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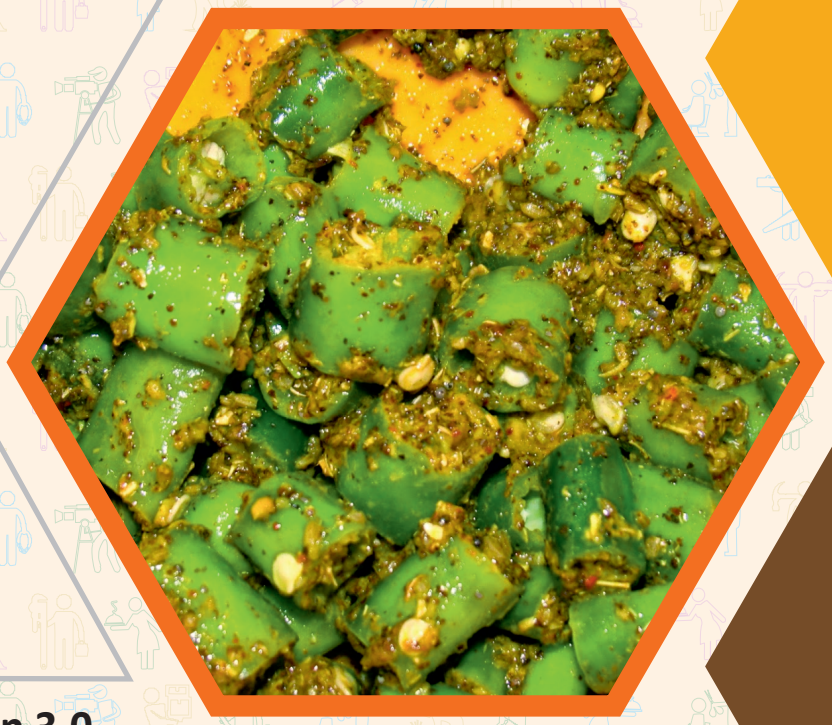
Participant Handbook



Sector
Food Processing

Sub-Sector
Fruits and Vegetables Processing

Occupation
Pickle Making Technician

Reference ID: **FIC/Q0102, Version 3.0**
NSQF level: 3

Pickle Making Technician

Published by

Food Industry Capacity & Skill Initiative (FICSI)

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First Edition, November 2022

This book is sponsored by Food Industry Capacity & Skill Initiative (FICSI)

Printed in India by FICSI

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> Skilling is building a better India. If we have to move India towards development then Skill Development should be our mission.

Shri Narendra Modi
Prime Minister of India

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is hereby issued by the

FOOD INDUSTRY CAPACITY AND SKILL INITIATIVE SECTOR SKILL COUNCIL

for

SKILLING CONTENT - PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

Job Role/ Qualification Pack: **'Pickle Making Technician'** QP No. **'FIC/Q0102, NSQF Level 3'**

Date of Issuance: **July 29th, 2021**

Valid up to: **July 29th, 2024**

**Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)*

Authorised Signatory
(Food Industry Capacity and Skill Initiative Sector SkillCouncil)

Acknowledgements

FICSI is thankful to all organizations and individuals who have helped us in preparation of this practical guide.

We also wish to extend our gratitude to all authors who reviewed the content and provided valuable inputs for improving the quality, coherence, and content presentation in chapters.

The preparation of this participant Handbook would not have been possible without the support of the Food Processing Industries. The Industry feedback has been extremely encouraging from inception to conclusion & it is with their inputs that we have tried to bridge the skill gaps existing today in the Industry.

This participant handbook is dedicated to all the aspiring youth who desire to achieve special skills which would be a lifelong asset for their future endeavors and help them make a bright career in the Food Processing Sector.

About this book

This Participant Handbook is designed to enable training for the specific Qualification Pack(QP). Each National Occupational (NOS) is covered across Unit/s.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS. Symbols used in this book are described below.

This reference book has been developed for use by partiipants of the skill development course for a Pickle Making Technician being implemented by FICSI through its affiliated training service providers. The contents of this book are completely aligned to the Qualification Pack for the role of a Pickle making Technician NSQF level 3 and has been divided into Units corresponding to each NOS. The contents of the book have been developed by NIFTEM (National Institute of Food Technology, Entrepreneurship and Management, Kundli), funded by MOFPI, Government of India.

The Pickle Making Technician is responsible for preparing different types of pickles from various fruits and vegetables. This role is similar for processing all types of pickles in manual and machine operated units.

1. FIC/N0105: Prepare and maintain work area and process machineries for pickle making
2. FIC/N0106: Prepare for pickle making
3. FIC/N0107: Pickle making
4. FIC/N0108: Complete documentation and record keeping related to pickle making
5. FIC/N9001: Ensure food safety, hygiene and sanitation for processing food products
6. DGT/VSQ/N0101: Employability Skills (30 Hours)

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1. Introduction

Unit 1.1 - Introduction to Food Processing

Unit 1.2 - Terminologies Used in Pickle Making

FIC/N0105

Key Learning Outcomes

At the end of this module, you will be able to:

1. Describe the food processing sector in brief
2. Discuss the career opportunities available within the food processing sector

UNIT 1.1: Introduction to Food Processing

Unit Objectives

At the end of this unit, you will be able to:

1. List the various sectors of food processing industry
2. Define food processing

1.1.1 Food Processing

Agriculture is India's mainstay industry. The majority of the products from various agricultural occupations are consumed within the country and exported to different countries around the world. Agriculture produce is also used as a raw material in the food processing industry. Food processing is the process of transforming raw materials into finished goods. They could be processed foods, ready-to-eat foods, food additives, or ingredients used to make other foods. The following figure explains the different level of food processing.

Primary Food Processing

- Primary Processing relates to the conversion of raw agricultural produce, milk, meat, and fish into a commodity that is fit for human consumption
- It involves steps such as cleaning, grading, sorting, packing, etc.

Secondary Processing

- Secondary food processing is the conversion of ingredients into edible products -
- This involves combining foods in a particular way to change properties. E.g. - Preparing of orange juices from oranges

Tertiary Food Processing

- Tertiary food processing is the commercial production of what is commonly called processed food
- These are ready-to-eat (RTE) or heat-and-serve foods.

Fig. 1.1.1: Level of Food Processing

1.1.2 Journey of Food from Harvest to Consumer

The flowchart below explains the process by which food material becomes a final, consumable product for various customers.

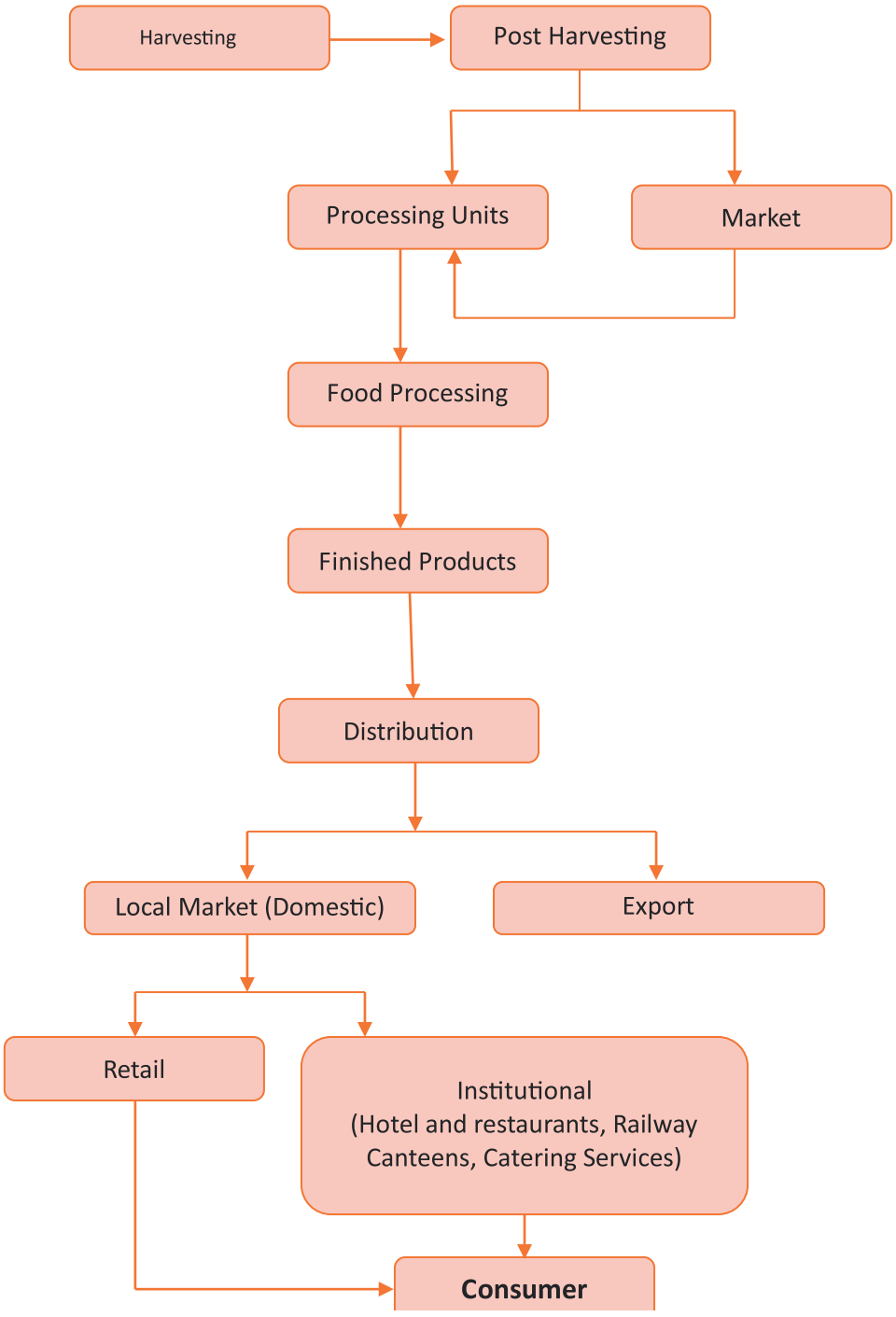

Fig. 1.1.2: Journey of Foods from Farm to Consumer

1.1.3 India's Food Processing Industry

- The major segments in the Food Processing sector comprise of Fruits and Vegetables, Dairy, Edible Oils, Meat and Poultry, Non-alcoholic beverages, Grain-based products, Marine products, Sugar and sugar-based products, Alcoholic beverages, Pulses, Aerated beverages, Malted beverages, Spices, and Salt.
- In India, the food processing industry is divided into several sub-sectors.

Dairy	• Whole milk powder, skimmed milk powder, condensed milk, ice-cream, butter and ghee, cheese etc.
Fruit and Vegetable Processing	• Beverages, juices, concentrates, pulps, slices, frozen and dehydrated products, potato wafers, pickles and pastes etc.
Grains and Cereals	• Beverages, juices, concentrates, pulps, slices, frozen and dehydrated products, potato wafers, pickles and pastes etc.
Fisheries	• Flour, bakeries, starch glucose, cornflakes, malted foods, vermicelli, beer and malt extracts, grain-based alcohol etc.
Meat and Poultry Processing	• Fish oil, frozen and canned products
Bread and Bakery	• Biscuits, breads, buns, cakes, confectionery, pastries, cookies, etc.
Consumer Foods	• Snack foods,namkeen, biscuits, ready-to-eat foods, alcoholic and non-alcoholic beverages

Fig. 1.1.3: Sub-Sectors of the Food Processing Industry

1.1.4 Overview of the Fruit and Vegetable Sector

The fruit and vegetable processing sub-sector deals with processed foods, semi-processed foods, and packaged foods that are made from fruits and vegetables. Theses includes:


Frozen foods


Confectionaries


Pickles


Jams


Juices


Jellies


Pulps


Concentrated foods

Fig. 1.1.4: Various Processed and Semi-Processed Food Products

Certain parameters are important to consider when selecting a fruit/vegetable for processing. They are:

1. Demand for processed food made from that vegetable/fruit
2. High quality produce
3. Coninuous supply

These parameters are critical for ensuring that raw materials can withstand the processing and preservation processes.

1.1.5 Market trends of Pickle Processing

- Pickles are preserved relishes made from vegetables or fruits that are widely consumed and have a ready market. Pickles are also recommended by health experts for consumption, albeit in moderation, due to their high concentration of essential nutrients such as iron, vitamins, potassium, and calcium.
- As a result, growing awareness about the health benefits of these anti-oxidant-rich products, such as preventing insulin resistance, aiding weight management, improving digestion, and reducing ulcers and muscle cramps, is expected to expand the segment in the near future.
- In recent years, a surge in promotional activities by manufacturers of packed pickles across multiple platforms has piqued consumer interest.
- This is also supported by an increase in demand for multi-cultural cuisines. The rising demand for non-GMO (genetically modified organisms) and organic pickles is expected to propel the global pickles market during the forecast period.
- Furthermore, the thriving food-service sector is contributing to the increasing demand for pickles around the world, which is expected to drive market growth.

- The global packed pickles market was worth USD 7.9 billion in 2018 and is expected to grow at a CAGR of 3.5 percent between 2019 and 2025. Pickles are primarily a domestic product that is consumed on a daily basis by nearly all Indian households. This is a global trend among the Indian diaspora. The Middle East and Africa are expected to grow at a CAGR of 6.6 percent from 2019 to 2025, making them the fastest-growing regional market.
- The rising popularity of online grocery shopping apps in both developing and developed countries will be the driving force behind segment growth.
- Amazon and Walmart have made inroads into the online grocery business, gaining significant popularity among urban consumers.
- In 2019, the fruit segment dominated the packed pickles market, accounting for more than 45.0 percent of the market.
- Mangoes, pears, olives, grapes, apples, peaches, currants, plums, and tomatoes are some of the most popular pickled fruits worldwide.
- Without a smidgen of pickles, no Indian meal is complete. Pickles are eaten as both savory items and as side dishes with main courses, particularly in Indian cuisine. Aside from the domestic market, Indian pickles are in high demand abroad. Pickles are becoming increasingly popular around the world as a result of their high quality.
- On the basis of product types, the market can be segmented into fruits, vegetables, meat, seafood, relish, etc. As per taste, the market is segmented into sweet, salty, and sour pickles. On the basis of distribution channels, the market is divided into grocery retailers, hypermarkets, supermarkets, food services, online retailers, etc.
- The global pickle market has been segmented into jars, bottles, pouches, tubs, and others based on packaging type. During the assessment period, the jars segment is expected to dominate the global pickles market because jars are easy to transport and store and are cost-effective. The pouches segment is expected to grow at the fastest rate due to their ease of storage and use as refill packs. Furthermore, using Tetra Pak pouches results in longer shelf life.

1.1.6 Methods of Processing Fruits and Vegetables

The following are some common methods of processing fruits and vegetables:

Drying

Concentration

Washing

Fermentation

Sterilization

Pasteurization

Blanching

Canning

Fig. 1.1.5: Different Food Processing Methods

UNIT 1.2: Terminologies Used in Pickle Making

Unit Objectives

At the end of this unit, you will be able to:

1. List the various terminologies used in the process of making pickle
2. Discuss the various organisational procedures and processes for making pickles and pastes
3. Discuss the standards to be followed for handling hazards and ensuring a clean work area

1.2.1 Various Terminologies Used in Pickle Making

The following table explains various terms used in pickle making.

Terminology	Meaning
Brine	It is the salt solution used in the curing process.
Brine strength	It is the weight of salt in proportion to the weight of the solution.
Degree salinometer	It is the tool for measuring the percentage of salt in the brine.
Salt equilibrium	It is the strength of salt in the brine. For pickling process, it has to be maintained between 12 to 14% of the volume of the final produce. At this strength, the pickle can be preserved for a long time.

Table 1.2.1: Common Terminology in Pickle Making

1.2.2 Types of Pickles

There are various types of pickle available in the market. The following table 1.3 list the different types of pickles and the places in India where they are most popular.

Types of Pickle	Example	Popular in
Chutney /Paste	Gongura, Tomato	South India
Dry	Lemon, Mango	UP. Bihar
Stuffed	Chilies	North India
Oil	Mango, mixed	Throughout India
Fermented	Cucumber, onion	Outside India
Non-Vegetarian	Chicken, mu on, pork	HP, U arkhand, Punjab

Table 1.2.2: Types of Pickle

1.2.4 Organizational Processes for Making Pickles

Pickling is a food preservation method used to make pickles. This method extends the shelf life of a specific food. Pickling food is done by immersing it in a salt solution or vinegar. The preservative quality of salt, combined with the acidic nature of the solution, prevents spoilage. This combination also produces lactic acid. It is done in a controlled environment where the temperature, storage conditions, and humidity in the air are all monitored. The resulting product has a salty and sour flavor that people refer to as “Pickle."

Pickles are foods made from fruits or vegetables. They are spice-flavored and preserved in salt solutions or vinegar to prevent spoilage. Pickles are traditionally made in every Indian home. However, increased demand for reputable brand pickles in recent years resulted in pickle-making companies entering the market to meet domestic and international pickle demand. Pickles are produced using cutting-edge technology and higher-quality ingredients to ensure that they last longer. They are made with high-quality edible oils to increase the shelf life by more than a year.

However, there are other types of pickles made from local produce that have a shorter shelf life. Pickles are processed in two ways: Curing and Fermentation.

1. **Curing Process**

   Step 1: Fruits and vegetables are washed, cleaned, and cut.

   Step 2: After this, they are kept in 12% salt solution, also called as brine.

   Step 3: The cured fruit or vegetable is stored in barrels.

   Step 4: Later, the cured fruits and vegetables are mixed with spices and ingredients. Step 5: Then, the mixture is covered with oil to make oil pickles.

2. **Fermentation:**

   Step 1: Cured fruits and vegetables are mixed with vinegar or acetic acid and are kept for fermentation.

   Step 2: In this process, the fermentative bacteria produce acids necessary for the preservation process. These bacteria also generate flavor compounds. This helps to enhance the taste of fermented pickles.

The following figure gives an overview of the pickle-making process. It demonstrates how raw materials are processed to make pickles.

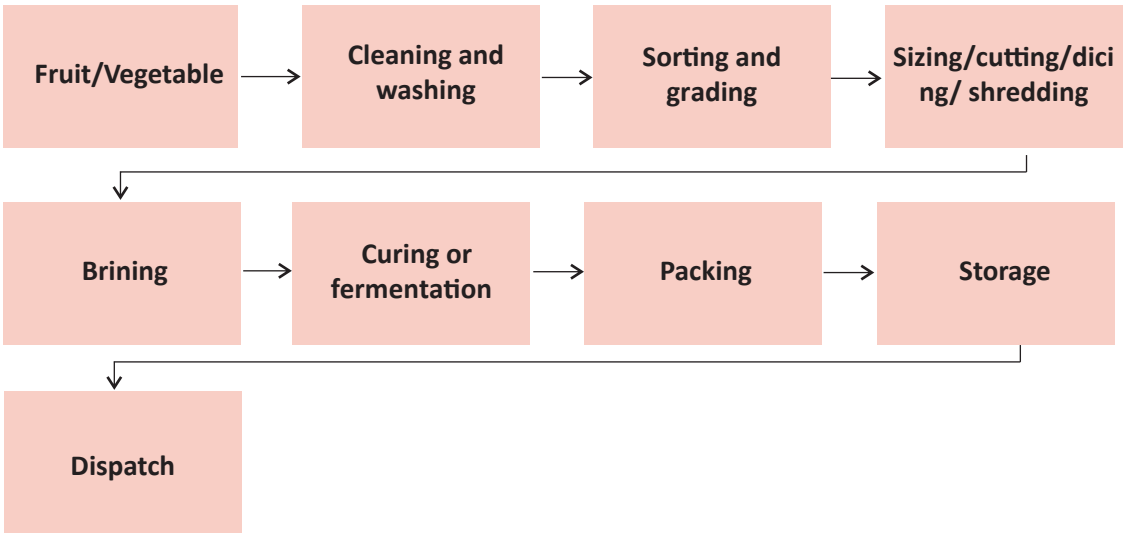

Fig. 1.2.1: Standard Procedure for Pickle Making

1.2.5 Finished Product Analysis

It is an optimum standard maintained continuously as per the company standard norms to produce a quality product and specific guidelines as per the government. If the quality standards are not maintained, then it could lead to fatal consequences. Processed food free from contamination will not cause any harm to the customers.

Every step involved in the process requires monitoring, inclusive of food safety and personal hygiene. For example, in pickles and pastes a quality check is done based on technical specification and organoleptic, which differ from fruit to fruit. Following are the parameters for quality check:

- **PH –** a numeric scale to check acid levels in pickles. Each fruit or vegetable has its own acidity level. The processing company maintains it as per their requirement.

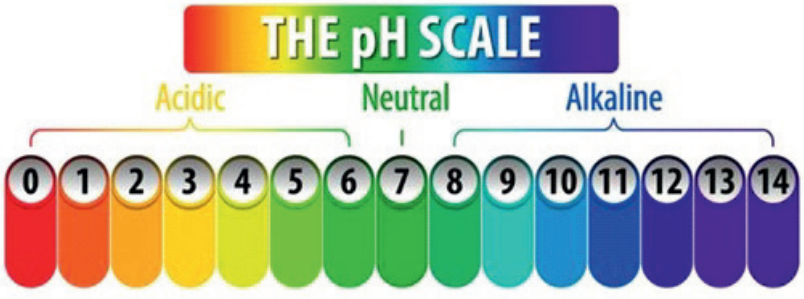

Fig. 1.2.2: pH Scale

- **TSS (Total Soluble Solids) –** It is the extracted mass of fruit, which contains fibers and fruit sugar. Each fruit or vegetable has its own Brix ratio. It is maintained as per company's requirement.
- **Viscosity -** Viscosity is a measure of a fluid's resistance to flow. It is measured by refractometer as per the need.

Fig. 1.2.3: Refractometer

- **Taste/flavour, colour, and texture –** it is checked by tasting the product.

- **Determination of drained weight -** The sample is drained on a standard mesh sieve. The weight of the material remaining on the sieve is expressed as percentage of the total weight of the can.

Fig. 1.2.4: Sieve and Weighing Scale

- **Determination of sodium chloride in brine -** Direct titration of sodium chloride in brine with standard silver nitrate solution is adequate for routine analysis.

Summary

- Food processing is the process of transforming raw materials into finished goods. They could be processed foods, ready-to-eat foods, food additives, or ingredients used to make other foods.
- There are three types of food processing – primary, secondary and tertiary processing.
- In India, the food processing industry is divided into several sub-sectors such as dairy fruit and vegetable processing, grains and cereals, fisheries, meat and poultry processing, bread and bakery and consumer foods.
- The fruit and vegetable processing sub-sector deals with processed foods, semi-processed foods, and packaged foods that are made from fruits and vegetables. For Example – juices, jellies, pulps,
- Food processing is the process of transforming raw materials into finished goods. They could be processed foods, ready-to-eat foods, food additives, or ingredients used to make other foods.
- There are three types of food processing – primary, secondary and tertiary processing.
- In India, the food processing industry is divided into several sub-sectors such as dairy fruit and vegetable processing, grains and cereals, fisheries, meat and poultry processing, bread and bakery and consumer foods.
- The fruit and vegetable processing sub-sector deals with processed foods, semi-processed foods, and packaged foods that are made from fruits and vegetables. For Example – juices, jellies, pulps, concentrated foods
- The important parameters to consider when selecting a fruit/vegetable for processing are demand for processed food made from that vegetable/fruit, high quality produce and continuous supply
- Pickles are recommended by health experts for consumption, albeit in moderation, due to their high concentration of essential nutrients such as iron, vitamins, potassium, and calcium.
- The rising demand for non-GMO (genetically modified organisms) and organic pickles is expected to propel the global pickles market during the forecast period.
- The thriving food-service sector is contributing to the increasing demand for pickles around the world, which is expected to drive market growth.
- The global packed pickles market was worth USD 7.9 billion in 2018 and is expected to grow at a CAGR of 3.5 percent between 2019 and 2025.
- Amazon and Walmart have made inroads into the online grocery business, gaining significant popularity among urban consumers.
- Mangoes, pears, olives, grapes, apples, peaches, currants, plums, and tomatoes are some of the most popular pickled fruits worldwide.
- Aside from the domestic market, Indian pickles are in high demand abroad. Pickles are becoming increasingly popular around the world as a result of their high quality.
- The pouches segment is expected to grow at the fastest rate due to their ease of storage and use as refill packs. Furthermore, using Tetra Pak pouches results in longer shelf life.
- The roles and responsibilities of Pickle making technician includes -handle raw material from post-harvest storage to process line, record-keeping and documentation, hygiene and sanitation maintenance, plan and execute pickling process to follow storage and packaging norms etc.
- Brine is the salt solution used in the curing process whereas brine strength is the weight of salt in proportion to the weight of the solution.
- Degree salinometer is the tool for measuring the percentage of salt in the brine.
- Pickling food is done by immersing it in a salt solution or vinegar.
- Pickles are processed in two ways: Curing and Fermentation.

Exercise

Answer the following questions:

1. List the roles and responsibilities of pickle making technician.
2. Name any two types of pickle.
3. What is brine strength.
4. Write a short note on standard procedure for pickle making.

Fill in the Blanks:

5. _____ and _____ are the most important factors to consider when working in the food processing industry.
6. _____ is done by immersing it in a salt solution or vinegar.
7. _____ is the tool for measuring the percentage of salt in the brine.
8. _____ attend to minor repairs of tools and machinery as per requirement.

Notes

Scan the QR codes or click on the link to watch the related videos

www.youtube.com/watch?v=wMu0EpUgCd4

Overview of Food Processing Industry

www.youtube.com/watch?v=iacTHJtrXIE

Overview of Fruits & Vegetables Industry

www.youtube.com/watch?v=H0l5JQJ3fos&t=74s

Orientation Video

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2. Professional and Core Skills

Unit 2.1 - Identification of Personal Strength and Weaknesses

Unit 2.2 - Decision Making

Unit 2.3 - Communication Skills

Unit 2.4 - Personal Hygiene

FIC/N0105

Key Learning Outcomes

At the end of this module, you will be able to:

1. Illustrate how to conduct yourself at the workplace
2. Illustrate the personal hygiene and sanitation guidelines
3. Illustrate the food safety hygiene standards to follow in a work environment

UNIT 2.1: Identification of Personal Strength and Weaknesses

Unit Objectives

At the end of this unit, you will be able to:

1. Undertake self assessment test
2. Identify personal strengths and weaknesses

2.1.1 SWOT

SWOT indicates strengths, weaknesses, opportunities, and threats. SWOT contributes in thinking about what they should and or shouldn't do. The framework also helps in identifying personal strength and weaknesses.

SWOT is a structure for calculating one's strengths, weaknesses, opportunities and threats that one may face. Through this one can focus work on his/her strengths, minimize weaknesses, and take the highest possible gain ofopportunities.

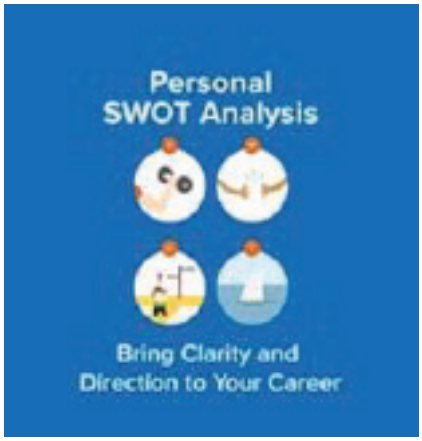

Fig. 2.1.1: Analysis

2.1.2 How to Conduct SWOT

Note down the answers of the subsequent questions

Strengths

- What are the benefit you are having which others don't have (example- skills, certifications, education, or connections)?
- What can you achieve superior match up to any other person?
- What are the special assets which you can avail?
- What others (your boss, in particular) monitor in you as your strengths?
- Among your all achievements on which you are most proud of?
- What are the morals you consider in, that mostly others fail to illustrate?
- Are you a member of association from which none is associated with? If yes, then what relations you have with leading people?

Weaknesses

- What jobs you generally avoid as you are not confident in performing them?
- What others (people around you) monitor in you as your weaknesses?
- Do you have full confidence in your education and skill training? If no, then where are you weak?
- Do you have any unconstructive job habits (example- are you habitually late, are you unsystematic, are you short temper, are you poor at stress management)?
- What are the personality behaviors that clutch you back? Example- you have to do meetings regularly, but you have fear of public speaking then this would be your major weakness.

Opportunities

- What are the latest technologies that can assist you? can you take help from other peo-ple or via internet?
- What is the status of your industry? If it is growing then how you can obtain the benefit from existing market?
- Are you a part of any group of strategic contacts which can help you or suggest good advices?
- What are the trends (management or other) you notice in your company? how you can avail benefit from them?
- Is your competitors are fading to do something important? If yes, then can you take benefit from their mistakes?
- Do you think there is any need in your businessthat no one is satisfying?
- Is there any complain from clients or vendors about anything in your corporation? If yes, then can you generate an opportunity by contributing any solution?

Threats

- What are the challenges you are currently facing in your work?
- Is your co-workers are competing with you for the projects or job?
- Is your work or the requirement of your job/services is changing?
- Do you believe, growing technology will threaten your position?
- Do you believe, any of your weaknesses will lead to threats?

2.1.3 SWOT Analysis

Write the strengths, weakness, oppotunities and threats in the 4 sections here

Strengths	Weaknesses
Opportunities	**Threats**

Table 2.1.1: Swot Anakysis

SWOT Analysis

1. Was this activity helpful in doing a self-assessment?
2. What were some of the most interesting things you discovered about yourself during the activity?

UNIT 2.2: Decision Making

Unit Objectives

By the end of this unit, the participants will be able to:

1. To choose two or more courses of actions to solve problem quickly and timely
2. Explain what is decision making
3. List various techniques of decision making

2.2.1 What is Decision Making?

- Decision making is the process of creating choices by identifying a decision, gathering information, and assessing alternative resolutions.
- Using a step-by-step decision-making process can help you make more deliberate, thoughtful decisions by organizing relevant information and defining alternatives. This approach increases the chances that you will choose the most satisfying alternative possible.

2.2.2 Steps of Effective Decision Making

- Decision making is the process of creating choices by identifying a decision, gathering information, and assessing alternative resolutions.
- Using a step-by-step decision-making process can help you make more deliberate, thoughtful decisions by organizing relevant information and defining alternatives. This approach increases the chances that you will choose the most satisfying alternative possible.

1. Listing all possible solutions/options
2. Setting a time scale and deciding who is responsible for the decision
3. Weighing up the risks involved
4. Deciding on values, or in other words what is important
5. Making the decision

Fig. 2.2.1: Steps for Effective Decision Making

2.2.3 How to Develop Decision Making Skills

- Please answer all these answers as honestly as possible
- Circle your answer for each answer
- Refer to the result table below and evaluate the results

Sl. No.	Decision making skills	Mark where you stand (circle your answer)				
		Strongly agree	agree	Somewhat agree	Somewhat disagree	Strongly disagree
1	Desire to actively participate in the process of solving/ improving a situation					
2	Too much analysis of situation results in delaying decision					
3	Respect other peoples suggestion and recommendations					
4	Analyze and calculate the risk and problems which may occur after taking a decision					
5	Follow work place rules and regulations in situations involving high level of risk at work					
6	Use your job specification to take appropriate decision					
7	Do not hesitate to consult your supervisor and subordinates before arriving to a decision point					
8	Do not make workplace decision on emotions					

Table 2.2.1: Format for Evaluation of Decisions

Result

Your Score	Evaluation	Result
1-3	You need to work hard to develop decision making quality	Need hard work
4	You possess this quality but need to enhance this for success	Keep improving
5	You possess this quality and this is your strength. Use it to make timely and effective decision	Use this strength always

Table 2.2.2: Result

UNIT 2.3: Communication Skills

Unit Objectives

By the end of this unit, the participants will be able to:

1. Record the types of communication skills

2.3.1 The Types of Communication Skills

Communication skill mainly addresses to the ability of the ways in order to communicate effectively with managers, colleagues and staff. It is an essential part for every industry. Communication is the act of transferring information from one place to another. It may be vocally (using voice), written (using printed or digital media such as books, magazines, websites or emails, visually (using logos, maps, chats or graphs), nonverbally (using body language, gestures, tone and pitch of voice). In practice it is often a combination of several of these. Productive communication skills in the workplace can reduce conflicts, lower the risk of projects indirectly and thus would make the work more agreeable.

In today's scenario having technical skills is not only enough to get the work done in the workplace. Completing the task must require the support of the whole team, and without proper communication, things will remain stringent in order to get better communication in the workplace. Communication skills are absolutely necessary for successful communication both in the workplace and in private life.

Fig. 2.3.1: Essential Communication Skills

- **Body Language (non-verbal):** When there is a discussion about body language, it refers to the ways by an individual presents themselves while interacting with someone. It includes body posture, hand movements or gestures, the type of eye contact that is made, and the voice tone.
- **Listening:** Communication in the workplace is not entirely about speaking; it mainly represents atwo-way channel. Onehas to pay close attention while talking, as this allows the team members to ask and clarify their doubts as well asinquiries to ensure that they are on the same page or track.

Fig. 2.3.2: 7 Key Active Listening Skills

- **Clarity and Conciseness:** One of the major ingredients for effective communication in the workplace is clarity, which mainly stands to be responsible to expresses the attempt of conveying an individual's message in the simple way possible. Before you start a conversation, type an email or being a discussion, have in mind what the purpose of the communication is and what information you hope to obtain as a result.
- **Friendliness:** In order to engage with the team members in an open or honest discussion, a person needs a friendly tone, a personal question, or simply a smile. It is important because the team members would not hesitate to contact the individual as they would be easily approachable for the conversation.

- **Empathy:** Showing compassion or empathy even when the individual disagrees with an employer, co-worker, or employee state to be very important as it helps in understanding their point of view and also respects their decision.
- **Confidence:** It is an important step to be confident when an individual tends to interact with others. As in all interactions, confidence (but not overconfidence) is crucial part. Conveying with confidence will give you peoples, faith in your abilities and will take you seriously.
- **Respect:** The employee must respect their co-workers' roles, skill set and ideas in order to meet the company's overall goal as a team.

  The team must communicate with each other in a respectful manner every time. Conveying them with respect through email by taking the time in order to edit their message is also required. If the individual would send them a sloppy written, confusing email, the recipient will think them to be disrespectful and also encourage them to think through the person's communication.

Summarizing the concept:

Effective and clear communication at the workplace ensures that the healthy work environment supports the overall team development, engagement of employees, innovative idea, which in turn help the overall company's growth, enhancing the goodwill and trust of its customers.

UNIT 2.4: Personal Hygiene

Unit Objectives

By the end of this unit, the participants will be able to:

1. Identify types of health and safety policies and procedures

2.4.1 Personal Hygiene

The expression "food hygiene" is often associated to personal hygiene. The concept of food hygiene really refers to the general cleanliness state of the food handlers' body and clothes. Microorganisms can easily pass to food and reach the consumer if the handler comes into contact with any pathogenic microorganism by their clothes, hands, hair, nails, rings and then sets out to prepare food. As so, the personal hygiene of whoever contacts with food, as well as behaviors they assume during its processing, constitute an important preoccupation in the food business. The set of rules, conditions and practices that assure adequate personal hygiene make up the good practices for personal hygiene.

2.4.2 Importance of Personal Hygiene

It is imperative for safe food-handling outcomes for all workers to be familiar with standard sanitation and hygiene practices. Fig. 2.4.1 shows the cycles of transmission of micro-organisms. One of the basic principles is to break the cycle by avoiding cross-contamination, which can be achieved by ensuring personal hygiene practices are followed.

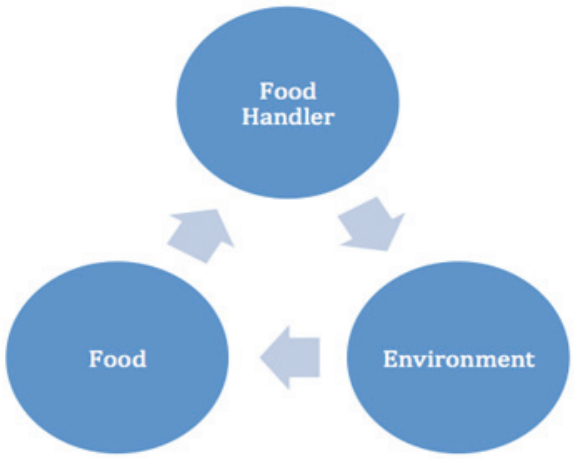

Fig. 2.4.1: Importance of Personal Hygiene

Proper personal hygiene is critical in any food service premise. Personal hygiene includes:

- Showering and bathing regularly
- Keeping hair clean hair and covered or tied back
- Keeping clean clothing and footwear that is used only at work
- Hand washing regularly

Fig. 2.4.2: Personal hygiene

2.4.3 Hand Washing

Proper and regular hand washing is a critical part of any food safety system.

Fig. 2.4.3: Methods of washing hand

How to Use Sanitizer?

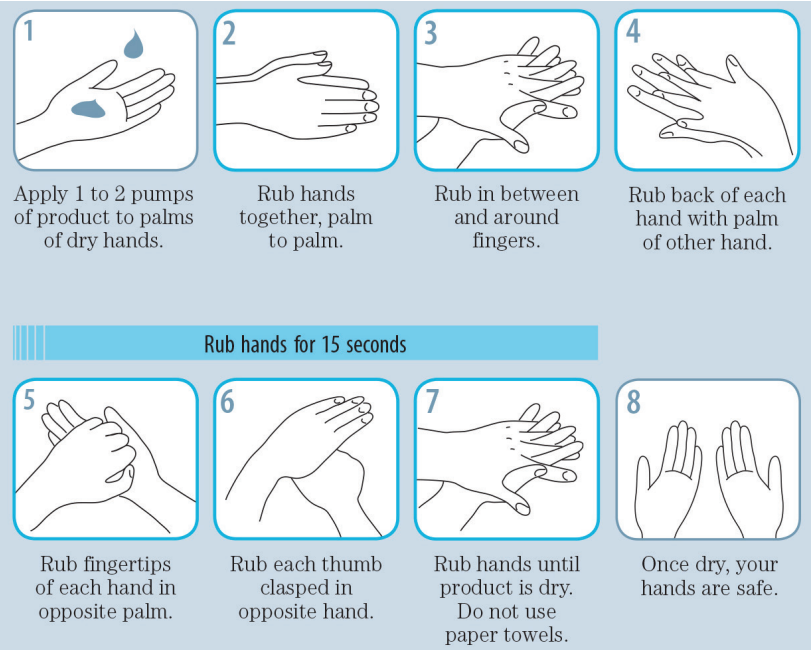

Fig. 2.4.4: Usage of Sanitizer

When to Wash and Sanitize Hand?

Fig. 2.4.5: Times to wash and sanitize hand

We need to stop the spread of COVID-19 in food industry by washing hands regularly with soap and water for 20 seconds – especially after going to the bathroom, before eating, and after coughing, sneezing, or blowing our nose.

Notes

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RE IMAGINE FUTURE

3. Prepare and Maintain Work Area and Process Machineries for Pickle Making

FICSI
Food Industry Capacity and Skill Initiative

Unit 3.1 - Cleaning and Maintenance

FIC/N0105

Key Learning Outcomes

At the end of this module, you will be able to:

1. How to prepare for production of pickle making
2. How to clean the production area for pickle making

UNIT 3.1: Cleaning and Maintenance

Unit Objectives

At the end of this unit, you will be able to:

1. List the materials and equipment used in cleaning and maintenance of the work area
2. List the sanitizers used in cleaning work area and machineries
3. Identify different kinds of waste material and comprehend the ways to dispose them safely
4. Specify the inspection procedure for inspecting the tools, equipment, and machinery used in the job
5. State the importance of reporting information such as faulty tools and equipment to the concerned authority

3.1.1 Cleaning and Sanitizing Work Area and Machinery

The cleaning and sanitizing process are one of the most essential programs in the food processing industry. It has always been a critical element for ensuring food safety and quality. Pickle - making industries need to be kept spotlessly clean to ensure compliance with standard regulations and prevent contamination. Everything from random debris to flakes of rust and paint needs to be kept clear from foodstuff to make sure the product is entirely safe for consumption, so frequent cleaning is vital to pickle processing operations.

Though the entire process is quite tricky because of the complexity of the machinery and equipment used for pickle making, it can also introduce additional difficulty by creating a wet environment. The equipment for pickle making must be designed and built to withstand these environments, like using only food-grade stainless steel, but the complexity doesn't end there. High- pressure washers used to clean equipment can also strip the coatings on machines and cause injuries to employees. Also, if there is oil on the floor, perform cleaning on time to avoid slips or falls. The wet environment often poses a slip-and-fall hazard as well as food contamination.

Cleaning and sanitizing (disinfecting) are usually two separate processes. Effective cleaning must be carried out before sanitizing the work area and machinery, as sanitizers may not work as well if the work area or machinery has not had all visible contamination removed. Cleaning is often done using the correct proportion of detergent and water. Detergents are chemicals that eliminate dirt and grease. However, it does not kill bacteria and other microorganisms. Microorganisms may be removed during the cleaning process but they can't be destroyed properly. Hence, sanitizing is required for this purpose.

The primary reasons for cleaning and sanitizing the work area and machinery used for pickle making are:

Fig. 3.1.1 Reasons for Cleaning and Sanitizing

The food processing industry follows standard procedures for cleaning the work area to ensure no bacterial growth due to the presence of leftover food particles. For cleaning purposes, the pickle making work area are divided into two categories:

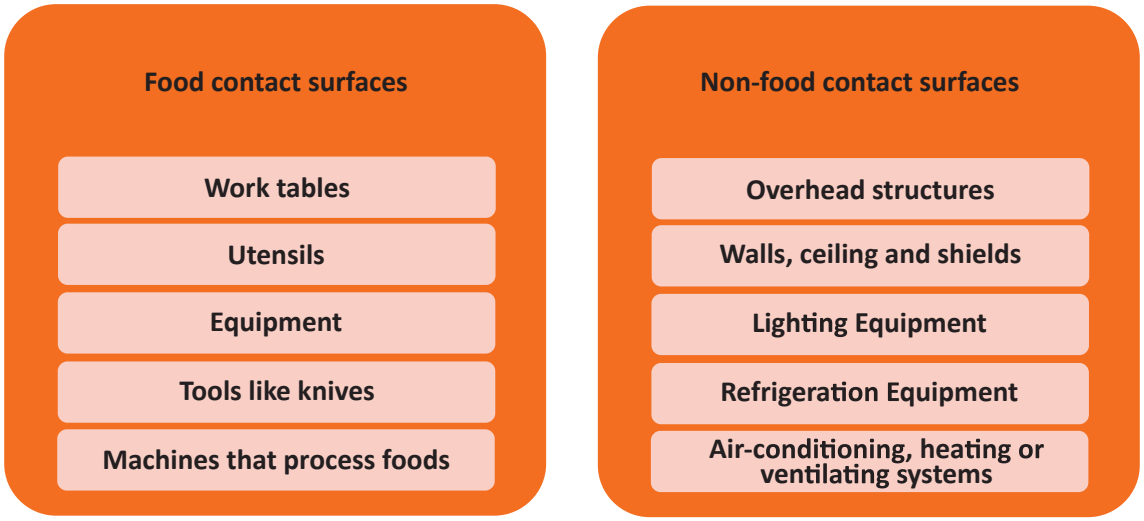

Fig. 3.1.2: Cleaning Work Area Categories

Proper and regular cleaning of the work areas protects food from any contamination. The cleanliness of the ambient air should also be controlled in the workplace, where contamination of any infectious material will be dangerous. The surfaces used for producing and storing pickle products should always be dry and hygienic during use. When wet cleaning is required, these surfaces must be sanitized and thoroughly dried to use. The entire work area in wet applications must be cleaned and sanitized absolutely before use or at the risk of contamination. Pickle -making equipment and tools when not in usage should be stored properly to avoid any contamination risk.

3.1.1.1 Types of Cleaning Equipment & Materials for Work Area & Machinery

Cleaning equipment is divided in to two sub-categories:

1. **Manual cleaning equipment –** Depends upon operation and energies of the employees and requisite the staff's maximum effort and techniques for cleaning.
2. **Automatic cleaning equipment –** Requires electricity or ba ery power for the operation. These cleaning machines ease labor and save a lot of time.

Microfiber Cloth

Abrasives

Different types of cleaning brushes - e.g. hard and soft floor brushes, scrubbing brushes.

Brooms

Vaccum Cleaner

Polishing Machine

Floor Scrubber

Steam Vapour Machine

High Pressure Sprays

Fig. 3.1.3: List of Equipment and Materials for Cleaning Work Area

3.1.1.2 Cleaning Agents and Sanitizers Used for Cleaning

There are several common cleaning and sanitizing agents that can be used to clean the food-contact and non-food contact surfaces. Select the right kind of cleaning agent or sanitizer based on the variation of soils, water hardness, the temperature of the method, plant surfaces, machinery, equipment, and tools.

Detergent suppliers usually have a range of detergents to be employed in varying and specific circumstances. The range of products will include:

Alkalis: • Caustic soda • Caustic potash • Coronate • Silicate, • Phosphate	**Acids:** • Phosphoric • Nitric • Citric • Glycolic	**Chelates:** • EDTA • NTA • Gluconate • Glucoheptonate, citrate • Polymeric	**Solvents:** • Isopropanol • Propylene • Butyl diglycol • Ethers	**Surfactants:** • Anionic • Cationic • Non-ionic • Amphoteric
Inhibitors: • Organic • Inorganic	**Enzymes:** • Protease • Lipase • Amylase	**Oxidising agents:** • Hypochlorite • Isocyanurates	**Stabilisers**	**Viscosity modifiers**

Fig. 3.1.4: Various Ranges of Detergents

There are three acceptable types of sanitizer solutions for use in the food processing industry.

Chlorine (Bleach) Concentration 50 to 100 ppm	• They are inexpensive and commonly used sanitizers that are effective against all bacteria. • Bleach is less effective in hot water and works best at a temperature range of 12.78°C-23.89°C. • Do not use splashless, scented or non-chlorine/color safe bleach.
Quaternary Ammonia (QUAT, QAC) Concentration: As per manufacturer's instruction	• These come in diluted form and are oderless, colorless and nontoxic. • They are stable at high temperatures, and are more effective in the presence of organic materials than chlorine. • It takes longer time to sanitize against some common spoilage bacteria.
Iodine Concentration 12.5 to 25 ppm	• Iodine compounds or iodophors are fast-acting and effective against all bacteria. • They are relatively nontoxic, non-irritating to skin, and stable.

Fig. 3.1.5: List of Sanitizers for Work Area and Machineries

3.1.1.3 Effective Practices for Sanitization and Cleaning

It is compulsory to follow the manufacturer's instructions provided on the label for effective and safe use of a sanitizer.

- Some sanitizers are toxic to people, and the residue must be rinsed off, while other sanitizers are food-safe and do not require rinsing. So, the manufacturer's instructions shall always be followed for the sanitizer to ensure safe use.
- Sanitizers work best at the correct dilution. If they are too weak, they do not work effectively, and money is being wasted if they are too strong.
- Sanitizers need time to work. The contact time varies depending on the job.
- Check the dilution, contact time, safety precautions, shelf life, and storage of all chemicals before use.

Cleaning and sanitization take time and cost money. However, well-designed and organized food processing businesses can reduce the time needed for thorough cleaning with proper planning. In some cases, the combined operation of cleaning and sanitization are performed using a sanitizer which has the features of both a detergent and a sanitizer. Still, the two-stage approach is more consistent and effective than the single-stage sanitizer approach. In the pickle -making processing industry, non-scented chemicals are used in operations due to the risk of taint. When cleaning and sanitizing work areas and equipment, the following practices must be followed:

There are three acceptable types of sanitizer solutions for use in the food processing industry.

Fig. 3.1.6: Standard Practices for Cleaning the work area and equipment

Cleaning and sanitization is a complex process. A defined and systematic approach should be followed to ensure it is conducted appropriately that considers several factors. This approach takes the form of a procedure, which is usually a legal and a fundamental requirement of global food standards. A collection of these cleaning procedures forms a Cleaning Plan or Program, which is plant-specific. The correct sequence of a general cleaning procedure for surfaces in a pickle -making processing facility is:

Fig. 3.1.7: Steps for Cleaning Work Area

The following chart explains workflow process of cleaning and maintenance of pickle - making machinery and equipment.

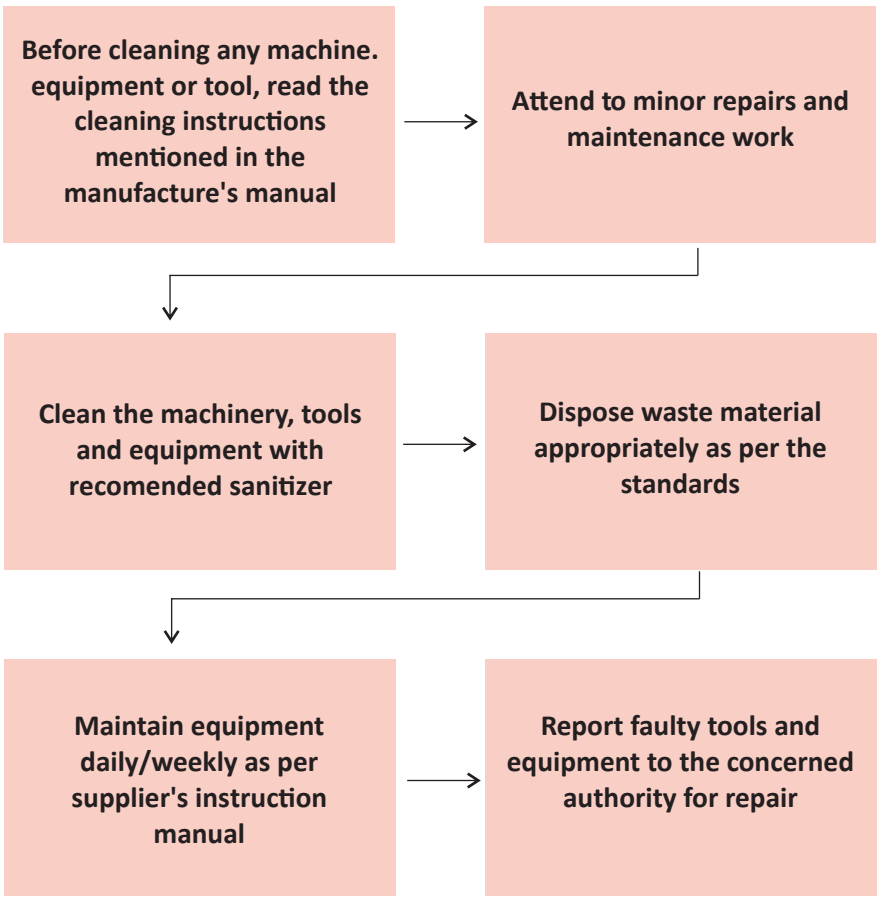

Fig. 3.1.8: Cleaning Process for Pickle -making Machinery and Equipment

It is important to report faulty tools and equipment to the concerned authority, as it minimizes the possible risks and hazards related to equipment and prevents major failures and serious injuries or mishaps. The following figure explains the significance of reporting to the concerned authority:

Fig. 3.1.9: Importance of Reporting Faulty Tools and Equipment

3.1.2 Maintenance and Check

In food manufacturing, maintenance supports various key objectives, many of which are unique to food production. Maintenance plays the following roles in food manufacturing:

1. It keeps the production running smoothly.
2. It helps to prevent any contamination and ensure food safety.
3. It reduces product losses.
4. It maintains regulatory compliance.

An effective maintenance routine ensures that operations are continued, repair costs are minimized, and downtime is reduced.

Following are the types of maintenance that are carried out in a food processing unit:

1. **Reactive Maintenance** is a method where machines run until they fail. It's a hands-off approach, and the significant benefit is that it keeps routine maintenance costs low.
2. **Predictive Maintenance** uses advanced technology such as infrared and ultrasound equipment during the routine inspection of machines. This process can stop unpredicted breakdowns, and using advanced technology and the industrial unit can reduce the amount of time needed to inspect equipment piece by piece. This type of maintenance is expensive, but this method accurately stays a step in front of faults.
3. **Proactive Maintenance** is a systemic issue-focused maintenance program. Rather than examining equipment, this approach considers how to control the problems that lead to machine wear and tear instead of the deterioration itself.
4. **Preventative Maintenance** is the checking of machines and equipment on a planned, regular basis. The purpose is to prevent costly downtime and minimize the probability of faults. It requires more planning and effort than other techniques. However, it has long and short-term benefits in cost-reduction and efficiency of machine performance. Preventative checks are done before a machine breakdowns and while it is still in running condition. Generally, the strategy leads to good food hygiene and prevents foreign materials from entering food produce.

It is essential to have a schedule for preventative maintenance of each piece of machinery and equipment used in the production. This consists of:

- Time schedule stating when and how frequently maintenance should be done
- Maintenance activities list for each item

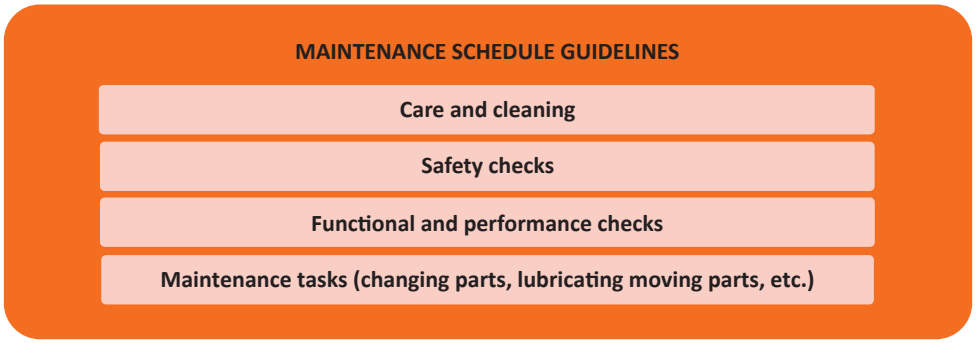

Fig. 3.1.10: Maintenance Schedule Guidelines

Checklist for Planning Maintenance

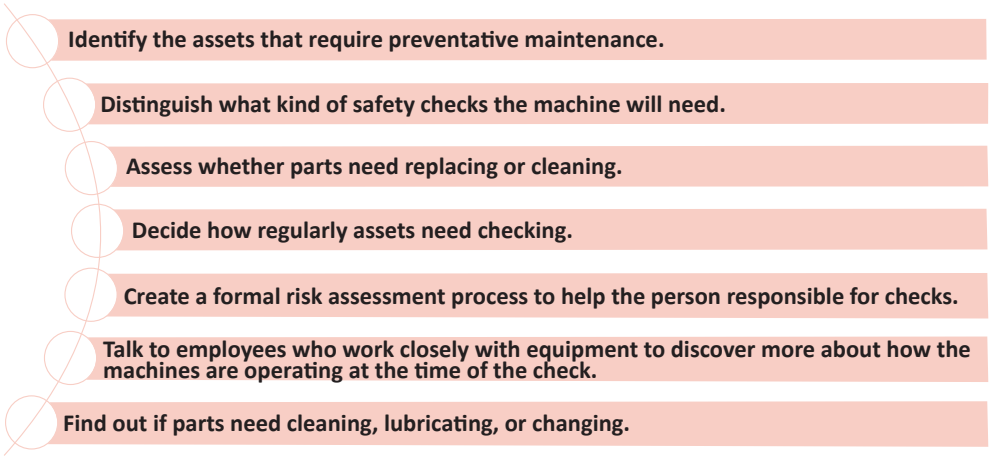

Fig. 3.1.11 Maintenance Checklist

After completing any maintenance, the technician must keep a log for maintenance. This log entry should include a description of the work carried out, who carried it out, and the date and time it happened.

Document Maintenance Procedures. Every piece of equipment and machinery should have detailed descriptions, drawings, and photographs of how and when each machinery should be maintained or serviced. It includes:

- Maintenance procedures
- Lubrication procedures
- Tool reconciliation procedures
- Procedures for temporary repairs
- Procedures for emergency repairs
- Spare parts inventory program
- Training procedures
- Handover procedures
- Audit Procedures

Note:-
An annual maintenance contract(AMC) is an agreement between an organization and a service provider that specifies the ongoing maintenance of machinery or property purchased from the provider. Therefore, ensure periodic maintenance by AMC(Annual Maintenance Contract) personal.

3.1.3 Inspection Methods for Tools, Equipment, and Machinery

Regular inspections ensure the safety of your workers. The inspection occurrence should be determined through risk assessment and calculation, taking justification of the manufacturer's recommendations, industry advice, and your own experience. Machinery and equipment that is exposed to conditions causing deterioration, could result in a dangerous situation should be inspected at suitable intervals, and after every event, liable to jeopardize its safety.

Following are the inspection methods for tools, machinery, and equipment:

1. **Start-up Inspection:** An excellent countermeasure to avoid start-up risk is thorough and continuous inspection along with condition monitoring. Respect all potential areas of danger. Examine as many of these hazards as possible until operational stability is reinstated. These include:
   - Temperature (all critical zones, components, and surfaces)
   - Vibration
   - Balance and alignment
   - Gauge readings (based on temperature, pressure, vacuum, flow, speed, proximity, etc.)
   - Differential filter pressure
   - Magnetic plug collections
   - Oil level, color, and clearness at all sight glasses
   - Leak zones
2. **Stop Inspection:** Stop inspections allow accessing the hard-to-reach machine conditions and frictional surfaces. Also, avoid all unnecessary invasions that can introduce a root cause for failure.
3. **Repair inspection:** Repair inspections present a valuable opportunity that too often goes untapped. It is to assess what failed, why it failed and what can be observed while performing the inspection.

Checklist for inspection

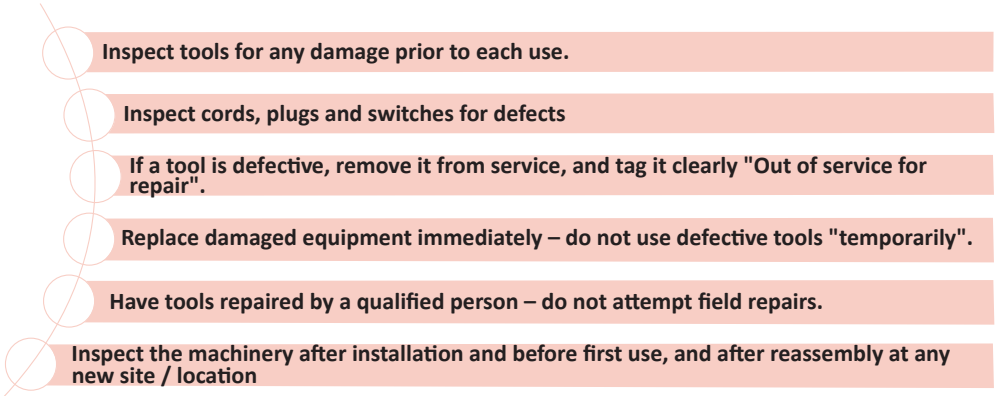

Fig. 3.1.12: Inspection Checklists

Equipment inspection can be carried out by someone who has adequate knowledge and experience of it to enable them to know:

- What to look at
- What to look for
- What action to be taken incase of a problem

The inspection is varied according to the necessary level of equipment's competence and its types, and how / where it is used. The nature of these inspections does not have to be determined by the same individual who commences them, provided that person is competent. This can often be done in-house by an experienced team, taking into account of:

- The manufacturer's recommendations
- Industry advice
- Experienced Staff who has sufficient knowledge of machine operations

3.1.4 Standard Practices for Handling Hazards and Cleaning Work Area

Every employee is concerned about their health and safety. As a result, following safety guidelines is required to avoid hazards and accidents. Similarly, sanitization and hygiene are the most important factors to consider when working in the food processing industry. The figure below depicts the standard practices for dealing with hazards, risks, and cleaning work areas:

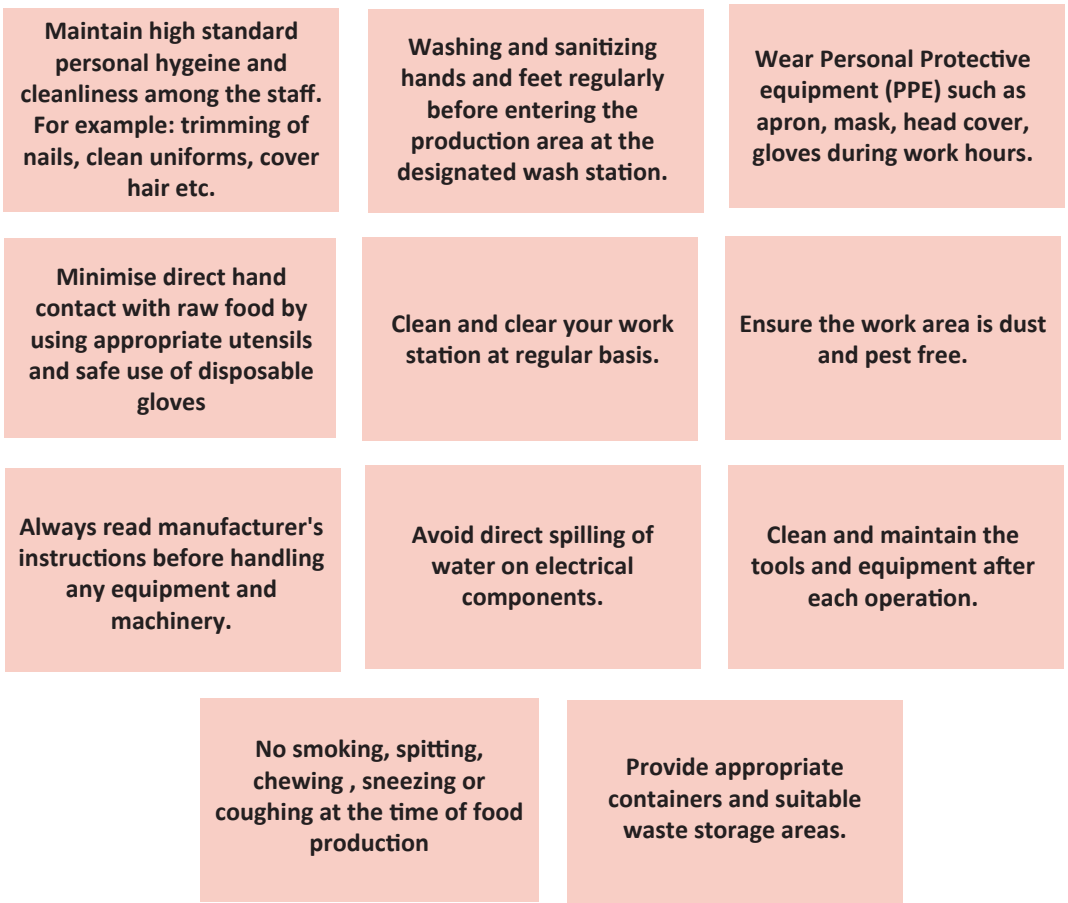

Fig. 3.1.13: Standard Practices for Handling Hazards and Cleanliness

Notes

Scan the QR codes or click on the link to watch the related videos

www.youtube.com/watch?v=tRAnusofqJ8

Maintenance Video

www.youtube.com/watch?v=QWpU7DAfNcs

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4. Prepare for Pickle Making

Unit 4.1 - Capacity Utilisation
Unit 4.2 - Plan Production Sequence
Unit 4.3 - Handling of Raw Material
Unit 4.4 - Identify Spoilage in Fruits and Vegetables

FIC/N0106

Key Learning Outcomes

At the end of this module, you will be able to:

1. Check the raw material for quality and grade
2. Illustrate the process for curing raw material and storing cured raw material
3. Illustrate the different methods of preparation of pickle
4. Illustrate the basic categories of packing

UNIT 4.1: Capacity Utilisation

Unit Objectives

At the end of this unit, you will be able to:

1. Check the raw material and manpower estimation

4.1.1 Raw Material and Manpower Estimation

The raw material is something that is used to produce a product. The availability of raw materials affects the production process which in turn affects the revenue of an organization. Raw material's availability assists manufacturing units in conducting production processes following the requests and wishes of the consumer. Raw material inventories are fundamental in Pickle making processing because the uncertain demand and availability of raw materials due to seasonal reasons can cause complications over costs incurred. Moreover, raw materials is an investment that affects the financial stability and listed as a current asset on a company's balance sheet. So, it is important to apply best practices for managing raw material inventory. There are two subdivisions of raw materials:

- **Direct Materials** are those resources that are part of or incorporated into the finished product. For example in Pickle industry vegetables, oil, spices etc
- **Indirect Materials** are those resources consumed during the manufacturing process but are not part of the finished product. For example disposable tools, protective equipment, cleaning supplies, fuel, light bulbs etc.

It is important to determine the value of opening and ending inventory for estimating raw materials for Pickle making as per production requirements. It is calculated as follows:

Raw Materials Inventory = Beginning Inventory + Raw Materials Purchased - Cost Of Goods Sold

1. **Beginning/opening inventory value -** The value is obtained from the previous accounting period balance sheet as the closing inventory.

   Opening Inventory = (Cost Of Goods Sold + Ending Raw Materials Inventory) - Raw Materials Purchased

2. **Closing/ ending inventory value –** It is the inventory on hand at the close of an accounting period. The value is revealed on the balance sheet.

   Ending Inventory = (Raw Materials Purchased + Beginning Raw Materials Inventory) - Cost Of Goods Sold

3. **Raw material Purchased –** it is calculated as:

   Raw Materials Purchased = (Ending Inventory – Beginning Inventory) + Cost Of Goods Sold

4. **Cost of goods sold (COGS) –** It appears as an item in the income statement during the accounting period.

Cost of goods sold = Begining inventory + Purchases – ending inventory

Note:-

- **Beginning Inventory -** Value of a company's inventory at the start of an accounting period.
- **Ending Inventory -** Value of goods still available for sale and held by a company at the end of an accounting period.
- **Raw Materials -** Vegetable, fruits, ingredients, spices, oil etc.
- **Good Sold -** Accumulated total of all costs used to create a product which has been sold.

To calculate manpower requirements for Pickle production, divide the value of goods and services produced by the total hours worked by employees over a specified period. Here are the steps to estimate manpower for production.

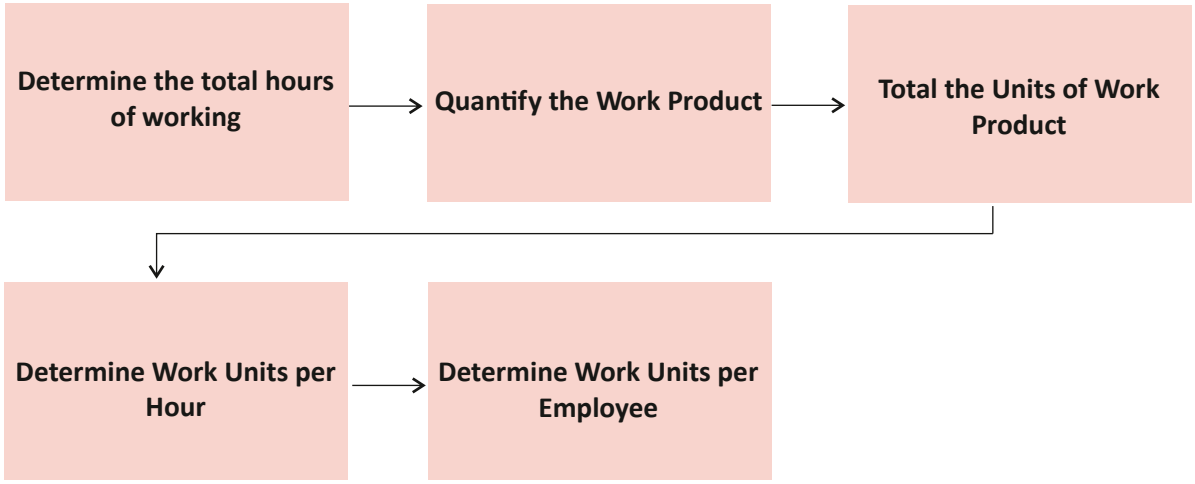

Fig. 4.1.1: Steps to Calculate Manpower Estimation for Production

UNIT 4.2: Plan Production Sequence

Unit Objectives

At the end of this unit, you will be able to:

1. Plan the production sequence to maximize capacity utilization of resources, manpower, and machinery
2. Calculate batch size and prioritize urgent orders based on the production schedule and machine capac-ity
3. Check the conformance of raw material quality to company standards

4.2.1 Planning the Production Sequence

The main ingredients used in pickle making are fruits and vegetables. Different types of pickles are made based on the maturity of fruits and vegetables.

Ingredients used in pickle making are divided into groups based on their roles. The following table explains this classification

Group	• Group products from same variety of raw material • Group products that require the same process • Group raw materials that do not impact the quality of the other
Plan	• Use the same equipment and machinery for various products • Plan maximum capacity utilization of machinery • Consider the process time for each product
Prioritize	• Plan efficient utilization of resources and manpower • Prioritize urgent orders
Calculate	• Batch size • Raw material requirement • Packaging materials • Manpower requirement
Check	• Performance of equipment and machinery • Availability of tools and equipment • Packaging material, power and fuel, and water
Organize	• Raw material and equipment as per formulation chart • Work responsibilities and allot them to workers and helpers

Table 4.2.1: Planning the Production Sequence

UNIT 4.3: Handling of Raw Material

Unit Objectives

At the end of this unit, you will be able to:

1. Check the raw material for quality and grade
2. Prepare the raw material for production
3. Recall the procedure of sampling to test the water quality and verifying the water level
4. Discuss the significance of drying line conveyor and sorting line conveyor
5. Explain the mechanism of peeling and slicing fruits and vegetables
6. Describe the operation of a peeling machine

4.3.1 How to Handle Raw Material

Before starting with the actual process of pickle-making, it is important to understand how to handle raw materials that are procured from the farmer/supplier. Given below is a simple chart that shows the process the raw materials undergo before the pickling process:

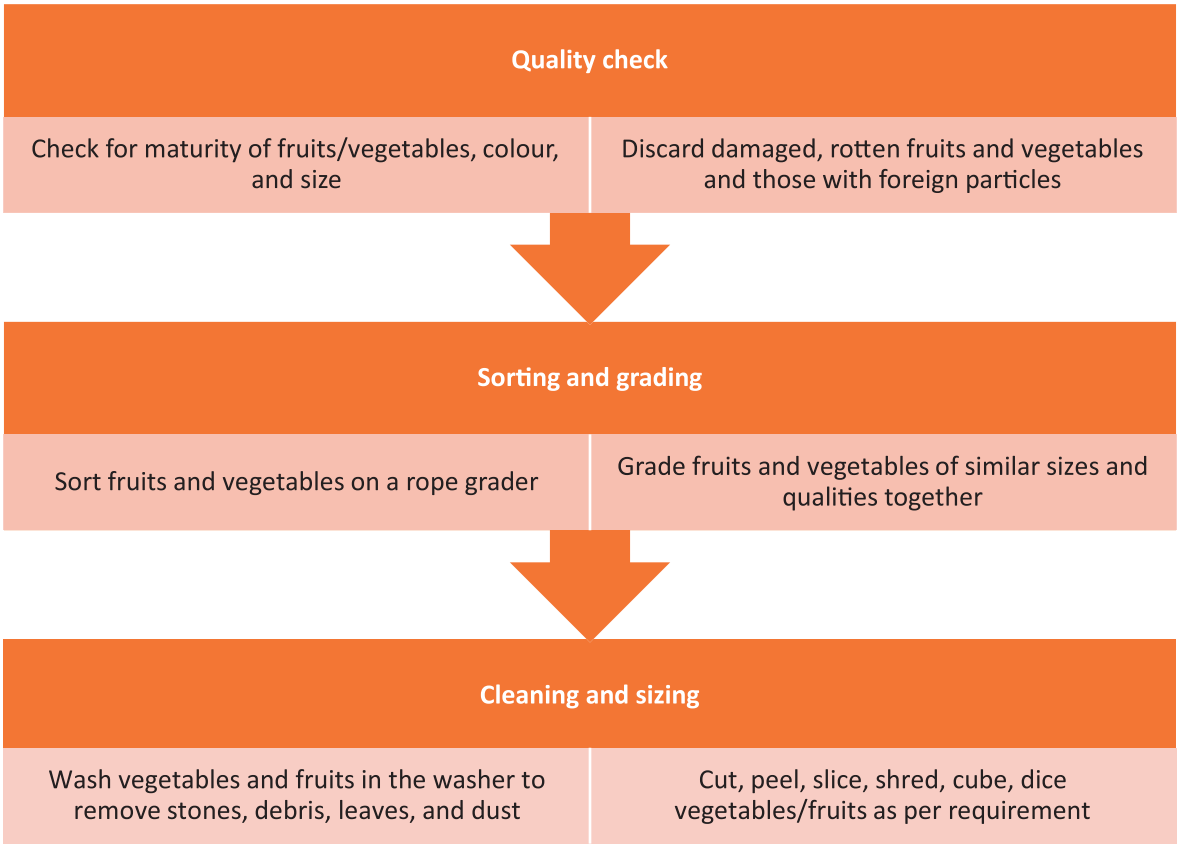

Fig. 4.3.1: Raw Material Handling

4.3.2 Operation of Peeling Machine

- A peeling machine is used for peeling various kinds of ball-shaped fruits and vegetables for pickle making. It is equipped with rotating soft and hard brushes which thoroughly clean and peel the fruits and vegetables.
- Operation - Peeling machine works on the principle of conversion of electrical energy from the electrical motor into mechanical energy in terms of the rotating shaft. A 2 HP motor is used to rotate the shaft at 900 rpm, around which approximately 70 rubber pads are fixed. These machines are high in performance and can be modified as per the requirements. Furthermore, it is very easy to clean and maintain.

Fig. 4.3.2: Peeling Machine

The following flow-chart shows process of the peeling machine:

Fruits/Vegetables are fed into a rotating bowl which is lined with an abrasive

When these rollers rotate, the abrasive surface removes the fruit/vegetable's skin

Skin is separated and washed away from fruits/vegetable with the stream of water

Peeled vegetable/fruits comes out from the side of the rotating bowl through gate.

Fig. 4.3.3: Process of Peeling Machine

4.3.3 Peel and Slice Fruits and Vegetables

1. **Peeling –** Peeling is the primary unit of operations for preparing fruit and vegetables for the pickle-making process. Depending upon the type of commodity, peeling and coring methods are selected, such as:
   - by hand or knife
   - by machine
   - by heat treatment
   - by using lye solution. Cores and pits in fruits like apple, mango, peach, apricot, etc. are removed by hand or machine (de-corer).

 Knife Peeling	 Mechanical Peeling	 Steam Peeling
 Lye Peeling	 Coring	 Slicing

Fig. 4.3.4: Peeling, Coring and Slicing Fruits and Vegetables

2. **Slicing -** After peeling, the fruits/vegetables are halved or cored manually or with the help of machines. However, peeled fruit should always be submerged in either water, containing 1-2 % salt solution or acid to avoid enzymatic browning.

UNIT 4.4: Identify Spoilage in Fruits and Vegetables

Unit Objectives

At the end of this unit, you will be able to:

1. Explain how to inspect the vegetables and fruits to identify spoilage

4.4.1 Operation of Peeling Machine

Fruits and vegetables being a part of fresh produce, contain high moisture which makes them highly perishable foods and hence more prone to spoilage. Microorganisms gain entry into fruits/vegetables from various sources. These sources include:

- Soil
- Water
- Diseased plant
- Harvesting and processing equipment
- Food Handlers
- Packaging and packing material
- Contact with spoiled vegetables

Because of the spoilage, it becomes harmful and unsuitable for human consumption.

Fig. 4.4..1: Spoiled Fruits and Vegetables

4.4.2 Types of Spoilage in Fruits/Vegetables

Fruit and vegetable spoilage is predominantly of the following types:

Types of Spoilage	Description
Microbial Spoilage	
Spoilage due to pathogens	Infect stem, leaves, roots, flowers, and other parts of the fruit/ vegetables themselves.
Spoilage due to saprophytes	Organisms under certain conditions grow on these fruits/vegetables and spoil them
Bacterial Soft Rot	Breaks down pectin, giving rise to a soft, mushy consistency, sometimes a bad odour and water-soaked appearance.
Fungal spoilage	Caused by Botrytis cinera in vegetables. Favoured by high humidity and warm temperature
Chemical Spoilage	Caused by Pesticide residue, detergents, etc.
Physical Spoilage	Damage to Fruits and Vegetables from Mechanical Parts of the Machines etc.

Table 4.4.1: Types of Spoilage

4.4.3 Process of Fruit/Vegetable Spoilage

The following process chart shows how fruits and vegetable spoilage take place:

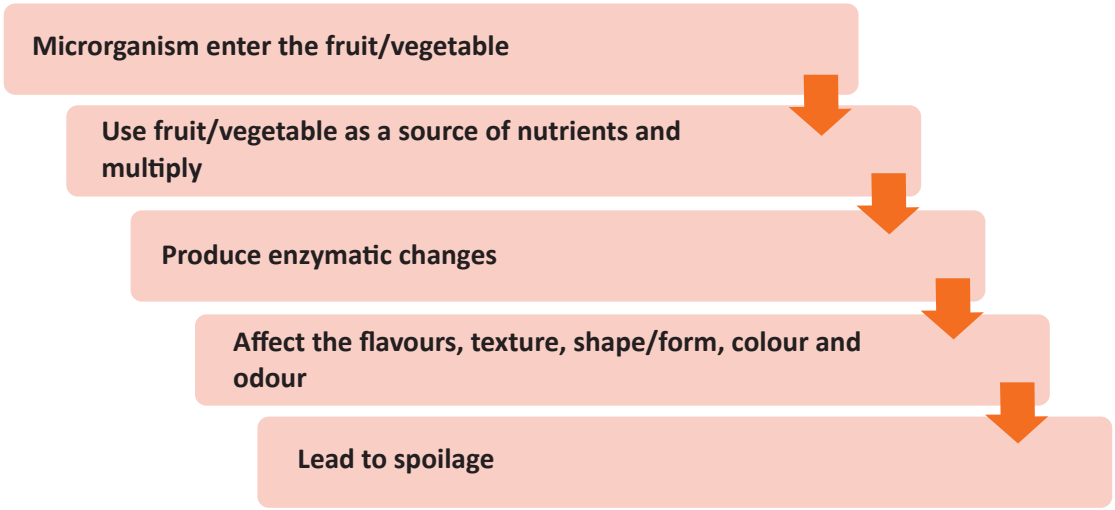

Fig. 4.4.2: Process of Spoilage

4.4.4 Criteria to Check Fruits/Vegetable Spoilage

The following chart shows the parameters to check the spoilage in fruits and vegetables:

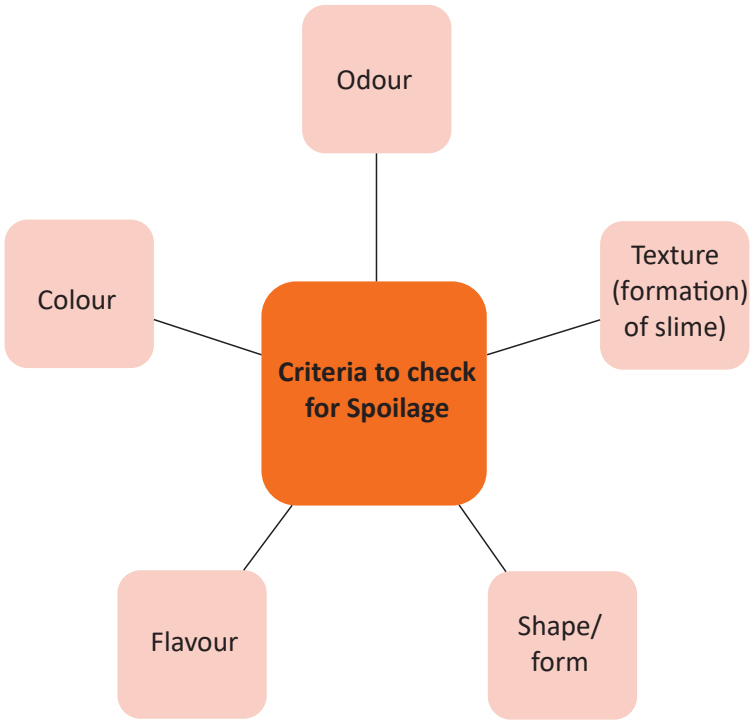

Fig. 4.4.3: Parameters to check Spoilage

Notes

Scan the QR codes or click on the link to watch the related videos

www.youtube.com/watch?v=C-6kF52qtOA

Machinery in Pickle Making Industry

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5. Carry out Pickle Making as per Production Needs

Unit 5.1 - Curing of Raw Materials for Pickle-Making

Unit 5.2 - Different Methods of Preparing Pickles

Unit 5.3 - Packing and Packaging

FIC/N0107

Key Learning Outcomes

At the end of this module, you will be able to:

1. Discuss the process of different types pickle through different ingredients.

UNIT 5.1: Curing of Raw Materials for Pickle-Making

Unit Objectives

At the end of this unit, you will be able to:

1. Illustrate the process for curing raw material and storing cured raw material

5.1.1 Process of Pickle Making

Pickling is the process of preserving fruit and vegetables in salt and vinegar. Pickles may be prepared in two ways; without fermentation or with partial or complete fermentation. Spices, edible oil, sugar/ jaggery, etc. are also added to improve the taste and palatability of the product. Pickles are a good appetizer and help in digestion by stimulating the flow of gastric juices.

The manufacturing of pickles has developed as an industry in the country. Mango pickle, cauliflower, turnip, carrot (mixed vegetable), amla, lime/lemon pickle, etc., are the commercial products available in the market.

Pickling is the process of fermentation by lactic acid-forming bacteria, present on the surface of commodities. Lactic acid bacteria (active at 30 degrees Celsius) convert fermentable sugar in the food to lactic acid and volatile acids. The acid and brine act upon vegetable tissues to produce a distinctive taste and aroma of a pickle. The salt and lactic acid are formed to preserve the pickle by preventing the growth of putrefactive bacteria, provided oxygen is excluded. Common examples of fermented pickles are cucumber and olive pickles.

5.1.2 Check the Water Quality and Verify Water Level

Potable water is essential in all fruit and vegetable processing, as an ingredient in some products, and for washing the equipment. It is recommended to carry out water testing from a reputed testing laboratory before setting up a food processing facility. Nowadays, RO (Reserve Osmosis) plants are installed to meet the water requirement of the food processing industry.

Fig. 5.1.1: Reserve Osmosis System

The quality of water is determined by making measurements or taking samples of water and testing them for acidity (pH, TDS and hardness), color, dissolved oxygen, and turbidity (a measure of the suspended particles in the water). Such tests give a water utility operator a basic, and general interpretation of the conditions of a water source.

Fig. 5.1.2: Water Testing

A pressure transmitter is used to determine the water level in a tank. The pressure at the bo om of a liquid-filled vessel is directly related to the height of the liquid. The transmi er measures this hydrostatic head pressure and provides the result of the liquid level.

Fig. 5.1.3: Pressure Transmitter

5.1.3 Wash, Sort & Dry the Fruits and Vegetables

1. **Wash -** Fruit and vegetables are generally washed with water to remove dust, dirt, and adhering surface micro-flora. Different washing methods include soaking or agitating in water, washing with cold or hot water sprays, etc.

Fig. 5.1.4: Pressure Cleaning

- Mechanical washers comprise stirring or tumbling the products on moving belts or rotating screens while they are absorbed in water or subjected to water sprays.
- Washing using high-pressure sprays is most satisfactory.
- Detergents are frequently used in the wash or rinse water.
- Vegetables may be soaked in a dilute solution of potassium permanganate or chlorine (25-50 ppm) for disinfection.
- The water temperature should be kept low to keep the fruit firm and to reduce leaching losses.
- High-pressure sprays should not injure the fruits.

Fig. 5.1.5: Washing Fruits & Vegetables

2. **Sort -** Sorting, and grading ensure the removal of an inferior or damaged commodity. For sorting, an inspection belt can be used, in addition to trained staff who detect poor quality produce unsuitable for pickle-making. Automatic colour sorters can be used for sorting to reduce labour costs. After the preliminary sorting process, the fruit and vegetables are graded to get consistent quality for size, color, etc. Grading process can be performed either manually or with the help of grading machines. For machine-driven grading, the fruit and vegetables are passed over screens with holes of different diameters.

Fig. 5.1.6: Sorting Fruits & Vegetables

3. **Dry -** Drying refers to the removal of a small amount of moisture from a solid or nearly solid material by evaporation to a predetermined level. Drying involves heat and mass transfer operations—and complete removal of moisture content to bone dry condition.

5.1.4 The Process of Curing

Curing is the process in which cleaned and cut vegetables and fruits are immersed in brine. Cured raw material is stored in barrels for some time. After the vegetable/fruit is properly cured it is sent for further processing.

The following chart gives a detailed overview of the process of curing:

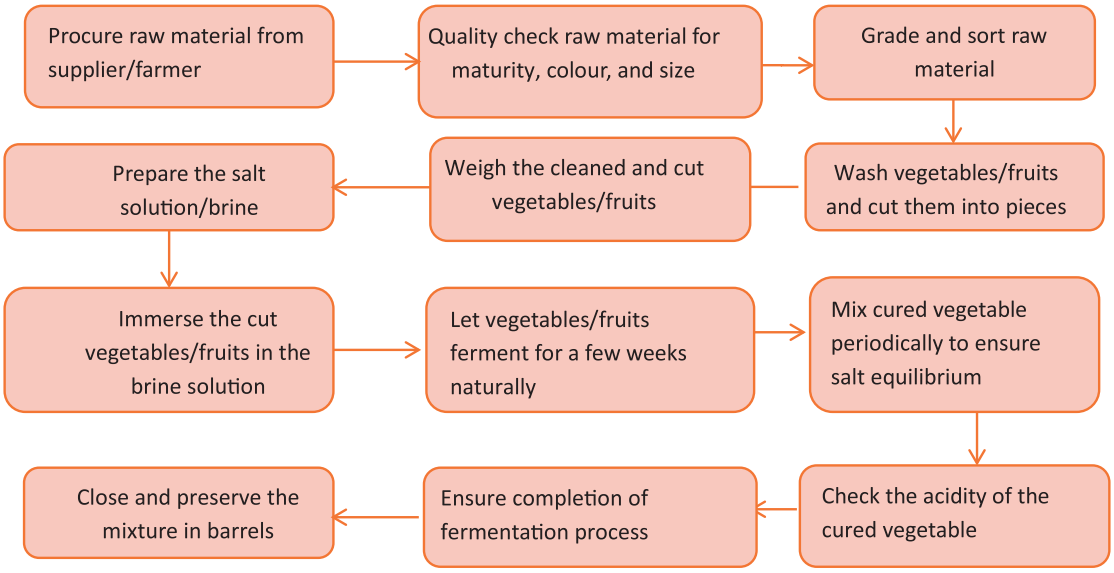


Fig. 5.1.7: Curing Process

UNIT 5.2: Different Methods of Preparing Pickles

Unit Objectives

At the end of this unit, you will be able to:

1. Illustrate the different methods of preparation of pickle

5.2.1 Preparation of Pickle in Oil

The following chart explains the process of preparing pickle in oil.

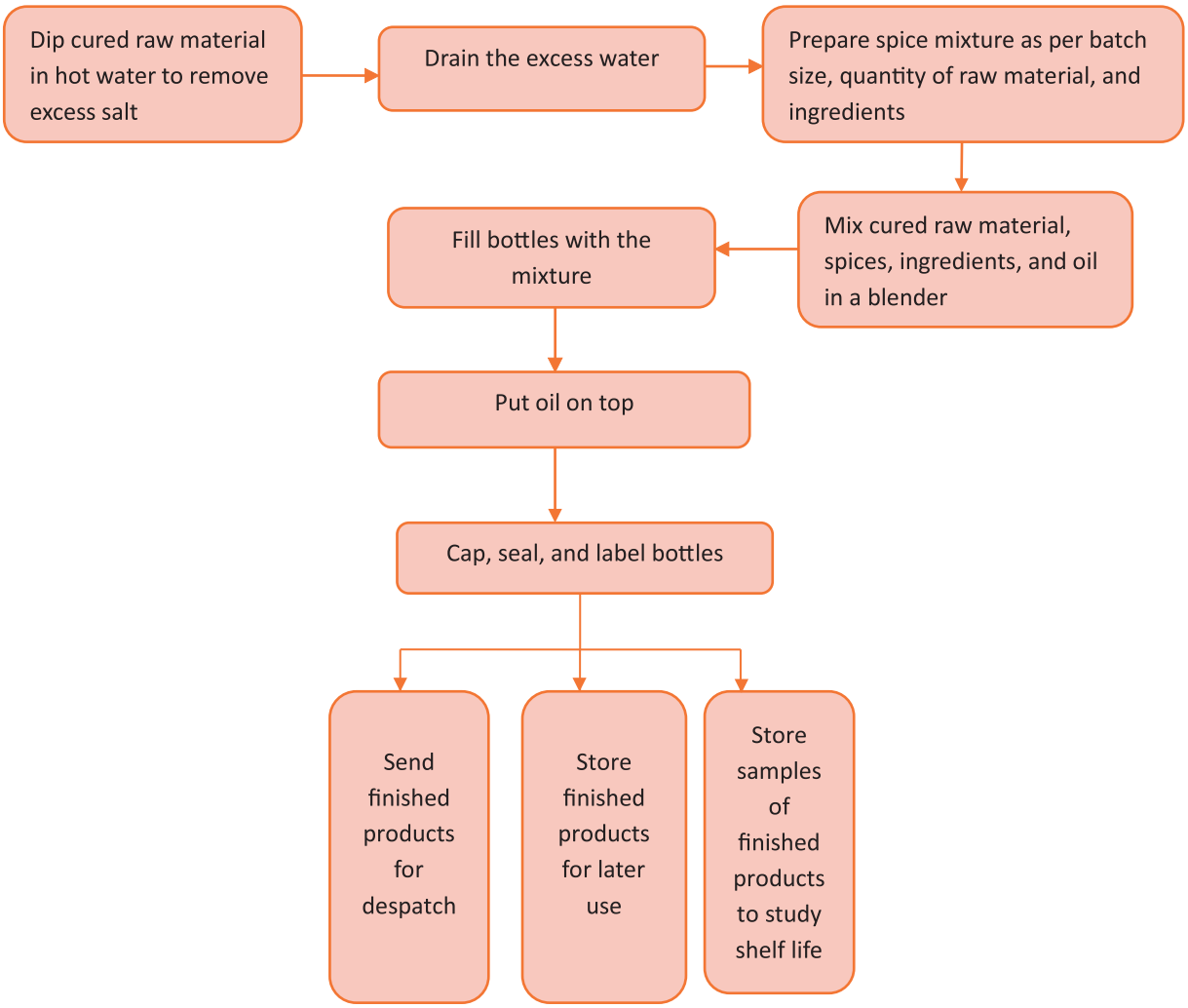


Fig. 5.2.1: Preparation of Pickle in Oil

Preservation with oil: In oil-based pickles, oil acts as a barrier for air and creates an anaerobic condition that is utilized by the native bacteria for the production of lactic acid. Oil also prevents the growth of spoilage yeasts and moulds. Generally, mustard oil is used. It helps the seasonings adhere be er to the fruits and vegetables. The fruit or vegetable should be wholly immersed in the edible oil. Cauliflower, lime, mango, amla, karonda, bi er gourd, brinjal, turnip pickles are prepared from this method.

The process of preparing chili pickle with the preservation of oil is shown below:

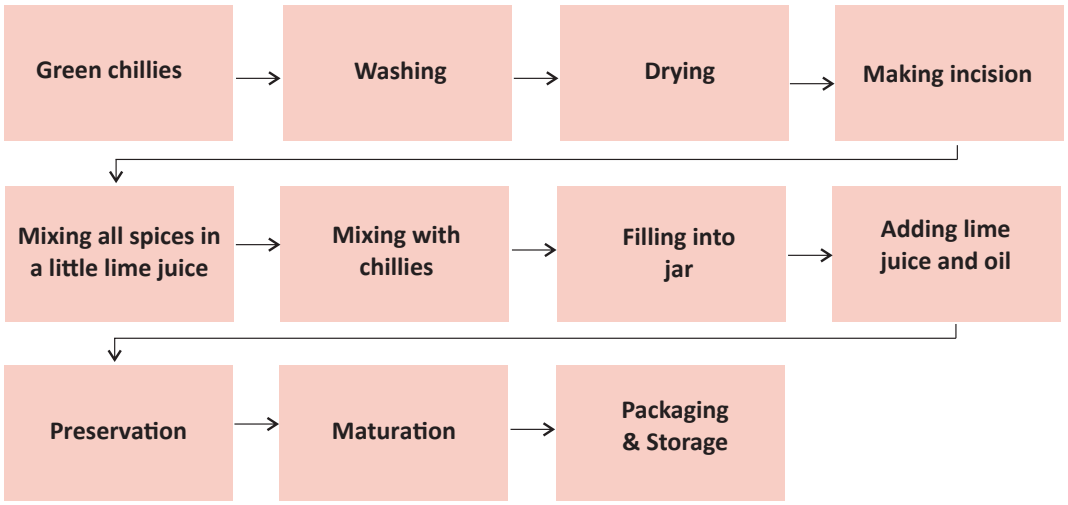
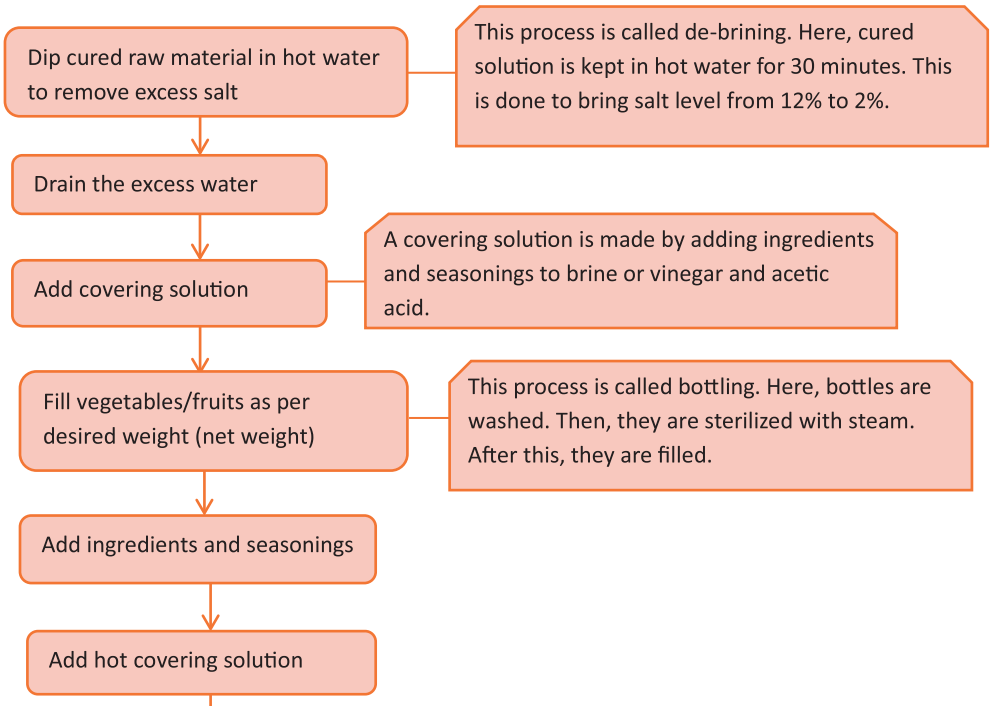


Fig. 5.2.2: Preparation of chili pickle

5.2.2 Preparation of Pickle in Brine

This chart explains the process of preparing pickle in brine solution.



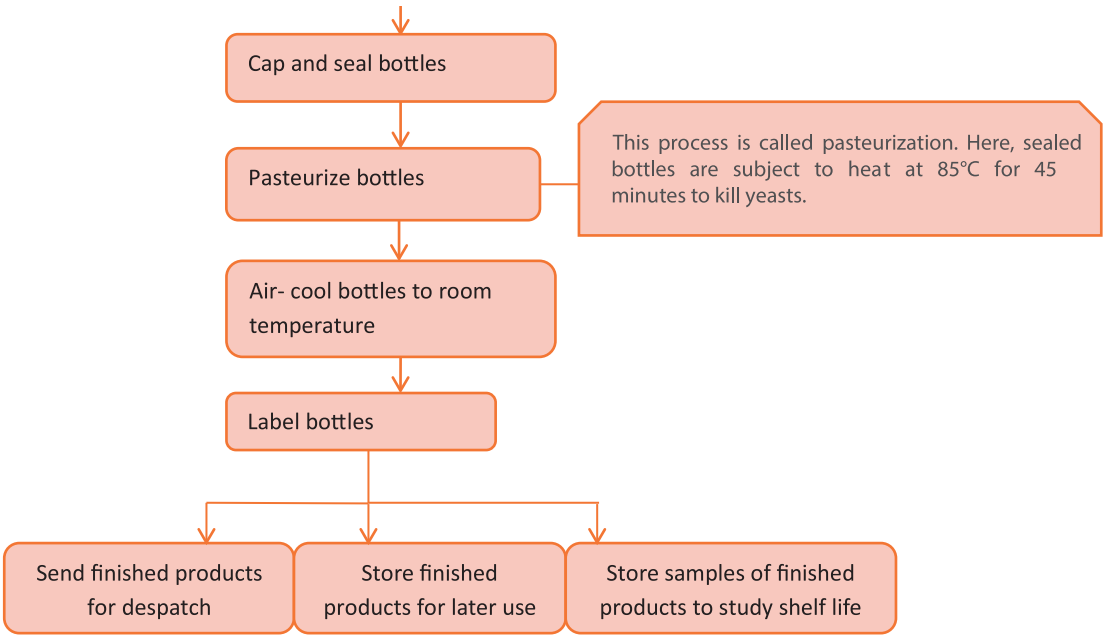


Fig. 5.2.3: Preparation of Pickle in Brine

Preservation with salt: Salt improves the taste and flavour, hardens vegetables' tissues, and controls fermentation. Vegetables do not ferment when packed with a large quantity of salt, bringing their final concentration in the material from 15-20%. Mould and even lactic acid- producing bacteria cannot thrive at this high salt concentration. This preservation method applies only to vegetables that contain very little sugar because sufficient lactic acid cannot be formed by fermentation to act as a preservative. Some fruits, such as lime, mango, etc., are also preserved using salt for pickle making.

The following flow chart shows the process of preparing lime pickles with the preservation of salt.

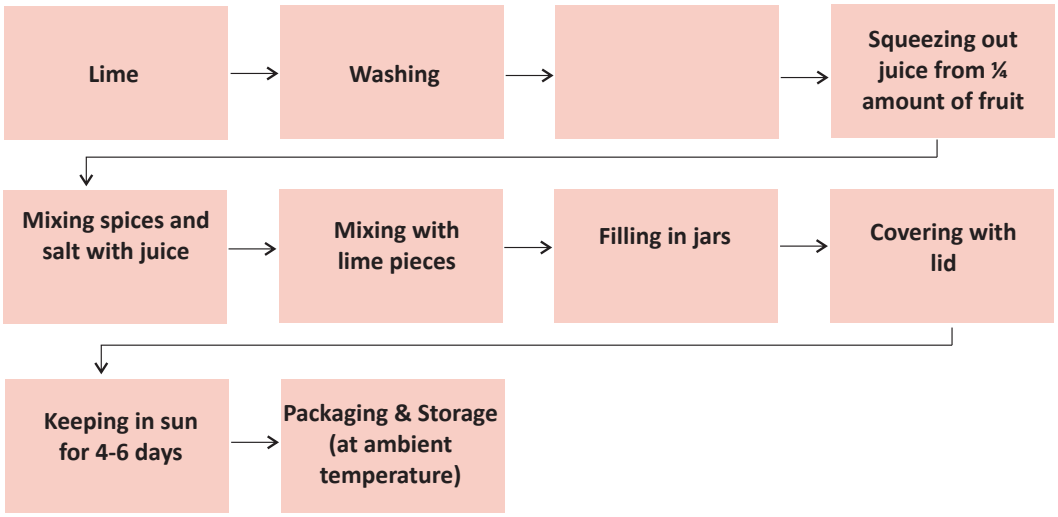


Fig. 5.2.4: Preparation of lime pickle

5.2.3 Preparation of Pickle in Vinegar

This chart explains the process of preparing pickle in vinegar.

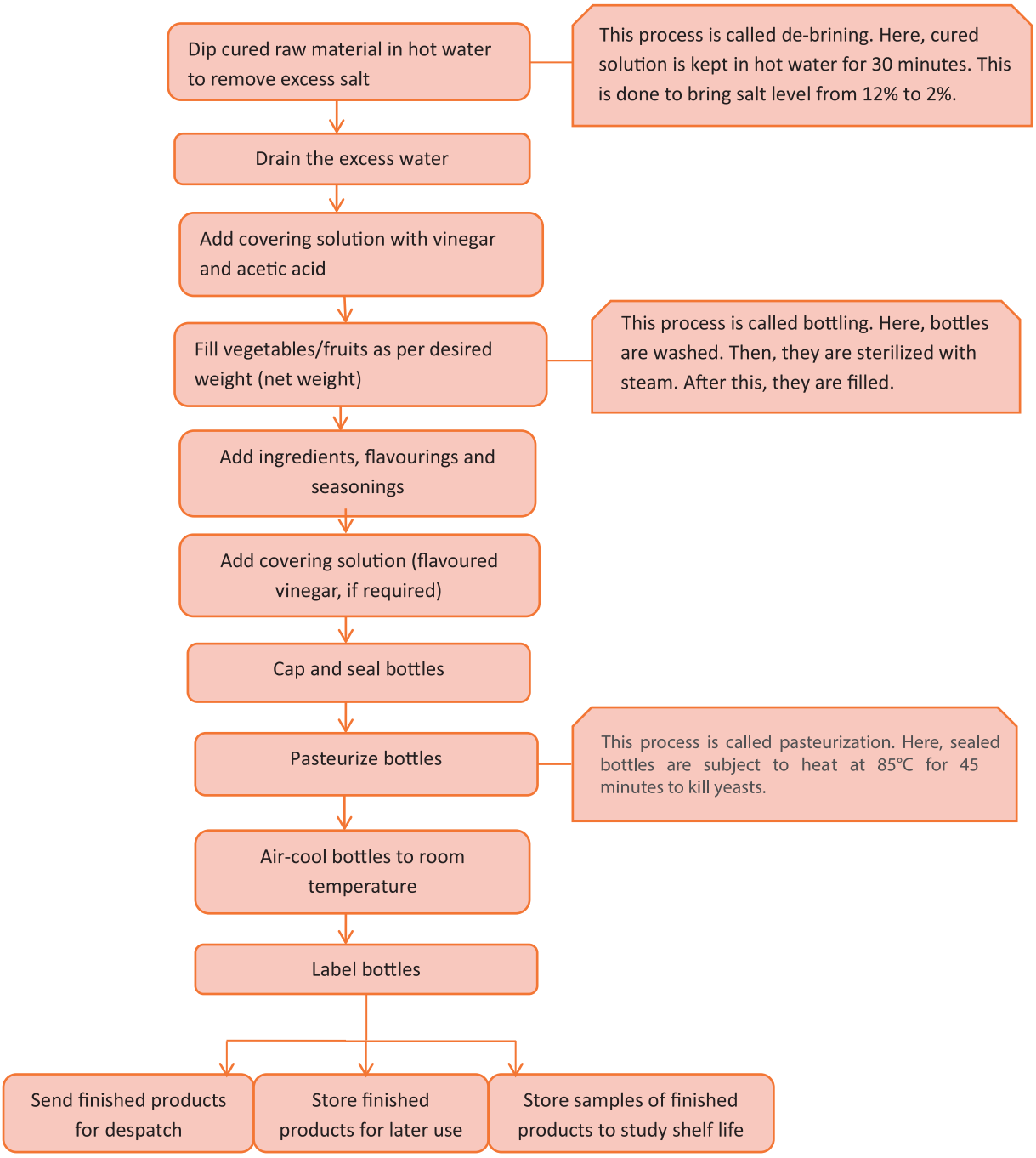


Fig. 5.2.5: Preparation of Pickle in Vinegar

Preservation with vinegar: In vinegar pickles, vinegar acts as a preservative. The final acid concentration should be no less than 2% in the finished pickle. To prevent vinegar dilution below this strength by the H2O liberated from the tissues, the vegetables or fruits are usually placed in strong vinegar of around 10% acidity for several days before the final packing. This treatment aids in the removal of gases trapped in the intercellular spaces of vegetable tissues. Papaya, pears, onion, garlic, chili, mango, and cucumber pickles are prepared using the vinegar preservation method.

The following flow chart shows the process of preparing cucumber pickles with the preservation of vinegar.

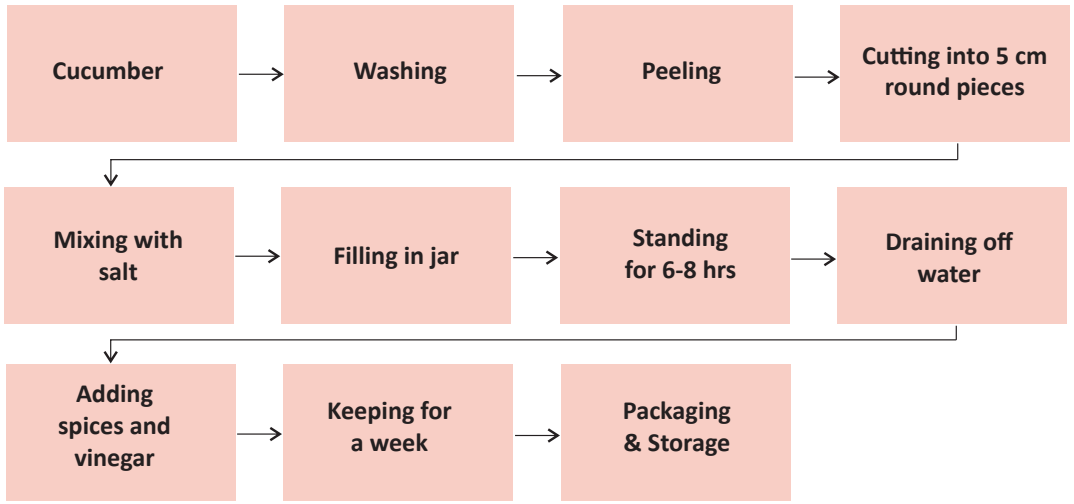


Fig. 5.2.6: Preparation of cucumber pickle

5.2.4 Types and Methods of Pickle Making

1. **Preparation with a mixture of salt, oil, spices, and vinegar:** E.g., Cauliflower, carrot, jackfruit, mixed vegetable pickle, etc.

   The process of preparing tomato pickle with the mixture of salt, oil, spices, and vinegar is shown below:

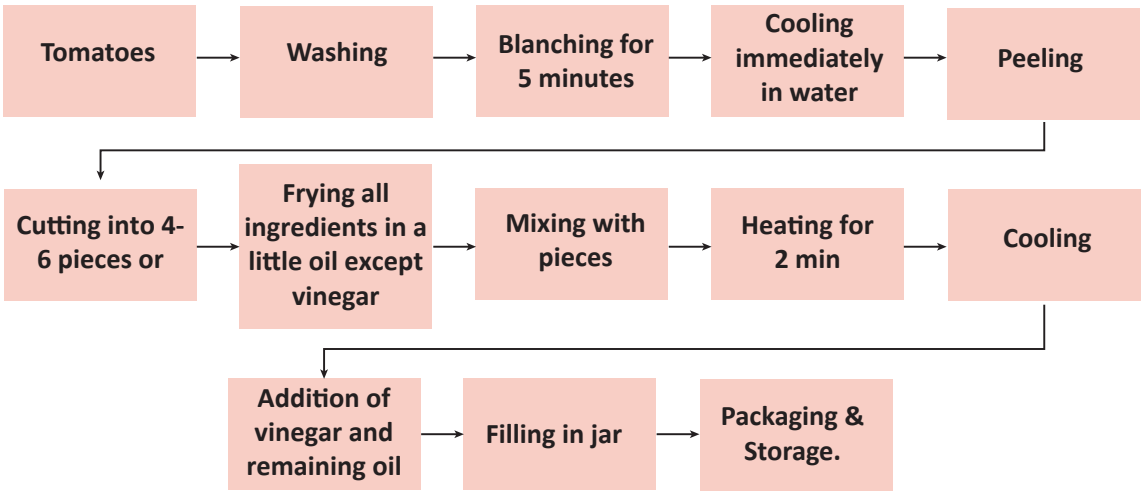


Fig. 5.2.7: Preparation of tomato pickle

Please note: Blanching is a food preparation method in which food is briefly immersed in hot liquid, for e.g. boiling water, often but not always as a prelude to cooking it further. Fruits, vegetables, are frequently blanched for pickle making. Sometimes it is used for softening, or to loosening of the skin to make peeling it easier, or simply to brighten its color of it.

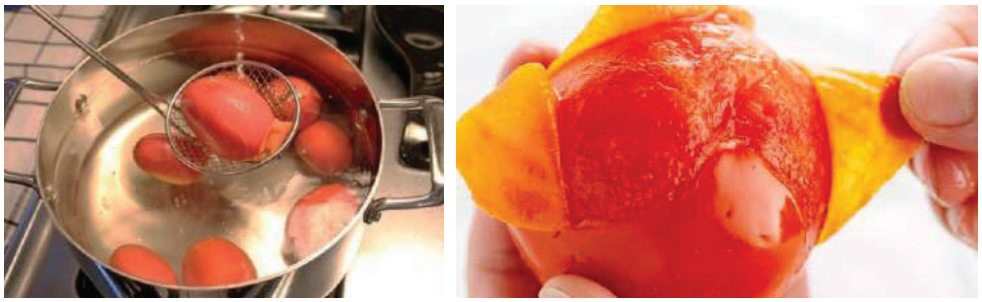


Fig. 5.2.8: Blanching

UNIT 5.3: Packing and Packaging

Unit Objectives

At the end of this unit, you will be able to:

1. Illustrate the basic categories of packing
2. Illustrate the various types of packaging materials used for pickles
3. Illustrate the factors for selecting packaging materials

5.3.1 Steps for Packaging of the Processed Food

- **Level of Packaging -** The finished product is filled in a container meant for packaging. Depending on the demand, the market and size of the industrial packaging are categorized as follows:

Primary Packaging

- **It is the type of packaging that comes in direct contact with food. E.g. Pouches, bottles, sachets, drums**

Secondary Packaging

- **It is the type of packaging that comes in contact with the primary packing. E.g. Cartons(filled with bottles)**

Tertiary Packaging

- **It is the type of packing that used to protect the secondary packaging. Eg. shipping box**

Fig. 5.3.1: Level of Packaging

- **Selecting Packaging material –** When selecting the packaging material to pack the finished products, one must ensure that the packaging material is:

Non-toxic and compatible with food	**Offers sanitary protection**	**Protect the product from moisture, gas, and odor**
Protects the product from light, temperature, humidity, and rain	**Protects the product from insects, mites, bacteria, rodents, and birds**	**Is transparent and tamper-proof**
Offers ease of opening, pouring, resealing, and disposing	**Is compatible with the size, shape, and appearance standards set by the organization**	**Is low on cost**

Fig. 5.3.2: Tips for Packaging Material Selection

- **Methods of Storing Finished Products –** The pickle processing industry follows the JIT (Just-In-Time) system. Here, the finished product is dispatched to the distributor, retail Industry, or institution as soon as the products are ready. A carton of processed pickles can be stored for a maximum of 2 days in the storehouse. In the case of cured pickles, where the flavors and oils are mixed as and when the demand arises, stock rotation systems Ike FIFO and FEFO are applied.
  - FIFO (First In First Out) is a stock rotation system that dispatches processed food depending on the order in which is produced.
  - FEFO (First Expired-First Out) is a stock rotation system wherein products that need to be consumed earlier are shipped first.

Summary

- Production is that activity whereby resources, flowing within a defined system, are combined and transformed in a controlled manner to add value, following the policies communicated by management.
- The production planning for pickle making consists of various plans related to routing, selection of vendors, selection of desired vegetables and fruits for pickle preparation, availability of other raw materials that are required in producing pickle like desired oil, spices filling the inventory with desired packaging material, inspection of production line for any maintenance etc.
- The Production Plan for pickle making begins with collecting data on any current or proposed food processing and storage operation. It consists of various charts, manuals, production budgets, etc., based on information received from management.
- Pickle -making industries need to be kept spotlessly clean to ensure compliance with standard regulations and prevent contamination.
- Cleaning and sanitizing (disinfecting) are usually two separate processes.
- Detergents are chemicals that eliminate dirt and grease. However, it does not kill bacteria and other microorganisms.
- For cleaning purposes, the pickle making work area are divided into two categories: food contact surfaces and non-food contact surfaces.
- Cleaning equipment is divided in to two sub-categories: manual and automatic cleaning equipment.
- It is important to select the right kind of cleaning agent or sanitizer based on the variation of soils, water hardness, the temperature of the method, plant surfaces, machinery, equipment, and tools.
- It is important to report faulty tools and equipment to the concerned authority, as it minimizes the possible risks and hazards related to equipment and prevents major failures and serious injuries or mishaps.
- An effective maintenance routine ensures that operations are continued, repair costs are minimized, and downtime is reduced.
- It is essential to have a schedule for preventative maintenance of each piece of machinery and equipment used in the production.
- After completing any maintenance, the technician must keep a log for maintenance. This log entry should include a description of the work carried out, who carried it out, and the date and time it happened.
- Regular inspections ensure the safety of your workers. The inspection occurrence should be determined through risk assessment and calculation, taking justification of the manufacturer's recommendations, industry advice, and your own experience.

Exercise

1. What are 3 types of packaging ?
2. Explain blanching
3. Mention at least 3 raw materials used in pickle making process

Notes

Scan the QR codes or click on the link to watch the related videos

www.youtube.com/watch?v=AIWN5rTf9RI

Pickle Making Process

www.youtube.com/watch?v=-Wrk4zAANpo

Pickle Packaging and Storage

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6. Organizational Standards & Norms

Unit 6.1 - Roles and Responsibilities of Pickle Making Technician

Unit 6.2 - Personal Hygiene & Sanitation Guidelines

Unit 6.3 - Hygiene and Sanitary Practices to be Followed by FBO {Schedule-4 of FSSAI Regulation}

FIC/N0107

Key Learning Outcomes

At the end of this module, you will be able to:

1. Know the roles and responsibilities of pickle making technician.
2. Illustrate the safety and hygienic conditions that need to be followed in food industry

UNIT 6.1: Roles and Responsibilities of Pickle Making Technician

Unit Objectives

At the end of this unit, you will be able to:

1. Summarise the key roles and responsibilities of 'Pickle Making Technician'
2. List the various terminologies used in the process of making Pickle
3. Discuss the various organisational procedures and processes for making pickles and pastes
4. Discuss the standards to be followed for handling hazards and ensuring a clean work area

6.1.1 Roles and Responsibilities of 'Pickle Making Technician

The following table explains the roles and responsibilities of Pickle making technician.

Roles	Responsibilities
Handle raw material from post-harvest storage to process line	• Check raw material for quality • Ensure fruits and vegetables are free from dirt, • debris, foreign matter, glass and insects • Ensure minimum loss of material
Record-keeping and documentation	• Document and maintain records of production Schedule and process • Document and maintain records of finished Products
Hygiene and sanitation maintenance	• Adopt safety- and sanitation-related measures • Follow food safety norms and practices
Inspect machines and troubleshoot issues or escalate them to the supervisor	• Ensure smooth operation of machinery to complete • production line • Optimize the use of machinery • Attend to minor repairs of tools and machinery when required • Ensure that safety rules and regulations are observed • Prevent accidents
Plan and execute pickling process, examine products at different stages of pickling	• Adhere to Good Manufacturing Practice (GMP) • Ensure the products meet the quality standards set by the organization
Inspect intermediate as well as finished products	• Check cured fruits and vegetables, fermented pickles, and finished products for quantity, quality, and salt equilibriumEnsure conformance of quality as per organizational
Follow storage and packaging norms	• Ensure safe and proper storage of raw material, packing material, and finished goods

Table 6.1.1: Roles and Responsibilities

UNIT 6.2: Personal Hygiene & Sanitation Guidelines

Unit Objectives

At the end of this unit, you will be able to:

1. State the personal hygiene and sanitation guidelines
2. State the food safety hygiene standards to follow in a work environment

6.2.1 Personal Hygiene & Sanitation Guidelines

Hygiene means conditions and practices that support to sustain health and stop the spread of diseases." Personal hygiene is cleanliness of person's body against disease, filth/dirt, extraneous materials.

The scope of sanitation and hygiene covers employees, buildings, equipment, utensils and management of materials [from starting ingredients to finished goods]. Sanitation and hygiene are the most important aspects to take care of when working in a food processing area. Some important sanitation and hygiene practices that must be followed are:

- General health examination for all personnel before employment
- Allow Only authorized personnel to come in the production areas
- Trying makeup, wrist watches and jewelry should be banned in the production area
- Wear Personal Protective Equipment (PPE) such as aprons, mouth mask, face mask, hand gloves, gum boots, and beard cover mask at all times during work hours
- Wash your hands properly with antibacterial soap or appropriate disinfectant and water before entering the manufacturing area and rewashed when contaminated
- Wash off dead skin cells and disease-causing microorganisms
- Always keep fingernails clean, trimmed and without polish
- Maintain a high standard of personal cleanliness viz. have a bath every day

Fig. 6.2.1: Hand Washing

- Always wear clean working clothes (uniform), gloves and footwear
- Avoid straight contact between worker's hands and raw ingredients, intermediate & finished products
- Do not allow to handle raw ingredients, packaging materials, intermediate and finished goods while suffering from a disease, illness, burns, injury or infection
- Always cover minor cuts, scrapes with an approved bandage prior to putting on gloves
- Wear clean, dedicated uniform and footwear before entering the manufacturing area
- Wear hair net/cover and effective hair restraints to prevent hair from falling into materials, products and equipment
- Smoking, drinking, eating and chewing plants, food, drink and personal tablets should be controlled to definite areas and not allowed in manufacturing, laboratory, storage or additional areas.

Fig. 6.2.2: Cover Minor Wounds

- A separate area should be provided for eating exterior to the production area.
- Hand washing stations, toilet facilities and changing places should be provided for personnel at appropriate places
- Buildings used for the manufacturing of finished goods must be neat, clean, appropriate design and construction to enable good sanitation.
- Personnel medicines should be stored in the individual locker to avoid false and/or mixed up during production process
- Take proper and timely medical treatment when you are ill or if you have met with an accident

Fig. 6.2.3: Activities Prohibited in Production Area

- Visit a registered medical practitioner at regular intervals to keep a check on your health
- Single use paper towels should be used for hand drying

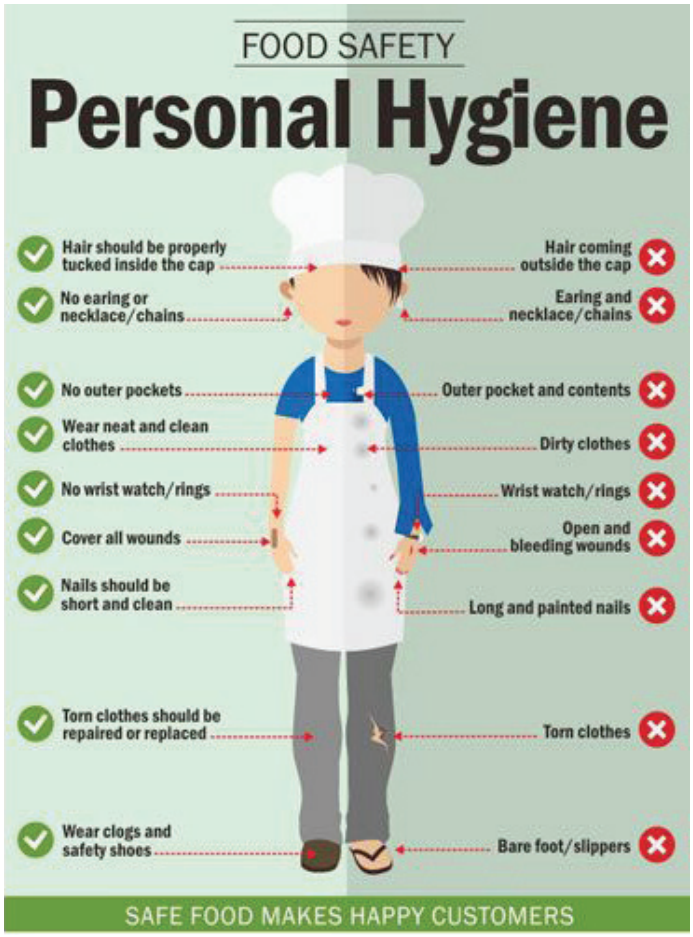

Fig. 6.2.4: Checklist for Personal Hygiene and Sanitation

UNIT 6.3: Hygiene and Sanitary Practices to be Followed by FBO {Schedule-4 of FSSAI Regulation}

Unit Objectives

At the end of this unit, you will be able to:

1. Know the food safety hygiene standards to be follow in a work environment
2. Explain schedule 4 of FSSAI and its importance
3. To introduce a single statute relating to food safety
4. List various general hygiene and sanitation practices by food business operator
5. Need of food safety for food business operator

6.3.1 General Hygienic and Sanitary Practices to be Followed by Food Business Operators {Schedule 4 of FSSAI Regulations}

The Food Safety and Standards Authority of India (FSSAI), has made Schedule 4 under Food Safety and Standards (Licensing and Registration of Food Businesses) Regulation, 2011. Under these regulations, it is mandatory that every Food Business Operator has to follow hygienic and sanitary practices in the premises where food is being manufactured. Schedule 4 is a set of basic - mandatory requirements to ensure safety of the food made in any premise and Food Business Operator shall continuously try to improve hygienic conditions and sanitary practices at the premises with a aim of attaining India HACCP standards.

The Schedule 4 is divided into five parts as follows:

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

Part II - General Requirements on Hygienic and Sanitary Practices to be followed by all FBO applying for License

Part III- Specific Hygienic and Sanitary Practices to be followed by FBO engaged in manufacture, processing, storing and selling of Milk and Milk Products

Part IV - Specific Hygienic and Sanitary Practices to be followed by FBO engaged in manufacture, processing, storing and selling of Meat and Meat Products

Part V - Specific Hygienic and Sanitary Practices to be followed by Practices to be followed by FBO engaged in catering / food service establishments

The general sanitary and hygienic requirements are part of Good Manufacturing Practices {GMP) and Good Hygienic Practices (GHP). For food manufacturer/ processor/handler below indicated generic guidelines are provided which will give fair idea about the practices to be followed. The place where food is made, processed or handled shall comply with the below indicated general requirements:

1. The units/ 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 walls shall be washed as per condition/requirement with an effective disinfectant the premises shall be kept free from insects. Windows, doors and other openings shall be fitted with net or screen, as appropriate to make the premise insect free. 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. 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/ fresh water shall be ensured in premises. In case of intermittent water supply, sufficient storage arrangement for water used in food or washing purpose 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 container or other equipment, the use of which is expected to cause metallic contamination injurious to health shall be employed in the preparation, packing or food storage.
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 away from the walls to allow correct 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 communicable diseases shall not be permitted to work. Any wounds or cuts 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 keep away from wearing, false nails or other items or loose jewelery that might fall into food and avoid touching their face or hair during handling food.
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 article of foods must be maintained and kept clean.
19. Foods while in transport in packaged form or in containers shall maintain the required temperature.
20. Disinfectants /Insecticides shall be kept and stored separately and 'away from food manufacturing /storing/ handling areas.

Notes

Scan the QR codes or click on the link to watch the related videos

www.youtube.com/watch?v=GlvfUzTXAdg

Roles and Responsibilities

www.youtube.com/watch?v=gNEx8P9UqPA&t=1s

Personal Hygiene and Sanitation

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7. Complete Documentation & Record Keeping Related to Pickle Making

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Food Industry Capacity and Skill Initiative

Unit 7.1 - Documentation

Unit 7.2 - Recording-Keeping

Unit 7.3 - Methods of Documenting and Record Keeping

FIC/N0108

Key Learning Outcomes

At the end of this module, you will be able to:

1. Illustrate the need for documenting and maintaining records of raw materials, process, and finished products
2. Illustrate the method of documenting and recording the details of raw material to final finished product

UNIT 7.1: Documentation

Unit Objectives

At the end of this unit, you will be able to:

1. Illustrate the need for documenting and maintaining records of raw materials, process and finished products

7.1.1 Need for Documentation

Every organization has to maintain records of raw material procurement, production processes, and sales. This is to ensure that the business runs effectively and is profitable. Listed beloware some reasons why there is a need for documentation:

- It gives detailed knowledge about running of the business.
- It helps to control product quality.
- It helps to keep track of the money invested in the business.
- It helps to identify the separate costs of raw material or product ingredients.
- It helps to identify the production cost of a particular process.
- It helps to ensure that quality assurance procedures are followed.
- It helps to ensure that the production unit is running smoothly/effectively.
- It works as an evidence for legal procedures.
- It helps to set an appropriate product price.
- It helps to take corrective measures at the right time.

UNIT 7.2: Recording-Keeping

Unit Objectives

At the end of this unit, you will be able to:

1. Illustrate the method of documenting and recording the details of raw material to final finished product

7.1.2 How to keep Records

Every food processing organization follows a more or less similar way of keeping records. Production records keep a log of:

- The quantity and type of raw materials
- The quantity and type of ingredients used
- The processing conditions in which production took place (e.g. the temperature set or the air pressure applied)
- The product quality

Product quality can be maintained only when:

- The same quantity and quality of ingredients and raw materials are mixed in every batch
- A standard formulation is used for every batch
- Standard process parameters are applied for every batch

Every batch of food is given a batch number. This number is recorded in:

- Stock control books (where raw material procurement is noted)
- Processing logbooks (where production process is noted)
- Product sales records (where sales and distribution is noted)

The batch number must correlate with the product code number, which is printed on labels. This helps the processor to trace any fault found in a batch back to the raw material used or the production process.

Product Name		Batch Number		
Raw material*	Supplier	Results of inspection for:		
		A	B	C

Table 7.2.1: Example of a Stock Control Book

UNIT 7.3: Methods of Documenting and Record Keeping

Unit Objectives

At the end of this unit, you will be able to:

1. Demonstrate the process of documenting records.

7.1.3 Type of Record

A production plant has following records:

1. **Stock register:** Maintain the details of all type of raw material in stock register, like: Name of vendor/ Supplier, quantity, batch no., date of manufacturing, whether certificate of analysis came with raw material, expiry date, GR No, where it is to be placed, how many pallets used, and FIFO status.
2. **Production register:** In this register, details of goods in process to be made for traceability purpose. In this register details like: how much quantity of material is in process, monitoring of time & temperature, other crucial parameters to be listed, as per standard operating procedure.
3. **Dispatch register:** This register is maintained to identify the status of dispatch for Finished Good. The general information mentioned like: Date and time on which truck was loaded, FIFO status, batch No., vehicle No., vehicle type, name of driver quantity loaded and out time.
4. **Records for GMP/GHP activities:** These records are formulated by food safety team of the unit. These records may follow below Indicated rules:
   - Clearly written standard operating procedures will avoid errors resultant of inefficient spoken communication, also understandable documentation will allow better tracing of performed work.
   - Documents like this have to be prepared, reviewed, and circulated with responsibility.
   - Documents like this have to be signed, accepted, and date must be mentioned preferably with time.
   - Documents should not have ambiguous contents. The title, nature, and purpose must be mentioned and laid out in an structured way.
   - All the documents must be recent and up-to-dated
   - If the document needs manual entry, in such case handwriting should be legible and must provide enough space in between words and sentences.
   - Document or record must be signed, if any modification is made
   - Storage of records should be at secure place and easily retrievable.
   - Documents or records have to be duplicated, copied or generated electronically which are crucial to regulatory conformity or supports necessary business actions.
   - In case any data is amended, it should be traceable.

Classification of GMP/GHP Records The accounts of GM P/ GH P may be categorized as:

- Quality Manual
- Standard Operating Procedure
- Test Method
- GMP Checklist
- Specification Sheet

Practical Exercise:

Objective: To make observation table for raw material stock register, process register and dispatch register

Materials required for practical:

- Raw material stock register
- Process register
- Dispatch register
- Weighing machine
- Moisture meter

Method:

1. Maintain the details of raw materials available at the production unit or plant in the stock register
2. Use the observation table and enter the details of the raw materials.
    - Enter the type of raw materials available at the plant.
    - Weigh the raw materials on weighing machine.
    - Enter the weight of each raw material in the stock register.

Precautions:

- Make sure that you make the correct entry after checking the raw materials physically.
- Ensure all records are up-to date as per SOP and are always ready for audits.

Notes

Scan the QR codes or click on the link to watch the related videos

www.youtube.com/watch?v=kcpGlHBpphA&t=62s

Audit, Documentation and Record keeping

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8. Food Safety, Hygiene and Sanitation for Processing Food Products

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Food Industry Capacity and Skill Initiative

Unit 8.1 - Food Safety, Hygiene, and Sanitation

Unit 8.2 - Hazard Analysis and Critical Control Point (HACCP)

Unit 8.3 - Fire Safety

FIC/N9001

Key Learning Outcomes

At the end of this module, you will be able to:

1. Illustrate the importance of safety, hygiene, and sanitation in food processing industry
2. Follow the industry standards to maintain a safe and hygiene workplace
3. Follow HACCP principles to eliminate food safety hazards in the process and products
4. Follow the fire safety practices in the work area

UNIT 8.1: Food Safety, Hygiene, and Sanitation

Unit Objectives

At the end of this unit, you will be able to:

1. Illustrate the importance of safety, hygiene, and sanitation in food processing industry
2. Follow the industry standards to maintain a safe and hygiene workplace

8.1.1 Good Manufacturing Practices (GMP)

GMP is a set of guidelines proposed by the Food Safety Standards Authority of India (FSSAI) to ensure the production of high quality and safe processed foods. It requires a qualitative approach towards manufacturing to reduce chances of microbial contamination, spoilage and errors.

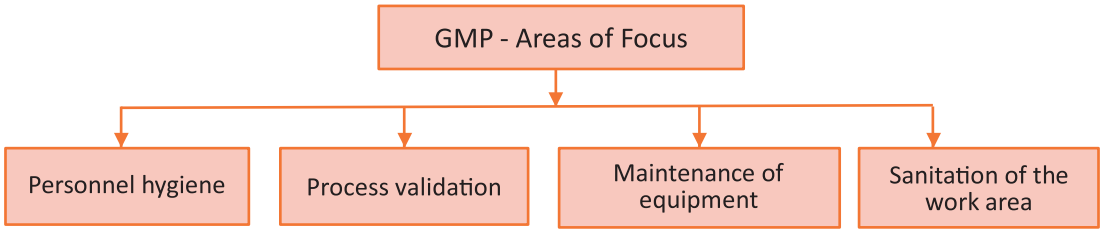

Fig. 8.1.1: Good Manufacturing Practices (GMP)

Area of focus	GMP
Personnel Hygiene	• Your organization follows strict hygiene and sanitation guidelines. • You are provided training on Good Manufacturing Practices (GMP). • You are in a sound health condition during working hours. • You follow high standards of cleanliness. • Your processing unit has enough facilities for toilets and wash stations.
Sanitation of the Work Area	• The processing unit where you work is located in a clean, pollution-free area. • The entire processing unit is well ventilated and has adequate lighting, • The entire work area follows high standards of cleaning and sanitization. • There is a designated area for keeping utensils and equipment. It is kept clean and pest-free at all times.
Equipment Maintenance	• The equipment used for processing foods is protected against contamination from lubricants, metal fragments, fuel and contaminated water. • The cleaning and maintenance of tools, materials, and equipment is an easy process. • The organization follows a cleaning and sanitizing drill as per daily, weekly and monthly schedules.

Area of focus	GMP
Process validation	• All processes of production, like raw material procurement, execution, storage, packaging and logistics follow strict organizational parameters. • Quality checks are conducted at each step of production. This helps to ensure that food quality is main-tained as per prescribed norms and standards. • The stock rotation of finished product follows the FEFO and FIFO methods. This is to ensure that there is a minimum chance of food spoilage. It will also help to retain the taste of processed foods.

Table 8.1.1: Areas of GMP

UNIT 8.2: Hazard Analysis and Critical Control Point (HACCP)

Unit Objectives

At the end of this unit, you will be able to:

1. Follow HACCP principles to eliminate food safety hazards in the process and products

8.2.1 What is HACCP

Hazard Analysis and Critical Control Point (HACCP) is an international food safety regulation that is fol-lowed to reduce the risk of hazards in a food-processing unit. It is a system that identifies possible hazards and controls them at various points of the production process. The HACCP is based on seven principles. They are as per Fig.ure below:

Conduct a hazard analysis
- Evaluate the production process and identify the points where hazards (physical, chemical, and biological) may be introduced

Identify critical control points
- Identify the critical points in the process plan where a hazard may occur
- Plan preventive measures at that critical point to control the risk

Establish critical limits
- State the boundary line between safe and unsafe processes
- State the limit until which a critical point maybe controlled

Establish a monitoring system
- State the process of monitoring critical points and critical limits

Establish corrective measures
- Specify the corrective actions that should be followed when critical limits are crossed

State verification procedures
- State the verification process to check whether HACCP principles are applied and followed
- Test the HACCP plan and ensure compliance on a regular basis
- Check whether the HACCP plan helps to prevent hazards effectively

Follow record-keeping procedures
- Keep records of all the critical points
- Maintain a log of situations when critical limits were exceeded
- State the corrective measures that were applied
- Include records of the development and maintenance of the system

Fig. 8.2.1: HACCP

Opera-tional step	Hazard	Control measure	Critical limit	Moni-toring method	Correc-tive ac-tion	Responsi-bility	Record
Procure-ment of Ingredients	Physical (dirt stone particles)	Supplier guarantee specifica-tions established by quality assurance depart-ment	As per company internal specifica-tions	Supplier guarantee certificate is visually confirmed	Reject ingredients, if not accompa-nied by supplier guarantee	Store manager	Supplier guarantee
	Chemical (toxins, pesticides from ingredients)	Relative humidity of the store to be main-tained					
	Microbio-logical (high load of bak-ing ingredi-ents, presence of pathogenic bacteria)	FIFO system should be established			Monitor tempera-ture and humidity of storage		Store tempera-ture logs

Table 8.2.1: Example of an HACCP Plan

UNIT 8.3: Fire Safety

Unit Objectives

At the end of this unit, you will be able to:

1. Follow safety practices in the work area

8.3.1 Symbols

There are some symbols that you must know and understand to ensure safety in case of an emergen-cy or fire. They are:

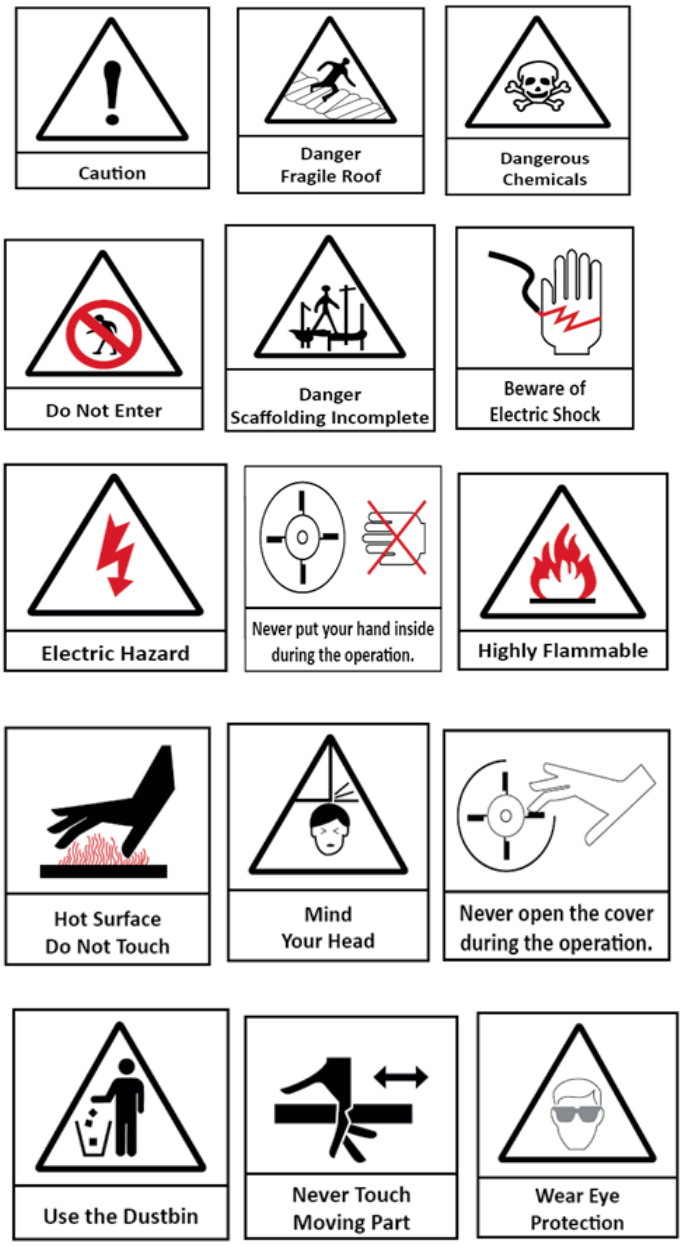

Fig. 8.3.1: Symbols

Fig. 8.3.2: Fire Safety Symbols

8.3.2 Emergency Measures

During an emergency, you must follow certain measures to tackle the situation in an organized manner. These measures are:

- Do not panic
- Respond to your senior immediately or escalate the matter to the concerned person
- Prepare against the emergency situation by keeping a fire bucket and a water source handy
- Evacuate the work area

After the emergency, you must:

- Report the situation to a senior or the concerned authority
- Undertake recovery measures

8.3.3 Fire Safety Measures

Just like emergency measures, some common fire safety measures must be followed in case of fire. They are:

- Press the closest fire alarm button (if available)
- Call the fire brigade
- Assemble at the assembly point or designated area for safety
- Evacuate the building from the closest fire exit

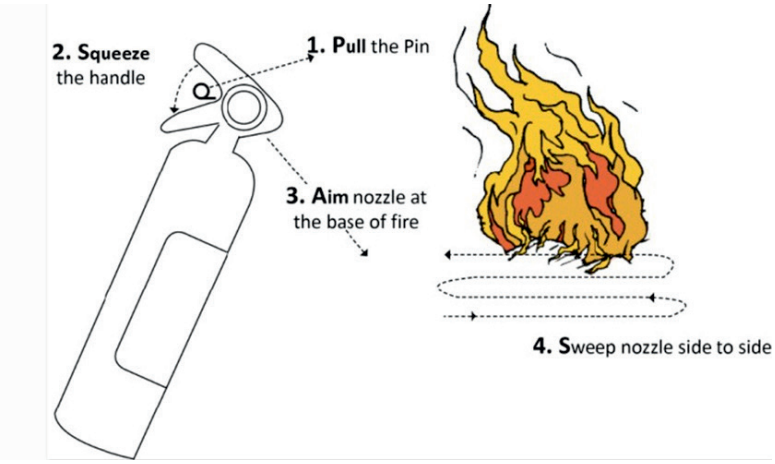

Fig. 8.3.3: Fire extinguisher

8.3.4 Steps to Use the Fire Buckets

Use the fire bucket filled with sand/water → Dump the sand/water on the fire → Refill the fire buckets

Fig. 8.3.4: Use of Fire Bucket

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9. Employability Skills

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10. Annexure

Module No.	Unit No.	Topic Name	Page No.	URL	QR Code (s)
1. Introduction	UNIT 1.1: Introduction	1.1.1 Training Programme Purpose & Benefits	14	www.youtube.com/watch?v=wMu0EpUgCd4	Overview of Food Processing Industry
	UNIT 1.1: Introduction	1.1.1 Training Programme Purpose & Benefits	14	www.youtube.com/watch?v=iacTHJtrXIE	Overview of Fruits & Vegetables Industry
	UNIT 1.1: Introduction	1.1.1 Training Programme Purpose & Benefits	14	www.youtube.com/watch?v=H0l5JQJ3fos&t=74s	Orientation Video
3. Prepare and Maintain Work Area and Process Machineries for Pickle Making	UNIT 3.1 - Cleaning and Maintenance	3.1.1 Cleaning and Sanitizing Work Area and Machinery	41	www.youtube.com/watch?v=tRAnusofqJ8	Maintenance Video
	UNIT 3.1 - Cleaning and Maintenance	3.1.1 Cleaning and Sanitizing Work Area and Machinery	41	www.youtube.com/watch?v=QWpU7DAfNcs	Cleaning & Sanitation

Module No.	Unit No.	Topic Name	Page No.	URL	QR Code (s)
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5. Carry out Pickle Mak-ing as per Production Needs	UNIT 5.2: Different Methods of Preparing Pickles	5.2.1 Prepa-ra-tion of Pick-le in Oil	71	www.youtube.com/watch?v=AIWN5rTf9RI	Pickle Making Process
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	Unit 6.2 - Personal Hygiene & Sanitation Guidelines	6.2.1 Personal Hygiene & San-itation Guide-lines	80	www.youtube.com/watch?v=gNEx8P9UqPA&t=1s	Personal Hygiene and Sanitation

Module No.	Unit No.	Topic Name	Page No.	URL	QR Code (s)
7. Complete Documentation & Record Keeping Related to Pickle Making	UNIT 7.3 - Methods of Documenting and Record Keeping	7.1.3 Type of Record	87	www.youtube.com/watch?v=kcpGlHBpphA&t=62s	Audit, Documentation and Record keeping
Employability Skills (30 Hrs)				https://www.skillindiadigital.gov.in/content/list	

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