filaments visible to the naked eye.

3.1.2. General criteria of Packaging Material

Factors to consider include product damage, fines, stickiness, bag opening size, re-closure among other things. In selection of packaging materials for Mushroom the following need to be considered:

3.1.3. Water Vapour Transmission Rate (WVTR)

Knowledge of WVTR of packaging materials and the effect of folding, creasing, crumpling of materials on papers and aluminum foil show considerable effect. However, thermoplastic materials are not much affected.

	WVTR, g/m ² , 24 hr. 38°C & 90% RH.			
	Flat	Folded	Crumpled	Gelboflex
Met PET (12μ)	0.9	1.7	3.4	18
Met PET / LDPE (50μ)	0.5	0.6	0.7	0.6
2-sides PVDC coated PET	4.2	3.7	5.9	4.8
2-sides PVDC coated PET/LDPE	2.9	3.6	3.3	3.1

Effect of Folding and Crumpling on the WVTR

3.1.4. Gas Transmission Rate

Permeability to gases like oxygen decides the shelf-life of oxygen sensitive fruit items. The oxygen transmission rates (OTR) of some plastic materials and the effect of folding and crumpling.

Effect of Folding and Crumpling on the OTR

	Oxygen transmission rate, ml /m ² , 24 hr. Atm. at 25°C.			
	Flat	Folded	Crumpled	Gelboflex
Met PET (12μ)	< 1	5.5	16	59
Met PET / LDPE (50μ)	< 1	< 1	2	3.5
2-sides PVDC coated PET	6	6	8	7
2-sides PVDC coated PET/LDPE	7	7	9	11

Besides OTR, permeability to volatiles and flavours is important in candies packaging. Polyolefins have high values, whereas plastics such as polyester, nylons, ethylene vinyl alcohol (EVOH) have good barrier properties for transmission of volatiles. The odour permeability's (for volatiles used in candies) of some materials.

Odour Transmission of Packaging Materials

Packaging Material	Thickness (μ)	Days to Aroma Leakage			
		Vanillin	Menthol	Piperonal	Camphor
BOPP / PE	17/50	6	2	1	13
PET / PE	12/50	2	16	5	< 30
PET / EVOH	12/15	< 30	< 30	30	< 30
OPP / EVOH / PE	18/15/50	30	< 30	27	< 30
PET / EVOH / PE	12/15/50	15	25	27	< 30

3.1.5. Tensile Strength & Elongation

Tensile Strength and Elongation properties of materials need to be studied as their running on high-speed machines should be suitable.

3.1.6. Tear Strength

For a fruit processed product, tear strength is of importance as low tear values are necessary and useful for opening packages by hands.

3.1.7. Heat Seal Strength

The performance of a finished package is determined by the effectiveness of the package seal i.e. the permeability to water vapor, gases and volatiles increase if the seal is not perfect. Thermoplastic films such as polyethylene give excellent heat seals.

3.1.8. Performance Properties

Apart from the above mentioned important properties, a material has to perform well on machines; therefore knowledge of physical properties like slip, stiffness, blocking resistance is also necessary.

Twist retention for twist wrap is also of importance. The initial function of packaging is to protect. However, the emotional role played by packaging is also of importance, especially when

the confection is a gift. A sophisticated packaging using deluxe materials is often used as a way of expressing feelings.

Packaging must also be specialized for specific target groups. A different pack size is required for quick impulse buys at petrol stations and roadside shops than for the super markets selling predominantly family sized packs.

3.2 Packaging Materials used for Mushroom

The different packaging materials used were, polythene, polypropylene, lug bottles, laminated pouches, PVC wrapped trays, plastic jars and tin cans. The suitability and adoptability of these packaging materials were studied in terms of keeping quality during the storage period and are given in the Table. It is inferred that different products required different type of packaging materials.

Name of the packaging material	Mushroom Product	Storage Period
Polythene bag	• Dried Mushroom • Mushroom Powder	• 2 Months • 2 Months
Polypropylene	• Mushroom Candy • Mushroom Soup Powder • Mushroom Powder • Dried Mushroom • Mushroom Chips	• 6 Months • 6 Months • 6 Months • 3 Months • 3 Months
Lug bottles	Mushroom Pickles	1 Year
PET jar	• Mushroom • biscuits Mushroom Candy	• 3 months • 6 months
PVC wrapped trays	Mushroom Nuggets	1 month
Laminated pouches	Mushroom curry	1 year

Tin Cans	Canned Mushroom	1 year
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Suitability of packaging materials for mushroom products

➤ Polyethylene (PE)

It is considered to be the backbone of packaging films. Since one of the greatest threats to the integrity of candies products comes from moisture, polyethylene with its low water vapour transmission is of definite interest. Polyethylene films are fairly free of plasticizers and other additives and are quite extensively used as a part of lamination. Its ability to heat seal increases its value.

Low Density Polyethylene (LDPE) is an economical material with low WVTR, however, it has high permeabilities to flavours/volatiles, poor grease resistance and are limp. High-density polyethylene (HDPE) is stiffer, more translucent and has better barrier properties but needs higher temperature for sealing.

Later additions include high molecular weight high-density polyethylene (HM HDPE) and linear low-density polyethylene (LLDPE). HM HDPE is a paper like film with high physical strength and barrier properties, but is less transparent than ordinary polyethylene. HM HDPE is available in twist-wrap grades. Polyethylene films are also suitable for making bags and pouches. A copolymer of polyethylene and poly vinyl alcohol, and EVOH has outstanding gas barrier properties especially when dry.

➤ Polypropylene

Polypropylene films are undergoing a growth trend in the candies industry. They have better clarity than polyethylene and enjoy superior machine ability due to stiffness. Lack of good seal ability has been a problem; however, PVDC and vinyl coating have been used to overcome this problem. Some varieties of PP have been specially developed for twist-wrap applications as they have the ability to lock in position after twisting. Pearlsed polypropylene with an opal finish and attractive gloss is also used. Both as laminates and overwraps, PP film is now widely used for all types of candies packaging applications.

➤ Poly Vinyl Chloride (PVC)

PVC is a stiff and clear film having low gas transmission rate. PVC can be used as small wraps, bags and pouches. PVC when co-polymerised with polyvinylidene chloride is known as Saran. Since it is a costly material, it is only used as a coating to obtain barrier properties and heat sealability. PVC film is also used for twist wraps, as it has twist retention properties and is excellent on high-speed machines.

➤ **Polyesters (PET) and Polyamide (PA)**

Polyethylene terephthalate film has high tensile strength, gloss and stiffness as well as puncture resistance. It has moderate WVTR, but is a good barrier to volatiles and gases. To provide heat seal property, PET is normally laminated to other substrates. Nylons or polyamides are similar to PET, but have high WVTR.

➤ **Metallised Films**

When polymeric films are metallised there is an improvement in their barrier properties. Metallisation is also used for decorative purposes and aesthetics. The films, which are used for metallisation are PVC, PET, PP and polyamides. To safeguard the interest of the consumer the Standards of Weights & Measures (Packaged Commodities) Rules, have imposed a limit on the weight of the wrapper. Under this, it is essential that in the case of twist wrap and pillow wrap candies, where the weight of the individual pieces is less than 10 grams, the size of the wrapper and the type of wrapping material selected is such that it meets the limit on weight of wrapper, under the above rules.

3.2.1 Types of Packages

- **Glass Bottle-** Gradually packed in glass bottles under different brand names appeared in the market, and became popular. The trend started in Maharashtra and Gujarat. They looked hygienic and appealed to the brand conscious upper class.
- **Tin cans-** Steel Cans are Among the Safest Forms of Food Packaging: Steel cans are strong, tamper resistant and feature an airtight seal to help guard against food borne illness and contamination. In addition, steel cans are the most recycled food package.

3.3 Methods for packaging of Canned Mushrooms

The canning process itself consists of several stages: cleaning and further preparing the raw food material; blanching it; filling the containers, usually under a vacuum; closing and sealing the containers; sterilizing the canned products; and labeling and warehousing the finished goods.

- Cleaning usually involves passing the raw food through tanks of water or under high-pressure water sprays, after which vegetable or other products are cut, peeled, cored, sliced, graded, soaked, pureed, and so on.
- Almost all vegetables and some fruits require blanching by immersion in hot water or steam; this process softens the vegetable tissues and makes them pliable enough to be packed tightly, while also serving to inactivate enzymes that can cause undesirable changes in the food before canning. Blanching also serves as an additional or final cleansing operation.
- The filling of cans is done automatically by machines; cans are filled with solid contents and, in many cases, with an accompanying liquid (often brine or syrup) in order to replace as much of the air in the can as possible.
- The filled cans are then passed through a hot-water or steam bath in an exhaust box; this heating expands the food and drives out the remaining air; thus, after sealing, heat sterilizing, and cooling the can, the contraction of the contents produces a partial vacuum within the container.
- Certain products are vacuum-packed, whereby the cans are mechanically exhausted by specially designed vacuum-can sealing machines.
- Immediately after the cans are exhausted, they are closed and sealed; a machine places the cover on the can, and the curl on the can cover and the flange on the can body are rolled into position and then flattened together. The thin layer of sealing compound originally present in the rim of the cover is dispersed between the layers of metal to ensure a hermetic seal.
- The sealed cans are then sterilized; i.e., they are heated at temperatures high enough and for a long enough time to destroy all microorganisms (bacteria, molds, yeasts) that might still be present in the food contents. The heating is done in high-pressure steam kettles, or

cookers, usually using temperatures around 240° F (116° C). The cans are then cooled in cold water or air, after which they are labeled.

Note: This is generalized canning process, there can be several variations and additions depending on the product but the fundamental process remains same.

3.3.1 Quality considerations during packing

Classification of Canned Foods:

There are three basic classification of canned foods based on their acidity, they are classified as low acid canned food, acidified canned food and high acid canned food.

1. Low Acid Canned Food (LACF):

A low-acid canned food (LACF) is any food (other than alcoholic beverages) with a finished equilibrium pH greater than 4.6 and a water activity greater than 0.85, excluding tomatoes and tomato products having a finished equilibrium pH less than 4.7. They include red meats, seafood, poultry, milk, and all fresh vegetables except for most tomatoes.

2. Acidified Canned Food (ACF):

Acid foods have a pH of 4.6 or lower. They include fruits, pickles, sauerkraut, jams, jellies, marmalades, and fruit butters. Although tomatoes usually are considered an acid food, some are now known to have pH values slightly above 4.6.

3. High Acid Canned Food (HACF):

The high-acid foods include jams and jellies, pickles, and most fruits. Because there is no fear of *Clostridium botulinum* growth, these foods require much less heating than low-acid foods. To be safe, such foods need only to reach pasteurization temperatures. For foods with a pH value of 3.5 or less, 175°F (79.5°C) is a sufficient pasteurization temperature.

3.4 Future Trends

The emergence of new and innovative products and the growing consumer demand are driving the canned food market growth. To stay competitive in the market and to meet the changing consumer demands, new products are being launched by players. New product launches help vendors increase their sales and market share. Vendors try to attract customers by introducing new canned food variants.

Moreover, the rising need for convenience in terms of food consumption will also drive market growth. The busy lifestyles of millennials have increased the need for convenient and canned foods. The airtight, sealed metal containers raise the shelf life and help in preserving the nutrition of food products. Canned food products are also consumed by health-conscious consumers, who look for food products that are nutritious. The taste and quality of food products are conserved against many conditions through the use of metal containers, right from manufacturing to distribution outlets. Moreover, steel cans are effective in protecting the canned contents from spoilage due to light. Also, the requirement for convenience, such as for single-serving containers of canned food, has given rise to the availability of a wide array of canned food products in the market.

CHAPTER 4

FOOD SAFETY REGULATIONS AND STANDARDS OF CANNED MUSHROOM

4.1 Standards

The specifications of Fruit Products Order, 1955 and Prevention of Food Adulteration Act, 1954 certification are mandatory. The canned mushrooms should conform to the specifications laid down in F.P.O 1955. The ISO 9000-2000, HACCP, ISO-14000 Series and European norms series standards promise a frame work which may guide the entrepreneurs towards fulfillment of a commitment of quality of products.

Thermally Processed Vegetables (Canned, Bottled/Flexible pack / Aseptically Packed) means the product obtained from fresh, dehydrated or frozen vegetables either singly or in combination with other vegetables, peeled or un-peeled, with or without the addition of water, common salt and nutritive sweeteners, spices and condiments or any other ingredients suitable to the product, packed with any suitable packing medium appropriate to the product processed by heat, in an appropriate manner, before or after being sealed in a container so as to prevent spoilage.

- The packing medium along with its strength shall be declared on the label. The product may be prepared in any suitable style appropriate to the product. The product may contain food additives permitted in these Regulations. The name of the vegetables used in the product and prepared in any style shall be declared on the label along with the range of percentage of each vegetable used in the product. Drained weight of vegetables shall be not less than the weight given below:—

(i) Liquid Pack

(a) Mushroom 50.0 percent of net weight of contents

(b) Green beans, carrots, peas, sweet corn/ baby corn 50.0 percent of net weight of contents

(c) Mushroom Packed in sauce 25.0 percent of net weight of content.

4.1.1. Canned Processing of Vegetable

The shelf life of food stored depends on these 4 main criteria:

1. Temperature:

Foods stored at room temperature or cooler (75°F/24°C or lower) will be nutritious and edible much longer than previously thought according to findings of recent scientific studies. Foods stored at 50°F to 60°F (which is optimal) will last longer than foods stored at higher temperatures. Heat absolutely destroys food and its nutritional value. Proteins break down and some vitamins will be destroyed. Taste, color, and smell of some foods may also change.

2. Moisture:

The reason long term food storage is dehydrated or freeze dried is to eliminate moisture. Too much moisture promotes an atmosphere where microorganisms can grow and chemical reaction in foods causing deterioration that ultimately can sicken us.

3. Oxygen:

Too much oxygen can deteriorate foods and promote the growth of microorganisms, especially in fats, vitamins, and food colors. That is the reason to use oxygen absorbers when dry packing your own food products.

4. Light:

Exposure to too much light can cause deterioration of foods. In particular it affects food colors, vitamin loss, fats and oils, and proteins. Keep long term food storage in low light areas for longest shelf life.

Most expiration foods in cans range from 1 to 4 years but keep the food in a cool, dark place and the cans undented and in good condition, and you can likely safely double that shelf life from 3 to up to 6 years. It shall also conform to the following standards.

4.2 Food Safety

Part I - General Hygienic and Sanitary practices to be followed by Petty Food Business Operators applying for Registration

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 Standards

Labeling requirements for packaged food products as laid down in the Part VII of the Prevention of Food Adulteration (PFA) Rules, 1955, and the Standards of Weights and Measures (Packaged Commodities) Rules of 1977, require that the labels contain the following information:

1. Name, trade name or description
2. Name of ingredients used in the product in descending order of their composition by weight or volume
3. Name and complete address of manufacturer/packer, importer, country of origin of the imported food (if the food article is manufactured outside India, but packed in India)
4. Nutritional Information
5. Information Relating to Food Additives, Colors and Flavors
6. Instructions for Use
7. Veg or Non-Veg Symbol
8. Net weight, number or volume of contents
9. Distinctive batch, lot or code number
10. Month and year of manufacture and packaging
11. Month and year by which the product is best consumed
12. Maximum retail price

4.3.1 Wherever applicable, the product label also must contain the following

The purpose of irradiation and license number in case of irradiated food. Extraneous addition of coloring material. Non-vegetarian food – any food which contains whole or part of any animal including birds, fresh water or marine animals, eggs or product of any animal origin as an ingredient, not including milk or milk products – must have a symbol of a brown color-filled circle inside a brown square outline prominently displayed on the package, contrasting against the background on the display label in close proximity to the name or brand name of the food.

Vegetarian food must have a similar symbol of green color-filled circle inside a square with a green outline prominently displayed.

All declarations may be: Printed in English or Hindi on a label securely affixed to the package, or Made on an additional wrapper containing the imported package, or Printed on the package itself, or May be made on a card or tape affixed firmly to the package and bearing the required information prior to customs clearance.

Exporters should review the Chapter 2 of the “FSS (Packaging and Labeling) Regulation 2011” and the Compendium of Food Safety and Standards (Packaging and Labeling) Regulation before designing labels for products to be exported to India. FSSAI revised the labeling Regulation and a draft notification to that effect was published on April 11, 2018, inviting comments from WTO member countries and the comments received are under review and the publication date remains unknown.

According to the FSS Packaging and Labeling Regulation 2011, “prepackaged” or “pre packed food” including multi-piece packages, should carry mandatory information on the label.



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