



# PM Formalisation of Micro Food Processing Enterprises Scheme

## Processing of Gherkins



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## TABLE OF CONTENTS

Page No.

### **Chapter 1: Introduction**

1.1	Status and Market size	1
1.1.1.	Commercially grown varieties	1
1.1.2.	Cultivation Scenario	2
1.1.3.	Production status of Gherkins	2
1.1.4.	Composition & Nutritive Value of Gherkins	3
1.1.5.	Nutritional benefits of Gherkins	4
1.1.6.	Health benefits of Gherkins	5
1.2	Indian Market Outlook	5
1.3	Harvest & Post harvest handling of Gherkins	6

### **Chapter 2: Processing of Gherkins**

2.1	Process flow for Processing of Gherkins	8
2.2	Critical factors in Processing	13
2.3	Defects in Processing	14

### **Chapter 3: Packaging of Gherkins**

3.1	Product characteristics influencing packaging	15
3.2	Key attributes to consider when selecting packaging material	15
3.3	Packaging material for Gherkins	16

### **Chapter 4: Food Safety Regulations and Standards**

	Food Safety Regulations & Standards	19
	Annexure I: Manufacturers & Suppliers List for Machineries	27

# CHAPTER 1

## INTRODUCTION

### 1.1. Status and Market Size

Gherkin (*Cucumisanguria*) belongs to family *Cucurbitaceae* which comprises of in the range of 118 genera and 825 species. Members of this family are spread mainly in tropical and subtropical regions of the world even though they have an Asian origin. Gherkins and commercial cucumbers belong to the same species (*Cucumis*), but are from different cultivar groups. Most cucumbers are consumed in fresh forms, while gherkins have a great popularity among the world as fermented pickles. "Pickling" refers to the processing by adding salt, vinegar and spices etc.

India has' today emerged as the origin of the finest gherkin cultivation, processing and exporters to the every-growing world requirement. Gherkin cultivation, processing and exports were started in India during the early 1990s with a modest beginning in Karnataka State in South India and later extended to the neighbouring states of Tamil Nadu and Andhra Pradesh. It has now reached a volume of 1.89 lakh MT of Cucumber & Gherkins, worth Rs. 1241.22 crores / 173.50 USD Millions during the year 2019-20. Gherkins are a major dietary constituent to many European countries and the USA. Hence, almost the entire volume of gherkins produced in India is exported, with little or no domestic demand, except for some five star hotels. India exports to all major countries like USA, France, Germany, Australia, Spain, South Korea, Canada, Japan, Belgium, Russia, China, Srilanka, Israel, etc.

The export of processed gherkin is done by about 51 companies located in Karnataka, Tamilnadu and Andhra Pradesh. These companies grow gherkins in contract with small and marginal farmers, to have a better quality control.

#### 1.1.1. Commercially grown varieties

High yielding gherkin hybrids are known to respond favourably to temperature, light intensity and day length. Varieties named cassata, Azax, Sparta and Vlasset are prevalent due to their marketable yield, high yield and sensory attributes.

Ajax variety is having wide adaptability, high yield in early age and suitability for all grades. **Vlasset** is a popular hand pick hybrid that features a blocky fruit shape and length to diameter ratio in the 2.8 range which nicely matches the needs of many hand pick green and brine stock programs. Cassata has a high number of fruits per plant and high per plant yield.

### 1.1.2. Cultivation Scenario

Gherkins are cultivated exclusively on "contract farming" basis in India. Currently there are more than 1 lakh small and marginal farmers who are engaged in the production of gherkins. The Indian gherkin manufacturers prescribe and support the entire gamut of activities in the cultivation practices to be followed by the farmers. This strict protocol is adhered to by the farmers to produce very high quality gherkins for the world markets. The contract farmers receive all inputs and technical support from the companies and also the farmers are assured guaranteed buy back of crop at pre-declared prices.

Gherkin industry can be considered the true and successful model of contract farming, with which the industry is able to have a good control over the final produce quality as per the requirement of the international market.

Timely cultural operations including weeding and irrigations are necessary for longer crop cycle and good harvest. Labour is an important input in the gherkin production especially for timely harvest of the crop.

### 1.1.3. Production status of Gherkins

Gherkin cultivation and production in India is mainly concentrated in the three southern states of Karnataka, Andhra Pradesh and Tamil Nadu. Karnataka accounts for almost 60 percent of the Gherkin production. Also, Tamil Nadu and AP each account for 20%. The climatic and soil conditions are favorable for two harvesting seasons, allowing for the distinct advantage of processing the produce for 10 months each year.

Year	Area (in '000 Hectare)	Production (In ' 000 MT)
2015-2016	71	1202
2016-2017	74	1142
2017-2018	82	1260

*Source: India & Ministry of Agriculture and Farmers Welfare, Govt. of India, 2018*

#### 1.1.4. Composition & Nutritive Value of Gherkins

Parameters	Quantity per 100g
Energy	13(Kcal)
Moisture	96.3(g)
Protein	0.4 (g)
Fat	0.1 (g)
Ash	0.3(g)
Crude fibre	0.4(g)
Carbohydrate	2.5 (g)

*Source: Nutritive value of Indian foods, NIN,2018*

**Table 7: Composition & Nutrients of Cucumbers (per 100g)**

Composition	Per 100 g
<b>Minerals</b>	
Calcium	16 mg
Iron	0.28 mg
Magnesium	13 mg
Phosphorus	24 mg
Potassium	147 mg
Sodium	2 mg
Zinc	0.20 mg
Copper	0.041 mg
Selenium	0.3 mcg
<b>Vitamins</b>	
Vitamin C (total ascorbic acid)	2.80 mg
Thiamine	0.027 mg
Riboflavin	0.033 mg
Beta carotene	45.00 mcg
Beta Cryptoxanthin	26.00 mcg
Lutein + Zeaxanthin	23.00 mcg
Pantothenic acid	0.259 mg
Vitamin B6	0.04 mg
Choline	6.00 mg
Folate (total)	7 mcg
Vitamin A (IU)	105.00 IU
Vitamin E ( $\alpha$ -tocopherol)	0.03 mg

*Source: USDA Nutritional Database*

### 1.1.5 Nutritional benefits of Gherkins

- Cucumbers are comprised with unique anti-oxidants in moderate ratios such as  $\beta$ -carotene and  $\alpha$ -carotene, vitamin-C, vitamin-A, zeaxanthin and lutein. These antioxidants help to protect from free radical's accumulation by scavenging them.
- Cucumber juice is extremely good for hair, skin and nails. Also it is a good source of Silica which is beneficial for healthy connective tissues, ligaments, cartilages etc.
- Cucumbers have mild diuretic property due to availability of its free-water, potassium and low sodium content. This helps in checking weight gain and high blood pressure. High potassium in cucumber helps to lower blood pressure.
- They surprisingly have a high amount of Vitamin-K. It has been found to have a potential role in bone strength by promoting osteotrophic (bone mass building) activity and used in the treatment of Alzheimer's disease patients by limiting neuronal damage in their brain
- Not only the benefits are restricted to the endocarp of the fruit but also the peel is a good source of dietary fiber that helps reduce constipation, and offers some protection against colon cancers by eliminating toxic compounds from the gut.
- Cucumber improves nutritional value of a food through increased vitamin levels and improved digestibility.
- Also fermentation secure safety by removing anti-nutritional factors and provides medicinal benefits while improving cultural and social well-being.
- In addition as a vegetable cucumber is cultivated because its extract has soothing, cleansing and softening properties which are used in skin tonics and other beauty aids in cosmetics industry.
- Cucumber also serves as a pesticide because of its steroid content. The fresh cucumber supply thiamine, vitamin C, niacin, phosphorus, iron, calcium and nutritional character. Cucumber also serves as insect killer due to steroid stuffing
- There are many advantages of consuming processed cucumber, much more than raw cucumbers. Pickled cucumbers have value added properties such as probiotic characteristics, nutritional enhancements and extended shelf life etc.

### **1.1.6 Health benefits of Gherkins**

- **Reduces Cancer Risk**

Cucurbitacins are a natural compound found in cucurbitant vegetables. There are multiple variations of cucurbitacins that work together to inhibit cancer growth, and breast cancer appears to be particularly sensitive to their effects. In addition, cucumbers contain the flavonoid fisetin, which shows antioxidant and anti-cancer behavior. Although more human studies are needed to confirm the role of cucumber in cancer prevention, research thus far is promising.

- **Improves Blood Sugar Control**

Cucumbers are non-starchy vegetables, one of the best categories of food for managing diabetes. The fiber and water content of fresh cucumbers makes them an ideal choice for glycemic control.

- **Promotes Hydration**

High-water foods can provide good hydration. Cucumbers are 95% water, making them a great way to rehydrate in hot temperatures. Cucumbers replace the electrolytes and water lost by the body.

- **Supports Heart Health**

Cucumbers are a good way to add more fiber and potassium to the diet. Fiber improves satiety and helps keep cholesterol levels down, while potassium reduces blood pressure levels. Cucumbers also provide folate, an essential B-vitamin that reduces stroke risk.

## **1.2 Indian Market Outlook**

Gherkin crop can be grown throughout the year in all seasons. The employment generating potential was high in gherkin cultivation and it provides employment opportunities to the family members of both the land holders and landless workers in rural areas. Hence, in areas of recurrent unemployment, the cultivation gherkin might be greatly helpful. Besides improving the income of different stakeholders involved in gherkin cultivation, it helps in augmenting foreign exchange earnings and also promotes investments in processing units intended for export of gherkins. Gherkin crop is completely cultivated under contract farming, with a producer company supplying all inputs including technical aspects of cultivation to a farmer by who contributes his land and labour. The company extension staff support and guide the farmers in crop management throughout the duration of the crop cultivation. The farmers are obliged to produce the crop as per the package of practices laid down by the

company. The crop is harvested daily, picked up in small trucks and brought to a collection center for preliminary sorting which is consolidated and delivered to the factory in the shortest duration of time.

This contract farming system ensures that quality assurance systems are meticulously followed in the manufacturing process as well. Food safety & adherence to customer specification is ensured all through the value chain. The industry has been found proactive in maintaining the quality standards as per the requirement of importing countries. With the produce having almost zero demand in the homeland, all these measures have led to the emergence of India as the origin of the finest gherkin cultivation, processing and exporters.

Initially processed gherkins were exported in bulk packing and since 2001 gherkins are being exported in "Ready-to-eat Jars".

Gherkin industry in India is today fully oriented and its exports are mainly of two categories: -

- a) Provisionally Preserved (preserved in vinegar,/ acetic acid and brine):  
Gherkin exports are in bulk form in 220 litres, packed in food grade H.D.P.E. drums (High Density Poly Ethylene). This is later repacked by the importers into smaller, ready to eat consumer packs to suit their consumers' requirement.
- b) Preserved in Vinegar:  
These are ready to eat gherkins which are in smaller packs of jars and cans.

### **1.3. Harvest & Post harvest handling of Gherkins**

#### **1.3.1. Harvesting**

The crop is ready for harvest in 30 to 35 days. The price of the product is decided by the stage of maturity. Only the tender immature Gherkin fruits are highly suited for processing. Smallest fruit (stage 1) which will weigh approximately 4.0g (250 fruits per kg) will fetch the maximum price followed by stage 2 and stage 3.

To maintain the grade, the harvesting of fruits must be done every day. A day's break would end up with outsized or overgrown gherkin crops means a loss to the farmer. Direct and sharp sun and high temperature should be avoided while harvesting, hence picking should be done in the early mornings or late evenings.

### **1.3.2. Harvesting method**

The fruits must be harvested by retaining the stalk on the plant. Harvested fruits should be collected under shade. The flower head has to be removed from fruit and water sprinkling on harvested fruits should not be done at any stage. The surface moisture must be dried by proper ventilation.

### **1.3.3. Postharvest Handling of Gherkins:**

After harvesting, jute bags alone have to be used and plastic bags must be avoided collection of fruits. The harvested produce should be transported to the factory on the same day before dusk and leaving the gherkin unprocessed overnight would result in poor quality produce. Alternatively, they can be brought to a collection center for sorting and then consolidated and delivered to the factory in the shortest duration of time.

#### **a. Pre-cooling**

Pre-cooling is essential immediately after harvest to minimize water loss, avoid decay and reduces the physiological and metabolic activities. In pre-cooling, the temperature is quickly brought down within 2-6 hours by fast and prompts cooling. This will help to extend the shelf-life and maintain the appearance of the fruit. Hydro-cooling or forced-air cooling or drenching fruit with cold well water in bulk containers can be used for pre-cooling.

#### **b. Sorting**

Sorting is done to cull out the broken, decayed, deformed and spoiled fruits are removed from the lot. It is generally done manually.

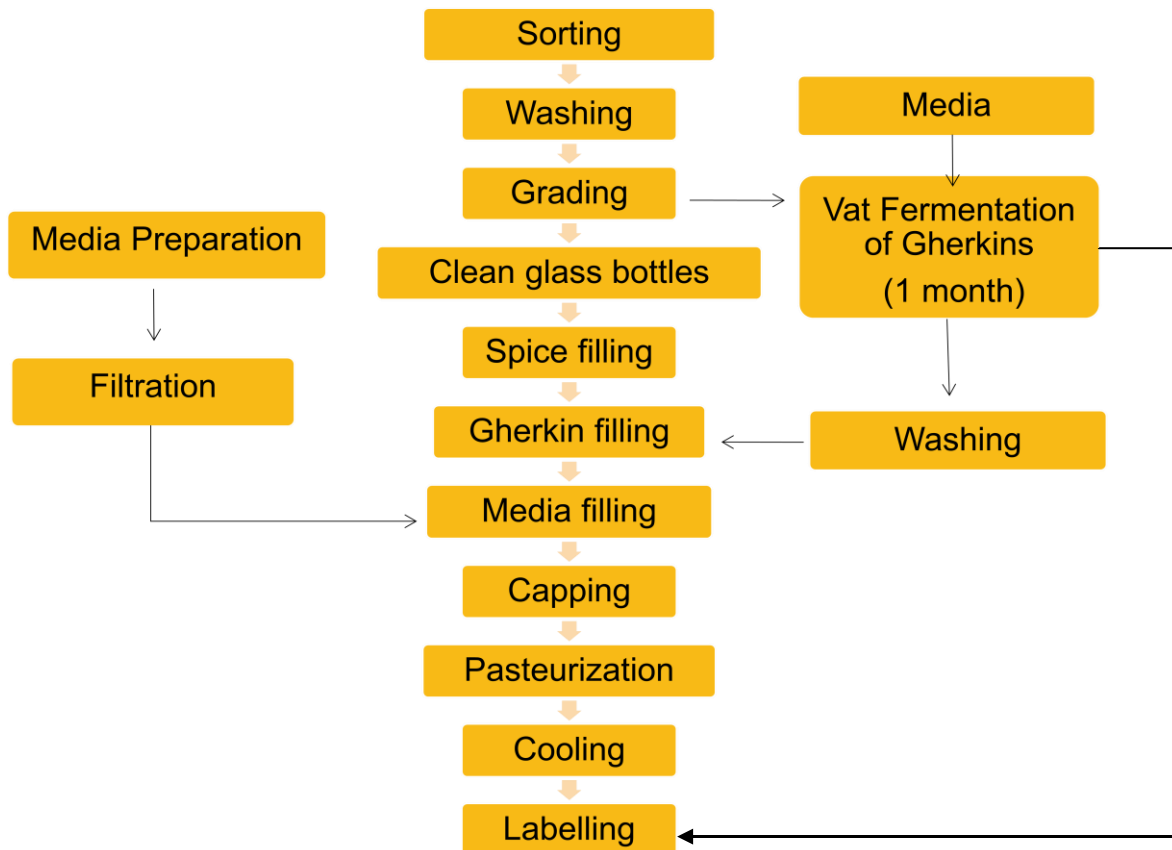
A rectangular shed with the top and three sides covered would be sufficient to function as a temporary storage facility till the fruit reaches the industry. A clean tarpaulin may be spread on the floor and the fruits spread out on it for a last inspection for disqualifying defects. Ventilation and protection from sun and rain are important.

The post-harvest quality of the fruit depends fully on the proper care taken after harvesting of the crop. The removal of undesirable and unsuitable fruits at initial stage improves the appearance and quality of the product and reduces the spoilage during later stages.

## CHAPTER 2

### Processing of Gherkins

#### 2.1 Process Flow for Processing of Gherkins



##### 2.1.1 Sorting

The washed gherkins are inspected on a conveyer belt to sort out crooked and bent vegetable, manually. To obtain a uniform product, crushed, unsound, decomposed, defective and too mature cucumbers should be removed from the lot. Flowers, stalks, damaged and infected vegetable are removed. Clean, fresh and green gherkins are taken for further processing.

##### 2.1.2 Washing

Gherkins are washed using brush washers or drum washers to remove the surface dust and mud particles. This is followed by visual inspection wherein gherkins that have any mold infection or are bruised are discarded.



Drum washer for Gherkins

Brushwasher for Gherkins



### 2.1.3 Grading

Grading is the sorting of gherkins by size on the basis of count per kg. Gherkins are graded by diameter & volume. Mechanical grading is preferable. The following table shows the criteria for grading and the order in which grade is given the market value.

Fruit count/ kg weight	Size of Fruit, mm	Order of grade, in terms of high value
300+	14 mm and below	1
100+	17 mm	2
60+	19 mm	3
30+	25mm	4
30 -	>25 mm	5

#### 2.1.4 Media preparation

The three categories of gherkins according to the media of packing are

- Gherkins 'in brine',
- Gherkins 'in natural vinegar 'and
- Gherkins 'in acetic acid'.

Changes to these are effected according to the specifications laid down by the buyers from time to time.

The common ingredients for the media are as follows

- Common salt (having less than 1% of impurities)
- Acetic acid or natural vinegar (to increase acidity of initial media)
- Calcium chloride (to prevent softening in fermented cucumber slices and ensures firmness& crispiness post-pasteurization)

The proportion of the ingredients vary depending on the three categories mentioned above, as required by the customers. The initial media strength should ordinarily range from about 8 to 10 percent of salt.

Media solution is prepared by dissolving the above ingredients in water. Then it is filtered to remove any impurities.

The following table shows the salinity and acidity levels that are required in the media, for the three categories mentioned above.

<b>Product</b>	<b>Salinity (as % NaCl)</b>	<b>Acidity (as % Lactic acid)</b>
Gherkin in brine	15±1	0.6
Gherkins in acetic acid or natural vinegar	4±0.2	3.2±0.2

### 2.1.5 Spice mix and Gherkin filling

Glass jars with metal caps or metal cans that are to be used are checked for any faults and then properly cleaned. Spices such as Dill leaves, Onion, Garlic, chillies etc. are filled in the base of the jars. Over the layer of spices, the graded gherkins are filled to the specific weight. The filling can be done manually.

**Pack out ratio** is the ratio of the weight fruits to the volume of brine/ media used and this should be in the range of 1.2 and can go till 2 depending on requirement and batch size.

The gherkins can be cut into long slices or dices or any fancy cuts based on customer requirements.

#### Filled jars moving in conveyor



### 2.1.6 Media filling

The jars filled with spices and the gherkins are then filled with the prepared media. Media is usually filled as a stream flowing over the bottles passing in a conveyor.



In case of fermented gherkin processing, the vats or HDPE barrels or pails are pre-filled with 20% of the required media. After that, the graded gherkins are filled into the vat/ barrels and then the balance media is added, based on the pack out ratio. The vats/ barrels are closed properly and left for fermentation for up to 1 month.



For gherkins packed in media in HDPE barrels/ pails, processes such as proper sealing, quality monitoring and curing are done. After curing is achieved, they are labelled and marketed.

In case of vat fermented gherkins, draining & washing of the fermented gherkins is done after the 4 week curing. The gherkins are washed with potable water and filled in glass jars with fresh brine and sent for capping. These jars go to capping and pasteurization.

### **2.1.7 Capping**

The capping of the jars is done automatically by the Capping machine. If Cans are used, they are also sealed automatically. A minimum 100 mbar vacuum is ensured inside the jars; this is essential for long product shelf life along with an effective pasteurization process.



### 2.1.8 Pasteurization

The products packed in glass jars/ cans should be pasteurized at between 80 to 85°C for 12 to 18 min in a pasteurization tunnel. The temperature of processing should be kept under strict control so that a minimum core temperature of 70°C should be obtained for the gherkin. This stage is very crucial as it is done to inhibit/eliminate the viable microbial load (pathogens) and to increase shelf life of product.



Glass jars entering pasteurization tunnel.

### 2.1.9 Cooling & Labelling

The pasteurized jars/ cans are then cooled to ambient temperature by blowing of cool air to arrest cooking. They are then labelled according to the requirements and specifications required by the customer. The jars are then packed into secondary packaging and then stored, ready for marketing

## 2.2 Critical factors in Processing

- ✓ It is important to select good quality gherkins and discard defective fruits because quality of raw materials determines the final quality of the product.
- ✓ Trimming and cleaning are essential for removing number of extraneous microorganisms
- ✓ Same size (graded) gherkins should be packed in jars / vats
- ✓ For pickling cucumber common salt having less than 1% of impurities is suitable
- ✓ Addition of Calcium chloride to brine improves firmness retention.
- ✓ Correct strength of salt for should be used for the media.
- ✓ Spices used should be cleaned and graded, without any impurities or spoilage

- ✓ Proper control of pasteurization should be done to ensure shelf life and quality of product
- ✓ Proper sealing of the jars/ cans should be done to ensure the shelf life of the product.

### **2.3 Defects in Processing**

- ❖ Contaminated salt will lead to cloudiness of brine.
- ❖ Salt with lime impurities will reduce the acidity and hence shelf life of the final product.
- ❖ Salt with iron impurities will result in the blackening of the vegetables.
- ❖ Water with significantly greater salts of calcium, sodium, magnesium etc. can interfere with the normal fermentation process. Iron in water will result in blackening.
- ❖ 13.3 % salt and higher would effectively inhibit the growth of natural occurring lactic acid bacteria in case of vat fermentation
- ❖ Insufficient pasteurization & poor pasteurization leads to spoilage

## CHAPTER 3

### Packaging of Gherkins

#### 3.1 Product characteristics influencing packaging

❖ High acidic nature

The substances that are generally added to pickles apart from the fruit/ vegetable are vinegar, salt, and spices. The presence of these ingredients, make the product highly acidic in nature.

❖ Composition of the product

For a pickle to have a fairly long shelf-life, the composition should be:

- Salt: over 12 per cent, best is >15 per cent
- Acidity: >2 per cent of which minimum 0.5 per cent should be acetic acid (treatable)
- pH: below 3.5 (high acid)
- Moisture: below 50 per cent
- Preservative: optimal and well mixed

#### 3.2 Key attributes to consider when selecting packaging material

- ✓ Excellent protection against light, moisture and oxygen
- ✓ Excellent seal integrity for containment
- ✓ Leak proof
- ✓ Acid resistance
- ✓ Good aesthetics and appearance

The primary packages for pickle must have the following characteristics

- ▶ It should allow heat transmission.
- ▶ Heat transmission i.e. heat transfer is very fast during heating and cooling.
- ▶ It should be heat-resistant i.e. it should have resistance towards Pasteurization temperature
- ▶ “Product quality maintenance” i.e. the package should not react with and change the properties of the product over a given period of storage and preservation.
- ▶ It should have resistance towards sunlight, storage temperature and atmospheric humidity

### **3.3 Packaging material for Gherkins**

#### **3.3.1 Primary Packaging**

The gherkins are packaged in primary materials such as glass/ tin cans, flexible pouches and HDPE barrels in single operation.

##### **1. Glass Containers:**

The use of glass bottles for the packaging of pickles such as gherkins is widespread although the fill/ heat/cool process needs to be applied with care to avoid breakage of the containers. Glass is the preferred packaging medium for gherkin pickles.

The improvements that have occurred in glass bottle packaging are:

- Light weight
- Surface coating to increase abrasion resistance
- Use of wide mouth containers fitted with easy-open-caps.

The advantages of glass containers include chemical inertness, aesthetic appeal, impervious to microorganisms, pests, moisture, oxygen and odours, ability to be heat processed, recycled and re-used. They are rigid, to allow stacking without damage. Further unlike metal cans, they are transparent to display the contents. The product has long shelf-life in glass than any other material. The disadvantages of glass containers include higher transport costs due to high weights, damage-prone nature, and are potentially hazardous from glass splinters or fragments that can contaminate the foods.

##### **2. Metal Containers:**

Tinplate cans made of low carbon mild steel of 98% purity, coated with 2% tin on either side with easy open ends are used. These tinplate containers are either 3 piece or 2 piece containers. They are lacquered internally to prevent corrosion. The tinplate used for this is a low carbon mild steel base plate suitably coated with a thin layer of tin metal. Tin plate must have a very low sulphur, phosphorus and copper content. For preservation and processing, tin is an ideal container for gherkin packaging. Double layered cans can be used for strongly acidic gherkin pickles.

Metal containers have advantages such as they offer highest shelf life, create a barrier against oxygen, moisture, bacteria, sunlight, and rodents etc., are tamper-proof/ leak proof, easy to stack, printable, recyclable and eco-friendly. Further they require no secondary packaging or cold storage and ensure the right nutritional values of the product until opened. The major disadvantages are that they slowly react with the contents over a period of time leading to corrosion and are expensive. To overcome corrosion, inside lacquered or resin-coated tin cans are used for food containing high acid content and sulphur content.

### **3. Flexible pouches**

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 resistant. Failure of seals or surface stickiness can render the pack ineffective and un-saleable.

Multi-layered coextruded pouches and laminated pouches have been introduced for use in packaging gherkin pickles, such as

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

### **4. Bulk packaging**

HDPE jars are prevalently used for bulk packing of gherkins. Though they are opaque and do not provide visibility of the pickle, they are convenient to handle, as they do not break in transit. HDPE Drums/Barrels of 240 or 260 litres containing fruit of 180-190 kg are commonly seen. HDPE pails of 15 litre capacity are also prevalent; they can pack 10 kg of fruit. High molecular weight HDPE is used.

### **3.3.2 Secondary& Tertiary packaging**

At the secondary packaging stage, the products in primary packaging are overwrapped in second packaging material such as PP or OPP film, Cardboard label or Paper wrap either as monopacks or multipacks. Fully packed products are placed in open or closed folding cartons, trays or display cartons at the tertiary packaging stage. If required filled cartons are sealed with cellophane

## CHAPTER 4

### Food Safety Regulations & Standards

#### Regulation 2.3 Fruits and Vegetable Products

##### Regulation 2.3.43 Pickles

1. 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, limejuice, 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.
2. 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.
3. 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 Brine  
    - (a) Drained Weight: Not less than 60.0 percent
    - (b) Acidity of brine as acetic acid: Not less than 2.0 percent
  - (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

#### Regulation: Food Safety and Standards (Contaminants, Toxins and Residues)

##### Regulations, 2011

###### ➤ Regulation 2.1: Metal contaminants

Product: Pickled Cucumbers

- Lead – 1 ppm
- Tin – 250 ppm

➤ **Regulation 2.3: Residues**

- Product: Cucumber

<b>Insecticide</b>	<b>Maximum Residual Limit ppm</b>
Ametroctradin	0.4
Azoxystrobin	0.05
Cymoxanil	0.1
Dimethomorph	0.2
Mancozeb	0.4
Metiram as CS2	2.0
Ethion	0.5
Imidacloprid	1.0
Permethrin	0.5
Pyraclostrobin	0.2
Thiophanate-Methyl	0.2

❖ **Food hygiene:**

(a) The product shall be prepared and handled in accordance with the guidance provided in the Schedule 4 of the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011 and any other such guidance provided from time to time under the provisions of the Food Safety and Standards Act, 2006 (34 of 2006).

❖ **Packaging and labelling:**

The product covered by this standard shall be labelled in accordance with the Food Safety and Standards (Packaging and Labelling) Regulations, 2011.

Chapter 1 - General

1.2: Definitions

1.2.1 : In these regulations unless the context otherwise requires:

1. “Best before” means the date which signifies the end of the period under any stated storage conditions during which the food shall remain fully marketable and shall retain any specific qualities for which tacit or express claims have been made and beyond that date, the food may still be perfectly safe to consume, though its quality may have diminished. However, the food shall not be sold if at any stage the product becomes unsafe.

2. “Date of manufacture” means the date on which the food becomes the product as described;

3. “Date of packaging” means the date on which the food is placed in the immediate container in which it will be ultimately sold;
5. “Lot number” or “code number” or “batch number” means the number either in numerical or alphabets or in combination thereof,
- representing the lot number or code number or batch number,
  - being preceded by the words “Lot No” or “Lot” or “code number” or “Code” or Batch No” or “Batch” or any distinguishing prefix
  - by which the food can be traced in manufacture and identified in distribution.
10. “Use – by date” or “Recommended last consumption date” or “Expiry date” means the date
- which signifies the end of the estimated period under any stated storage conditions,
  - after which the food probably will not have the quality and safety attributes normally expected by the consumers and the food shall not be sold
11. “Vegetarian Food” means any article of Food other than Non- Vegetarian Food as defined in regulation 1.2.1(7).

## **Regulation 2.1: Packaging**

### **Regulation 2.1.1: General Requirements**

2. Containers made of plastic materials should conform to the following Indian Standards Specification, used for packing or storing whether partly or wholly, food articles namely: -
- i. IS: 10146 (Specification for Polyethylene in contact with foodstuffs);
  - ii. IS: 10142 (Specification for Styrene Polymers in contact with foodstuffs)
  - iii. IS: 10151 (Specification for Polyvinyl Chloride (PVC) in contact with foodstuffs);
  - iv. IS: 10910 (Specification for Polypropylene in contact with foodstuffs);
  - vii. IS: 12252 - Specification for Polyalkylene terephthalates (PET)

## **Regulation 2.2: Labelling**

### **Regulation 2.2.1: General Requirements**

1. Every pre-packaged food shall carry a label containing information as required here under unless otherwise provided, namely -
2. The particulars of declaration to be specified on the label shall be in English or Hindi in Devnagri script: Provided that nothing herein contained shall prevent the use of any other language in addition to the language required under this regulation.

3. Pre-packaged food shall not be described or presented on any label or in any labelling manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character in any respect;
4. Label in pre-packaged foods shall be applied in such a manner that they will not become separated from the container;
5. Contents on the label shall be clear, prominent, indelible and readily legible by the consumer under normal conditions of purchase and use;
6. Where the container is covered by a wrapper, the wrapper shall carry the necessary information or the label on the container shall be readily legible through the outer wrapper and not obscured by it;
7. License number shall be displayed on the principal display panel in the following format, namely: -



Provided that the existing products of a unit shall comply with the requirement of this clause on and after the six months of commencement of the Food Safety and Standards (packaging and labelling) Amendment Regulation ,2013.

### **Regulation 2.2.2 Labelling of Pre-packaged Foods**

In addition to the General Labelling requirements every package of food shall carry the following information on the label, namely, —

1. The Name of Food: The trade name or description of food contained in the package.
2. Ingredient: (For a single ingredient product, it can be mentioned as such.)
3. Nutritional information –

Nutritional Information or nutritional facts per 100 gm or 100ml or per serving of the product shall be given on the label containing the following: —

energy value in kcal;

the amounts of protein, carbohydrate (specify quantity of sugar) and fat in gram

4. Declaration regarding Veg or Non veg

Every package of Vegetarian Food shall bear a declaration to this effect by a symbol and colour code as stipulated below for this purpose to indicate that the product is Vegetarian Food.

The symbol shall consist of a green colour filled circle, having a diameter not less than the minimum size specified in the Table below, inside the square with green outline having size double the diameter of the circle, as indicated:



iv. Size of the logo (vegetarian)

<b>S No</b>	<b>Area of principal display panel</b>	<b>Minimum diameter mm</b>
1.	Upto 100 cms. Square	3
2.	100-500 cm square	4
3	500-2500 cm square	6
4	>2500 cm square	8

The symbol shall be prominently displayed on the package having contrast background on principal display panel, just close in proximity to the name or brand name of the product and on the labels, containers, pamphlets, leaflets, advertisements in any media.

5. Declaration regarding Food Additives-

i. For food additives falling in the respective classes and appearing in lists of food additives permitted for use in foods generally, the following class titles shall be used together with the specific names or recognized international numerical identifications:

Acidity Regulator, Acids, Anticaking Agent, Antifoaming Agent, Antioxidant, Bulking Agent, Colour, Colour Retention Agent, Emulsifier, Emulsifying Salt, Firming Agent, Flour Treatment Agent, Flavour Enhancer, Foaming Agent, Gelling Agent, Glazing Agent, Humectant, Preservative, Propellant, Raising Agent, Stabilizer, Sweetener, Thickener

6. Name and complete address of the manufacturer

- i. The name and complete address of the manufacturer and the manufacturing unit if these are located at different places; in case the manufacturer is not the packer, the name and complete address of the packing unit shall be declared on every package of food;
- ii. Where an article of food is manufactured or packed by a person or a company under the written authority of some other manufacturer or company, under its brand name, the label shall carry the name and complete address of the manufacturing or packing, the name and complete address of the manufacturer or the company and on whose behalf it is manufactured or packed or bottled.

7. Net quantity by weight shall be declared on every package of food.

8. Lot/Code/Batch identification shall be given on the label.

9. Date of manufacture or packing.

The date, month and year in which the commodity is manufactured, packed or pre-packed, shall be given on the label.

If the 'Best before Date' of the products is

- More than three months, the month and the year of manufacture, packing or pre-packing shall be given.
- Less than three months, the date, month and year in which the commodity is manufactured or prepared or prepacked shall be mentioned on the label.

10. Best Before and Use by Date: the month and year in capital letters up to which the product is best for consumption, in the following manner, namely: —

“BEST BEFORE ..... MONTHS AND YEAR

OR

“BEST BEFORE ..... MONTHS FROM PACKAGING

OR

“BEST BEFORE ..... MONTHS FROM MANUFACTURE (Note: blank be filled up)

11. Instructions for use:

(i) Instructions for use, including reconstitution, where applicable, shall be included on the label, if necessary, to ensure correct utilization of the food.

#### **❖ Schedule H of FoSCoS: 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 equipment's 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 equipment's 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.

**Annexure I**  
**Manufacturers & Suppliers List for Machineries**

	Name of the company	Machineries
1	Sara Udyog No. C- 167, sector 10, Noida -201301, Uttar Pradesh, India 919810137891 919818264602	Pickle processing and packaging machine
2	Sujay Industries Shed No. A267, 6th Main, 2nd Stage Peenya Industrial Estate, Bangalore - 560058 Karnataka, India Jayaram : 9845195720; Sudhir : 9845201201 Tel: +91.08028362210 / 11 eMail : <a href="mailto:info@sujayindustries.com">info@sujayindustries.com</a>	Rotary washer, Brush washer, Grading machine, Inspection Conveyors, Jar/ Bottle washer, Brine filling machine, Jar conveyor, Sorting tables, Barrel/ drum washer
3	Accelor Food Tech Private Limited No. 22, RVL Nagar, Uppilipalayam, Neelikonampalayam, Coimbatore - 641015, Tamil Nadu, India Contact Number: 08048724337 Contact Person: Balaji	Vegetable washer and sorter line
4	Laxmi Enterprises Shop No. 11, VishwaKumud Apartment, 525 Narayan Peth, Near ModiGanpati, Near ModiGanpatiMandir, Pune-411030, Maharashtra, India Ph: 08048580537	Sorting, filling and packaging machine
5	Spursh Udyog 5th Avenue, Block D1/D2, 3rd Floor, Dhole Patil Road, Aundh, Pune - 411001, Maharashtra, India	Filling & Packaging equipment
6	Shiva Engineers T Block, Plot No. S 33, Bhosari MIDC Pune - 411026, Maharashtra, India	Washing, grading, and sorting machinery, Inspection Conveyor, Tunnel Pasteurizers

7	SLV Engineering, Sy No 96, Koraluru Village, Thirumalasettyhalli Bangalore 560067 Factory Landline No: 080 28549066	Rotary washer, Brush washer, Grading machine, Inspection Conveyors, Jar/ Bottle washer, Brine filling machine, Jar conveyor, Sorting tables, Barrel/ drum washer; Tunnel pasteurizer
8	Packolabel Systems Private Limited G-65, Sec-63, 201301, Noida Uttar Prades, India Ph. +91 9811157589	Processing, sorting and grading machines and lines for Cucumbers.
9	SS Engineers & Consultants 11-49, Morampudi Junction, Pidimgoyya Panchayati, Rajahmundry - 533107, East Godavari, Andhra Pradesh, India Ph: 08042958925	Washer, Inspection conveyor
10	Shivsu Canadian Clear International Limited (Chennai) No.6B Parivakkam Road, Leelavathi Nagar, Cheneerkuppam, Parivakkam Parivakkam , Chennai-600056, Tamil Nadu, India	Bottle washers, Tunnel pasteurizers
11	Specific Conveyors Plot No. 28 & 38, Sy No. 160 To 163, Cherlapalli, Hyderabad - 500051, Telangana, India Ph: 08048573750	Conveyors, Grading system, Bottle conveyors
12	Gee Gee (Foods & Packaging) Co. Pvt. Ltd Address : B- 188/2, Savitri Nagar, Malviya Nagar New Delhi - 110017 (India) Mobile No. : +91-9868849305 Office Phone: 011-26013003, 26011892 , 26014370 (Fax)	Bottle washers, can reforming & seaming machinery, Flange rectifier, Lug capping machinery



## Contact Us

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