



PM Formalisation of Micro Food Processing Enterprises Scheme

Processing of Khachai Lemon Pickle



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CHAPTER 1

1.1 Introduction

Pickling is one of the oldest and most successful methods of food preservation known to humans. It is difficult to suggest a date for production of the first pickled foods, but it is known that both vinegar and spices were being used during biblical times. Pickles of various kinds are known throughout India and many parts of the world. They are good appetizers and add to the palatability of a meal. Fermentation of plant and animal foods was known to the early Egyptians, and fish were preserved by brining in prehistoric times. By the third century BC, Chinese labourers were recorded to be consuming acid-fermented vegetables while working on the Great Wall. The Koreans created *kimchi* from acid-fermented Chinese cabbage, radish, and other ingredients centuries ago. Corn, cassava and sorghum were fermented and became staples of the African diet. In the west, acid fermentation of cabbage and cucumbers produced sauerkraut and pickles, which are still popular today. Early explorers carried kegs of sauerkraut and pickles that prevented scurvy on their voyages. Pickles from India or *achaar* are unique because these are mixed with spices that only India produces. Some common Indian spices include cumin, mustard seeds, fenugreek, turmeric, coriander, etc. Some of the typical Indian pickles made from mango (*aam ka achaar*), lime (*nimbu ka achaar*), turnip, cabbage, cauliflower, etc. have become popular in several countries.

1.2 Principle of Pickling

There are mainly two methods of preserving fruits and vegetables namely

- (i) by killing all the microorganisms responsible for spoilage, by heat or other means and then checking the entry of fresh microorganisms into the preserved product, and
- (ii) by making the conditions most unfavourable for the growth and multiplication of microorganisms. The first method is generally employed in the preservation of fruits and vegetables for making fruit juices, fruit powders, etc. and the second method in the preparation of pickles. The process of preservation of food in common salt or vinegar is called as pickling. Spices and edible oils also may be added to the product. Salt, vinegar, lactic acid and oil are the important ingredients used in pickle production. These substances when used in sufficient quantities, act as preservatives

either singly or in combination. The preservative action of these substances are given below:

Salt

Vegetables do not ferment when they are covered with strong brine or packed with a fairly large quantity of salt. Spoilage is prevented by adding sufficient common salt, bringing its final concentration in the material from 15 to 20 percent. At this high salt concentration, mould and even lactic acid-forming bacteria do not grow. This method of preservation is only applicable to vegetables which contain very little sugar because sufficient lactic acid cannot be formed by fermentation to act as preservative.

Vinegar

In vinegar pickles, vinegar acts as a preservative. In order to ensure satisfactory results, the final concentration of acid as acetic acid, in the finished product should not be less than 2 percent. To avoid dilution of the vinegar by the water liberated from the tissues, the vegetables are generally placed in strong vinegar of about 10 percent acidity for several days before final packing. This treatment also helps to expel the gases present in the intercellular spaces of the vegetable tissue.

Lactic acid

Bacteria prefer for their growth media with little or no acid. The lactic acid bacteria, however, can grow in acid media and can also produce acid through their action on the substrate. They can grow in the presence of 8 - 10 percent salt. The growth of undesirable organisms is inhibited by adding salt while allowing the lactic fermentation to proceed. In fermented pickles, microorganisms ferment sugars to lactic acid. When vegetables are placed in brine, the soluble material present in them diffuses into the salt water owing to osmosis and the liquid penetrates into the tissues. The soluble material, besides containing mineral matter, contains fermentable sugars. These sugars serve as food for lactic acid bacteria, which convert them into lactic and other volatile acids.

Oil

In oil-based pickles, fruits or vegetables are completely immersed in the edible oil. It acts as a barrier for air and creates an anaerobic condition which is utilized by the native bacteria for the production of lactic acid. Oil prevents growth of spoilage yeasts and moulds. Generally mustard oil is used.

1.3 Classification of Pickles

Depending on the method of preparation, pickles can be classified into three types such as pickles in vinegar, pickles in citrus juice or brine and pickles in oil. Fruit pickles are generally preserved in sweetened and spiced vinegar, while vegetable pickles are preserved in salt.

Pickles in vinegar

These are most important pickles in the world.

Pickles in citrus juice or brine

Steeping of the vegetable in a salt solution of pre-determined concentration for a certain length of time is called brining. Vegetables which do not contain sufficient water are better fermented by covering them with a weak brine solution. Alternately, dry salt is also used for vegetables which contain sufficient water content. It involves packing vegetables with a small quantity of dry salt (about 2-3 kg for every 100 kg) without adding water. Salt extracts the water from the vegetables owing to osmosis and forms the brine. The sugars present in the vegetables are extracted into the water and are fermented by the lactic-acid forming bacteria which are naturally present in great numbers on the surface of the fresh material. After certain time, enough lactic acid is formed to kill the bacteria and prevent any further change in the material, provided certain precautions are taken to prevent the growth of moulds. The lactic acid permeates to the fermented vegetables and gives characteristic flavour. It is the same acid which is present in sour milk and it is digested and utilized by the body as a source of energy. *Leuconostoc mesenteroides* was identified as one of the most important microorganisms for initiation of vegetable fermentation.

Pickles in oil

These are pickles containing some edible oil and are highly popular in India. Usually oil pickles are highly spiced. Cauliflower, lime, mango, turnip pickles, etc are prepared in this

manner. The method of preparation of some of the oil pickles vary in different parts of the country. In north India, rapeseed or mustard oil is commonly used, but in south, gingelly (sesame) or groundnut oil is preferred.

Desired Quality of Ingredients Used in Pickling

Raw materials used in pickling should possess certain definite characteristics for achieving a wholesome pickle. The desired qualities of ingredients used in pickling are given as follows:

Salt

In general, pure common salt is generally preferred for pickling. It should not contain more than 1.0% percent of impurities, should not contain chemicals like tricalcium phosphate or magnesium phosphate which are generally added to salt as anticaking agents. Salt should be free from lime (calcium oxide), as it reduces the acidity of the vinegar in which brine vegetables are pickled and also causes lime deposits of the bottom of the container. Salt should be free from iron, which in contact with the tannin of the fruit, vegetable and spice produces blackening of the pickle. It should not contain magnesium salts which impart a bitter taste to the pickle.

Vinegar

Vinegar of good quality should contain at least 4 percent acetic acid. Usually malt or cider vinegar is used. Vinegars of low acid content or imitation or synthetic vinegars are not suitable for pickling. Vinegar should not come in contact with iron as it leads to blackening of the pickle.

Oil

Good quality oil free from rancidity or oxidation is preferred. Vegetable oil is added to the pickle. It is often mixed with the spices to make a paste. Oil is also poured onto the top of pickles to form a barrier against oxygen. Top quality vegetable oil should be used.

Sugar

Sugar used in the preparation of sweet pickles should be of high quality.

Spices

Spices are added practically to all pickles, the quantity added depending upon the kind of fruit or vegetable taken and the kind of flavour desired. The spices generally used are bay leaves, cardamom, chillies, cinnamon, clove, coriander, ginger, mustard, black pepper, cumin, turmeric, garlic, mint, fennel, etc. These should be of good quality and should be stored in tin cans in a cool and dry place.

Spices used should be good quality, clean and free of mould and insects. They are either roasted or fried before adding to the pickle mixture. The amount and type of spices added depends on personal taste.

Water

Only potable water should be used for the preparation of brine. Hard water contains salts of calcium, sodium, magnesium, etc. which interfere with the normal salt-curing of the vegetable. If hard water is to be used, a small quantity of vinegar should be added to brine to neutralize its alkalinity. Iron should not be present in the water in any appreciable quantity as it causes the blackening of the pickle.

Legal Definition and Specifications

In India, the Food Safety and Standards (FSS) Rules (2006) defines pickles as preparation made from fruits and vegetables or other edible plant material including mushrooms free from insect damaged or fungal infection, singly or in combination preserved in salt, acid, sugar or any combination of the three. The pickle may contain onion, garlic, ginger, sugar, jaggery, edible vegetable oil, green or red chillies, spices, spice extracts/oil, lime juice, vinegar/acetic acid, citric acid, dry fruits and nuts. It shall be free from copper, mineral acid, alum, synthetic colours and shall show no sign of fermentation. Pickles may be of following combinations conforming to the requirements as given below:

Spoilage of Pickles

Different kinds of spoilages occur in pickles. Some of them irrespective of the type of the pickle are briefly described as follows:

Shrivelling

Shrivelling occurs when vegetables like cucumber are placed directly in a very strong solution of salt, sugar or vinegar. Use of weak solutions to start with and later gradually increasing their strength avoids such defect.

Bitter taste

Bitter taste in the pickle may result from use of strong vinegar or prolonged cooking of spices or addition of excess amounts of spices.

Blackening

Blackening defect in pickles may result from use of iron knives for cutting the fruits and vegetables and use of iron containers for processing. Further, it may also result from growth of specific molds that cause blackening.

Dull or faded products

Pickles become dull and faded either due to use of inferior raw material or due to insufficient curing.

Softness and slipperiness

This is a most common defect and results due to the action of bacteria. Insufficient covering with brine or use of weak brine or insufficient covering with oil are invariable causes for this defect. By using a brine of proper strength and by keeping the pickle well below the surface of the brine or oil, this kind of spoilage can be eliminated.

Scum formation

When vegetables are placed in the brine for curing, a white scum is invariably formed on the surface due to the growth of wild yeast. This scum retards the formation of lactic acid and helps the growth of putrefactive bacteria that causes the vegetables to become soft and slippery. Hence, it is essential to remove the scum as soon as it is formed. Addition of about 1% acetic acid helps to prevent the growth of wild yeast in the brine, without hindering the formation of lactic acid.

Cloudiness

This defect is usually found in case of onion and some other vegetables and occurs when vinegar become cloudy and turbid, thereby spoiling the appearance of the pack. This could be due to microbial activity or due to the use of inferior quality or possible chemical action between vinegar and impurities such as calcium, magnesium and iron compounds.

1.4 Factors that affect fermentation

Fermentation is affected by several factors including the temperature, salt concentration, pH, oxygen availability and nutrient availability. The rate of fermentation can be controlled by manipulating any of these factors.

A.-Temperature

Different bacteria tolerate different temperatures. Most have an optimum of between 20-30°C although some prefer higher temperatures (50-55°C) and others colder (15-20°C). Most lactic acid bacteria work best at temperatures of 18-22°C. The *Leuconostoc* species which initiate fermentation have an optimum of 18-22°C. The *Lactobacillus* species have temperature optima above 22°C. The optimum temperature for pickle fermentation is around 21°C. A variation of just a few degrees from this temperature alters the activity of the microbes and affects the quality of the final product.

B.-Salt concentration

Lactic acid bacteria tolerate high salt concentrations, which gives them an advantage over other less tolerant species. This allows the lactic acid fermenters to begin metabolism, which produces acid, which then further inhibits the growth of non-desirable organisms. *Leuconostoc* species tolerate high salt concentrations, which makes them ideal to start the lactic acid fermentation.

Salt plays an important role in initiating the fermentation and also in the quality of the product. The addition of too much salt may inhibit the desirable bacteria and also affect the hardness of the product. The principle function of salt is to withdraw juice from the vegetables

and make a favourable environment for fermentation. Salt is generally added to give a final concentration of 2.0-2.5%. At this concentration the Lactobacilli are slightly inhibited but the Leuconostoc are not affected.

C.-pH

The optimum pH for most bacteria is near the neutral point (pH 7.0). Certain bacteria are acid tolerant and will survive at reduced pH levels. Both Lactobacillus and Streptococcus species are acid tolerant.

D.-Oxygen availability

Some of the fermenters are anaerobes while others require oxygen. Some of the lactobacilli are microaerophilic which means they grow in the presence of reduced amounts of oxygen.

E.-Nutrients.

All bacteria require a source of nutrients for metabolism. The fermenters require carbohydrates, either simple sugars such as glucose and fructose or complex ones such as starch or cellulose. The energy requirements of microbes are very high. Limiting the amount of substrate available can reduce the rate of fermentation.

Requirements

Raw materials, equipment and apparatus

- Fruit/vegetable, sugar
- Peeler
- Juicer
- Pulper
- Filter cloth / sieve
- Pans of suitable size
- Heaters
- Thermometer
- Crown corking / capping machine
- Corks / caps
- Volumetric flask
- Measuring cylinder
- Weighing balance

- Potable water

Chemicals and reagents

1. Hydrochloric acid
2. Citric acid / ascorbic acid
3. Potassium metabisulphite
4. Sodium benzoate

Other Equipment

Utensils

Do not use zinc, copper, brass, galvanized metal, or iron utensils. These metals may react with acid or salt and affect the quality (color changes) and safety of pickles.

Jars

Processing times are based on standard-sized, Mason-type jars designed for home canning use. Inspect jars for cracks and chips, and discard damaged ones.

Lids

Two-piece, metal canning lids and screw bands are recommended. Follow the manufacturer's instructions for preparing the lids. To prevent sealing failures, do not reuse lids. Wash the screw bands and discard any with dents or rust.

Boiling Water Canner

These canners, made of aluminum or porcelain-covered steel, have removable baskets and fitted lids. Any large container may be used if it has room for at least 1 inch of water to briskly boil over the tops of jars during processing. Place a metal rack in the bottom of the container to keep the jars from resting directly on the bottom, which can cause breakage.

1.5 Suitability for small-scale production

Pickles are fairly safe products for small-scale manufacturers to make. When preserved properly they carry a low risk of food poisoning and have a long shelf life. Pickles can be made using relatively simple equipment that is readily available in most places. Pickles can be prepared from a variety of fruits and vegetables depending on what is available. By varying the

proportions of fruit and vegetables and the amount of spice added, a range of products can easily be made.

Constraints to production

Many small-scale processors choose to make pickle as it is relatively easy. There may be a high level of competition. The conditions for fermentation (temperature, pH and salt content) need to be closely monitored to ensure a good product. The availability of acetic acid may be a problem in some areas. It is essential that a survey is carried out to determine the potential market for the product before starting on production. A successful business depends on a good market for the product. Too often, small-scale processors decide to make pickles because there is an abundant supply of raw material, with no evaluation of the demand for the product. These type of ventures usually fail.

CHAPTER 2

2.1 Kachai Lemon (*Citrus jambheri* Lush.)

Kachai Lemon (*Citrus jambheri* Lush.) of Manipur is an exotic horticultural fruit from Northeast India which has been accorded Geographical Indication (GI) registration tag. Popularly known as Kachai Champra (Lemon), it is widely grown in the Kachai village in Ukhrul District, Manipur. Unlike the other lemon varieties grown in other part of world, Kachai Lemon is considered to be unique as it contains 45-51 mg/100 ml ascorbic acid, the highest so far available in the realm of citrus while other lemon varieties have only 45-51 ascorbic acid mg/100 ml of juice. The juice content is 36-56 ml per fruit. The fruit bearing plans of Kachai Lemon look like flowering trees during harvesting time.

Uses and Processing Opportunities

Kachai Lemon is a high yielding landrace with high economic value. It is consumed as fresh fruit and also used for making juice and pickles. The best ways of consumption are as fresh fruit or fresh squeezed juice. Citrus fruits are well known for their vitamin C content and are also good sources of vitamin A, folic acid and dietary fibre. Fresh citrus fruits can be stored for several days at room temperature or for several weeks in the refrigerator. Fresh- squeezed juice should be stored in the refrigerator and is stable at refrigerator temperature for several weeks from a

nutritional stand point. Different value added products can be prepared from Kachai Lemon. The major products are juice, squash, RTS beverage and pickle. ICAR Research Complex for NEH Region, Manipur Centre has standardized a commercially viable technology of converting Kachai Lemon juice into powder. In addition, ascorbic acid and pectin can be extracted from juice and peel respectively.

Parameters

Fruit Weight	: 60-100 g
Fruit Length	: 44-55 mm
Fruit breath	: 40-59 mm
Rind thickness	: 1.9-3.5 mm
Fruit shape	: Spheroid
Fruit Colour	: Yellow to Orange Yellow
Juice / Fruit	: 40-57%
Seed / Fruit	: 7-19
TSS	: 6.8-10.5 brix
Acidity	: 4.1-6.1%
Ph	: 2.84-2.90
Ascorbic acid	: 45-51 mg /100 ml juice

2.2 Processing of Kachai Lime Pickle

Good quality lime are selected for making lime pickle and washed thoroughly before use. The cleaned lime fruits are sliced and cut into four pieces. About one-fourth of the cut lime fruit pieces are squeezed to extract juice. Later, the remaining lime pieces are mixed with selected spices, salt and extracted lime juice. Spices such as turmeric, red chilli powder, cardamom, cumin, aniseed, black pepper, etc. are used. The mixture is filled into clean glass or glazed jars kept usually in sunlight for about a week. During this period the useful biochemical changes takes places. At the end of one week, selected edible oil which is previously heated and cooled is mixed with the mixture and stored.

Method 1: Ingredients for making Kachai Lime pickle

Place of origin/usage: Manipur.

Nature of food: Vegetable based.

Time of consumption: Dietary supplement.

Usual composition/ingredients: Kachai Lime 1.5kg, salt 375g, coriander seeds 12g, cumin seeds 9g, fenugreek seeds 15g, red chilly powder 12g and turmeric powder 2 g.

Method of preparation: Fully ripe lime were selected and washed well and cut into 4 slits. Coriander, fenugreek and cumin seeds were roasted and powdered. Salt, red chilli powder, turmeric and roasted spice powder were added to the like pieces and pickle was placed in pet jar and allowed to cure for one week.

Procedure

1. Select ripe but not over-ripe limes with dark yellow skins and no sign of bruising or mould growth.
2. Wash the limes in clean water and dip in hot water (60-65°C) for about 5 minutes to soften the skin.
3. Cut each lime into four pieces and dip into a saturated salt solution for 20-30 minutes. Alternatively, pack the limes and salt in layers (1kg salt per 5kg limes) in a sealed jar, ensuring that the surface is covered with juice. Ferment the packed limes for 24 hours. It may be necessary to press the fruits down to hold them under the surface of the liquid.
4. Dry in the sun for 2-3 days. Sometimes salt crystals are sprinkled on the limes while they are drying. Drying is continued until the skin becomes brown and the pieces are soft and breakable.
5. Roast the fenugreek seeds until they splutter. Grind all the seeds together and add to the limes.
6. Fill into pots or glass jars and seal.
7. Store in a cool place away from direct sunlight. Store for one month to allow fermentation to take place.
8. Re-pack in sterilised glass jars or polythene bags, ensuring that no air bubbles are trapped in the pickle. Pour a thin layer of oil onto the surface of the pickle.
9. Store in a cool place away from sunlight.

Method 2: Ingredients for making Kachai Dry salted lime pickle

Place of origin/usage: Manipur.

Nature of food: Vegetable based.

Time of consumption: Dietary supplement.

Method of preparation: Limes are placed in a layer, approximately 2.5 cm deep, into the fermenting container (a barrel or keg). One kilogram of salt is added for every four kilograms of limes. The salt is sprinkled over the vegetables. Another layer of vegetables is added and more salt added. This is repeated until the container is three quarters full. A cloth is placed above the vegetables and a weight added to compress the vegetables and assist in the formation of brine. The formation of brine takes about 24 hours. The container is then placed in the sun for a week. As soon as the brine is formed, fermentation starts. As fermentation starts, bubbles of carbon dioxide appear. Fermentation takes between one and four weeks depending on the ambient temperature. Fermentation is complete when no more bubbles appear.

CHAPTER 3

PACKAGING OF KACHAI LEMON PICKLE

Packaging should protect the product from contamination and prevent it from spoilage, and at the same time it should:

- Extend shelf life
- Facilitate distribution and display
- Provide the consumer with greater ease of use and time-saving convenience
- Communicate with the consumer as a marketing tool

3.1 Good Packing Materials for pickle packaging

- Resistant to moisture and vapor
- Durable and leak proof
- Resistant to cracking and brittleness at low temperatures
- Resistant to oil, grease, and water
- Able to protect foods from absorption of off-flavors and odors
- Easy to seal
- Easy to label

Pickle finds a place in the poor man's meal as well as in the parties hosted by the richest in the country. They are manufactured and consumed in every part of the world. Although, the recipe may differ, in general they are sour, salty and spicy. Pickles are not the main meal itself but used with the main meal or some course to increase the pleasure of eating. Pickles products

made from kachai lemon by employing preservation methods to make the product shelf-stable at ambient conditions. The preservation process generally used includes dehydration and drying, salting, fermentation, use of additives, heating, sugaring etc.

Packaging of kachai lemon pickle

The spoilage of pickles could be due to microbial contamination or oxidation/rancidity of the oil used in the manufacture. A good package for pickles should have the following attributes:

- Aroma retention
- Excellent protection against light, moisture and oxygen
- Excellent seal integrity for containment
- Grease and oil resistance
- Acid resistance
- Good aesthetics and appearance

3.2 Types of Packaging for Pickles

Traditionally, the practice was to prepare pickles at home and store in ceramic or earthenware jars. Gradually over the years, pickles are manufactured and commercially marketed in the country, as branded products.

In our country, still large quantity of pickle is sold loose. The shopkeeper displays various types of pickles in large glass jars, and weighs out desired quantity of pickle to his customers. The customer trusts the shopkeeper for the quality and not the brand name. However, gradually pickle packed in glass bottles under different brand names, appeared in the market and became popular. The trend started in Maharashtra and Gujarat. Glass bottled pickles are almost double in cost because of heavy packing and transportation costs. They looked hygienic and appealed to the brand conscious upper class.

With the advent of plastics, pickles packed in HDPE (high density polyethylene) and later PET (polyethylene terephthalate) jars were introduced. HDPE jars are usually used for packing 1

kilogram and more. They are opaque so do not provide visibility of the pickle, but are convenient, as they do not break in transit. The PET jars are transparent, with good eye appeal and safe for pickle. PC (polycarbonate) bottles are best for pickles but they are still very costly.

Over the last few years, cost effective flexible pouches of co-extruded and laminated structures have replaced glass jars. The pouches could be flat pillow pouches or stand-up pouches, which have a good display value. They are light in weight and hygienic. However, in flexible pouches, the sealant layer selection is very critical, as the contact layer needs to be acid and oil resistant. Failure of seals or surface stickiness can render the pack ineffective and unsaleable.

Initially, the flexible packaging of pickles commenced as a simple LDPE (low density polyethylene) pouch, which neither provided protection from oxygen nor did it give an effective heat seal, as LDPE is not compatible with oil, causing failure of pouches. Gradually multi-layered coextruded pouches and laminated pouches were introduced. The typical structures are:

- 100 μ HD – LD – HDPE
- 140 μ LD – HDPE
- 110 μ LLDPE – BA – Nylon – BA – LLDPE
- 20 μ BOPP / 50 μ LD – HD (or Cast PP or EAA)
- 12 μ Polyester / 75 μ LD – HD
- 12 μ Metallised Polyester / 100 μ LD – HD

The capacity of the pouches range from 200 grams to 1 kilogram. The pouches could be flat pillow type or stand-up pouches for shelf display.

- For catering / institutional packs – 5 or 6 kilograms - HDPE or PET jars. 20 kg HDPE jars are also available and used for the purpose
- For consumers – 400/500 grams glass jars or PET jars
- For cost conscious housewives - printed pillow or stand-up pouches
- For portion packs – polystyrene or polypropylene injection moulded containers with flexible heat-sealable, peelable lids

Nitrogen flushing/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.

Gas flushing involves the use of a preservative gas to modify the environment within food packaging. Typically, inert gas packaging is done using nitrogen gas to achieve conditions suitable for longer food storage periods.

Gas flushing will displace oxygen and other contaminants from stored food packaging, minimizing oxidative reactions that encourage rapid food spoilage.

Nitrogen packing requires the use of high concentrations of gaseous nitrogen within food packaging. Nitrogen at 99.0% concentration is usually recommended for food preservation. Other chemical conditions that contribute to effective nitrogen packaging are:

- Oxygen concentration should be maintained under 1%
- Carbon monoxide and carbon dioxide concentrations in the air mixture below 10ppm and 300ppm respectively.
- Moisture concentrations should remain below 55.8ppm

Gaseous nitrogen has unique chemical and physical properties that make it suitable for use in food processing. Nitrogen is inert which means it will not react with prepared food materials, which can alter their aromas or flavors. Also, gaseous nitrogen will effectively displace oxygen minimizing oxidation and the growth of microorganisms that cause foods to lose their freshness and deteriorate faster.

Wrapping styles for pickle sachet packaging

Flow wrapping

Flow wrapping is a horizontal-motion process in which product of any shape is wrapped in clear or printed polypropylene film. The end result is a flexible package with a non-lap type seal on the bottom and crimped end seals.

CHAPTER 4

FSSAI STANDARDS AND FOOD SAFETY

4.1 FSSAI STANDARDS FOR KHACHAI LEMON PICKLE

Food Category System 2.3.43 Pickles

Pickles means the preparation made from fruits or vegetables or other edible plant material including mushrooms free from insect damage or fungal infection, singly or in combination preserved in salt, acid, sugar or any combination of the three. The pickle may contain onion, garlic, ginger, sugar jaggery, edible vegetable oil, green or red chillies, spices, spice extracts/oil, lime juice, vinegar/ acetic acid, citric acid, dry fruits and nuts. It shall be free from copper, mineral acid, alum, synthetic colours and shall show no sign of fermentation.

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. Pickles may be of combinations as given below:—

(i) Pickles in Citrus juice or Brine conforming to the following requirements:—

- (a) Drained Weight Not less than 60.0 percent
- (b) Sodium Chloride content when packed in Brine Not less than 12.0 percent
- (c) Acidity as Citric Acid when packed In Citrus Juice Not less than 1.2 percent

(ii) Pickles in Oil

- (a) Drained Weight Not less than 60.0 percent
- (b) Fruit and Vegetable pieces shall be practically remaining submerged in oil

(iii) Pickles in Vinegar

- (a) Drained Weight Not less than 60.0 percent
- (b) Acidity of vinegar as acetic acid Not less than 2.0 percent
- (iv) Pickle without medium means the pickles other than enumerated above. This may contain ingredients given in Para 1 of this specification. Such pickles shall be labelled as "(give name of vegetable or fruits) Pickle".

Food Category 4.1.2.3 Fruits in vinegar, oil, or brine

Includes pickled products such as mango pickles, lime pickles, pickled gooseberries, plums and pickled watermelon rind. Oriental pickled (“cured” or “preserved”) fruit products are sometimes referred to as “candied” fruits. These are not the candied fruit products of category 4.1.2.7 (i.e. dried, sugar coated fruits).

FOOD ADDITIVES FOR FRUIT IN VINEGAR, OIL, OR BRINE

Food category System	Food Category Name	Food Additive	INS No	Recommended Maximum Level	Note
4.1.2.3	Fruit in vinegar, oil, or brine	Acesulfame potassium	950	200 mg/kg	188
		Aspartame	951	300 mg/kg	144, 191
		BENZOATES		250 mg/kg	13
		CAROTENOID S		1,000 mg/kg	
		CHLOROPHYLLS and CHLOROPHYLLINS, COPPER COMPLEXES		100 mg/kg	
		Caramel III - ammonia caramel	150c	200 mg/kg	

Food category System	Food Category Name	Food Additive	INS No	Recommended Maximum Level	Note
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4.1.2.3	Fruit in vinegar, oil, or brine	Caramel IV - sulfite ammonia caramel	150d	7,500 mg/kg	
		beta-Carotenes, vegetable	160a(ii)	1,000 mg/kg	
		Diacetyltartaric and fatty acid esters of glycerol	472e	1,000 mg/kg	
		ETHYLENE DIAMINE TETRA ACETATES (EDTA)		250 mg/kg	21
		Grape skin extract	163(ii)	1,500 mg/kg	

Food category System	Food Category Name	Food Additive	INS No	Recommended Maximum Level	Note
4.1.2.3	Fruit in vinegar, oil, or brine	HYDROXYBENZONATES, PARA		250 mg/kg	27
		Neotame	961	100 mg/kg	
		PHOSPHATES		2,200 mg/kg	
		Polydimethylsiloxane	900a	10 mg/kg	
		SACCHARINS		160 mg/kg	144
		SORBATES		1,000 mg/kg	42

		SULFITES		100 mg/kg	44
		Sucralose (Trichlorogalact osucrose)	955	180 mg/kg	144

4.2 Food Safety

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

SANITARY AND HYGIENIC REQUIREMENTS FOR FOOD MANUFACTURER/PROCESSOR/HANDLER

The place where food is manufactured, processed or handled shall comply with the following requirements:

1. The premises shall be located in a sanitary place and free from filthy surroundings and shall maintain overall hygienic environment. All new units shall set up away from environmentally polluted areas.
2. The premises to conduct food business for manufacturing should have adequate space for manufacturing and storage to maintain overall hygienic environment.
3. The premises shall be clean, adequately lighted and ventilated and sufficient free space for movement.
4. Floors, Ceilings and walls must be maintained in a sound condition. They should be smooth and easy to clean with no flaking paint or plaster.
5. The floor and skirted walls shall be washed as per requirement with an effective disinfectant the premises shall be kept free from all insects. No spraying shall be done during the conduct of business, but instead fly swats/ flaps should be used to kill spray flies getting into the premises. Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect free The water used in the manufacturing shall be potable and if required

chemical and bacteriological examination of the water shall be done at regular intervals at any recognized laboratory.

6. Continuous supply of potable water shall be ensured in the premises. In case of intermittent water supply, adequate storage arrangement for water used in food or washing shall be made.

7. Equipment and machinery when employed shall be of such design which will permit easy cleaning. Arrangements for cleaning of containers, tables, working parts of machinery, etc. shall be provided.

8. No vessel, container or other equipment, the use of which is likely to cause metallic contamination injurious to health shall be employed in the preparation, packing or storage of food. (Copper or brass vessels shall have proper lining).

9. All equipments shall be kept clean, washed, dried and stacked at the close of business to ensure freedom from growth of mould/ fungi and infestation.

10. All equipments shall be placed well away from the walls to allow proper inspection.

11. There should be efficient drainage system and there shall be adequate provisions for disposal of refuse.

12. The workers working in processing and preparation shall use clean aprons, hand gloves, and head wears.

13. Persons suffering from infectious diseases shall not be permitted to work. Any cuts or wounds shall remain covered at all time and the person should not be allowed to come in direct contact with food.

14. All food handlers shall keep their finger nails trimmed, clean and wash their hands with soap, or detergent and water before commencing work and every time after using toilet. Scratching of body parts, hair shall be avoided during food handling processes.

15. All food handlers should avoid wearing, false nails or other items or loose jewellery that might fall into food and also avoid touching their face or hair.

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

4.3 LABELLING

Labeling Requirements

All food products sold in India that are prepackaged are required to comply with the Food Safety and Standards (Packaging and labelling) Regulations, 2011. The Food Safety and Standards Regulation, 2011 is a notification issued by the Food Safety and Standards Authority of India under the Ministry of Health and Family Welfare. In this article, we look at the regulations pertaining to food labelling in India.

Applicability of Food Labelling Regulations

The food labelling regulations require all “Prepackaged” or “Pre-packed food” to comply with the labelling regulations in India. As per the rules, prepackaged food means food, which is placed in a package of any nature, in such a manner that the contents cannot be changed without tampering it and which is ready for sale to the consumer.

General Labelling Requirements

The following labelling requirements must be complied with by all prepackaged food sold in India:

- The label must be in English or Hindi or Devnagri language. In addition to the above, the label can contain information in any other language, as required.
- The label must not contain information about the food that could be deemed to be false, misleading, deceptive or otherwise create an erroneous impression regarding the product.
- The label must be affixed to the container in such a manner that it would not easily be separated from the container.
- The contents or information presented in the label should be clear, prominent, indelible and readily legible by the consumer.
- If the container is covered by a wrapper, then the wrapper must contain necessary information or make the label of the product inside readily legible by not obscuring.
- The name of the food must be mentioned along with the trade name and description of the food contained. In case the food contains more than one ingredient, then a list of ingredients must be presented in descending order of their composition by weight or volume, as the case may be, at the time of its manufacture;

Nutritional Information

Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product must be given on the label along with the following information:

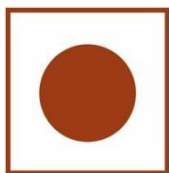
- energy value in kcal;
- the amounts of protein, carbohydrate (specify the quantity of sugar) and fat in gram (g) or ml;
- the amount of any other nutrient for which a nutrition or health claim is made;
- It is important to note that any “health claim” or “nutrition claim” or “risk reduction” claim made in the label will be thoroughly scrutinized by the FSSAI authorities.

Hence, any such claim must be validated by test data. As per the rules, the following is the definition for “health claim”, “nutrition claim” and “risk reduction” claim:

- “Health claims” means any representation that states, suggests or implies that a relationship exists between a food or a constituent of that food and health and include nutrition claims which describe the physiological role of the nutrient in growth, development and normal functions of the body, other functional claims concerning specific beneficial effect of the consumption of food or its constituents, in the context of the total diet, on normal functions or biological activities of the body and such claims relate to a positive contribution to health or to the improvement of function or to modifying or preserving health, or disease, risk reduction claim relating to the consumption of a food or food constituents, in the context of the total diet, to the reduced risk of developing a disease or health-related condition;
- “Nutrition claim” means any representation which states, suggests or implies that a food has particular nutritional properties which are not limited to the energy value but include protein, fat carbohydrates, vitamins and minerals;
- “Risk reduction” in the context of health claims means significantly altering a major risk factor for a disease or health-related condition;

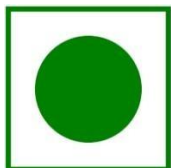
Veg or Non-Veg Symbol

All packaged food that is “Non-Vegetarian” must have a symbol that is a brown colour filled circle inside a square with a brown outline. If a food contains only egg as a non-vegetarian ingredient, then the manufacturer may provide a declaration that the product contains only egg and add the non-vegetarian symbol.



Non-Veg Symbol

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



Veg Symbol

Information Relating to Food Additives, Colours and Flavours

Food additives contained in the food product must be mentioned along with class titles along with the specific names or recognized international numerical identifications. Addition of colouring matter should be mentioned on the label along with certain statements like “CONTAINS PERMITTED NATURAL COLOUR(S)”, just beneath the list of the ingredients on the label. In case of addition of extraneous flavouring agent, then it should be mentioned in a statement like “CONTAINS ADDED FLAVOUR” just beneath the list of ingredients on the label.

Name and Complete Address of the Manufacturer

The name and complete address of the manufacturer must be mentioned on every package of food. In the case of imported food, the package must contain the name and complete address of the importer in India.

Net Quantity

All packaged food must carry the net quantity by weight or volume or number, as the case may be. The net quantity of the commodity contained in the package must exclude the weight of the wrappers and packaging materials.

Lot Number of Batch Identification

A lot number or batch number or code number must be mentioned on all packaged food so that it can be traced while manufacturing and distribution. Only bread and milk including sterilised milk are not required to comply with this regulation.

Date of Manufacture or Packing

The date, month and year in which the commodity is manufactured, packed or pre-packed must be mentioned on the label. In the case of food products having a shelf life of more than three months, then the month and the year of manufacture can be given with the “Best Before Date”. In case of products having a shelf life of fewer than three months, the date, month and year in which the commodity is manufactured or prepared or pre-packed must be mentioned on the label with best before date.

Country of Origin for Imported Food

For imported food, the country of origin of the food should be declared on the label of the food. In case a food product undergoes processing in a second country which changes its nature, the country in which the processing is performed should be considered to be the country of origin for the purposes of labelling.

Instructions for Use

Instructions for use, including reconstitution, should be included on the label, if necessary, to ensure correct utilization of the food



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