Spice and Herbs Processing Level-II

Based on May 2019, Version 2 Occupational standards

Module Title**: - Performing Soaking & Bleaching Process**

LG Code: IND SHP2 M12 LO (1-3) LG (42-44)

TTLM Code: IND SHP2 TTLM 1020v2

October 2020

UNESCO
United Nations
Educational, Scientific and
Cultural Organization

Table of Contents

LG #42	LO #1- Prepare the soaking and bleaching equipment and process for operation

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Confirming available materials to meet soaking and bleaching operation
- Identifying and confirming cleaning and maintenance requirements and status
- Fitting and adjusting machine components and related attachments
- Entering processing/operating parameters
- Checking and adjusting equipment performance
- Carrying out pre-start checks

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Confirm available materials to meet soaking and blanching operation
- Identify and confirm cleaning and maintenance requirements and status
- Fit and adjust machine components and related attachments
- Enter processing/operating parameters
- Check and adjust equipment performance
- Carry out pre-start checks

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Confirming available materials to meet soaking and blanching operation

1.1. Introduction

Soaking/washing of spice and herbs:-soaking/washing most commonly takes place when fresh herbs are delivered to the processing unit. Spices are rarely washed, but notable exceptions are nutmegs which are dipped in water to remove unsound nuts or "floaters", and cardamom which may receive a sodium bicarbonate dip to preserve its green color. In the case of herbs it is most important to wash them as soon as they arrive in order to remove 'field heat' and thus slow down the growth of micro-organisms. Large amounts of clean chlorinated water are required, using chlorine levels that are higher than those found in tap water.

Blanching is a thermal treatment that is usually performed prior to food processes such as drying, freezing, frying, and canning. It is essential to preserve the product quality during the long-term storage because it inactivates the enzymes and destroys microorganisms that might contaminate raw spice and herbs during production, harvesting and transportation. Blanching involves heating spice and herbs rapidly to a predetermined temperature and maintaining it for a specified amount of time, typically 1 to less than 10 min. Then blanched product is either rapidly cooled or passed immediately to a next process. The time required for blanching a product depends on the time required for inactivation of peroxidase and polyphenoloxidase enzymes. Blanching is the process of destroy enzymes which would otherwise cause changes in colour, flavour and texture. After washing, certain spice and herbal materials may undergo a parboiling or blanching process in which they are put into boiling water for a brief period without being fully cooked.

Table: 1.1. Spice and herbs type and their part use as raw materials for soaking and blanching

Plant organs use as raw material	Spice and herbs
Aril	Mace of nutmeg
Barks	Cassia, cinnamon
Berries	All spice, black pepper, chilies
Buds	Clove
Bulbs	Onion, garlic, leek
Pistil	(female part of flower) Saffron
Kernel	Nutmeg
Leaf	Basil, bay leaf, mint, marjoram, sage, curry leaf
Rhizome	Ginger, turmeric
Latex from rhizome	Asafoetida
Roots	Angelica, horse-radish
Seeds	Ajowan, aniseed, caraway, celery, coriander, dill, fennel, fenugreek mustard, poppy seed

1.2. Spice and herbs raw materials for soaking

1.2.1. Leaves and stems

The aromatic herbs such as basil, bay leaves, mints, oregano, parsley, rosemary, sage, tarragon and thyme are often used fresh to garnish food, as dry seasonings or for extracted essential oils. As a general rule, the leaf and stem should be cut when the growth has matured to an elongated flower stem but without full flower or significant senescence of the lower leaves. The essential oil can be distilled from fresh or dry plant material. Harvesting the plant material should be avoided when it is wet and if it is to be dried the plant material should be evenly spread onto the drying racks or drier to ensure there is no sweating, fermentation and microbial invasion and make ready for soaking and blanching operation.

Figure: 1.1. Herbs raw materials

1.2.2. Flowers, buds and seed

The harvested flower buds and seeds of spice and herbs should soaking/washing and blanching before processing. Only fully developed flowers, buds and seeds are picked and wash or soaked and blanch before going to other processing. Some example of flower, bud and seed use as raw materials for soaking and blanching process are thyme, rosemary, black pepper, cumin, cove, and fenugreek.

Figure: 1.2. Flower, fruit, bud and seed raw materials use for soaking and blanching

1.2.3. Rhizomes

The common spices which are derived from rhizomes are turmeric and ginger use as raw materials for soaking and blanching process. Care is necessary to avoid damage to the rhizome (splitting or bruising) as injuries can result in fungal infection and rejection during preparation for soaking and blanching process. Rhizomes are lifted whole, washed, sun dried and the rhizome fingers (which are kept as seed material) are separated from the mother rhizome.

Figure: 1.3. Rhizome of ginger and turmeric

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Define soaking?(2pts)

2. Define blanching?(2pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Spices are rarely washed, but notable exceptions are nutmegs which are dipped in water to remove unsound nuts or "floaters", and cardamom which may receive a sodium bicarbonate dip to preserve its green color. (2pts)

2. Blanching is the process of destroy enzymes which would otherwise cause changes in colour, flavour and texture. (2pts)

Note: **Satisfactory rating - 8 points** **Unsatisfactory -8 below points**

Score = ----------

Rating: ----------

You can ask you teacher for the copy of the correct answers.

Answer sheet

Test I

1._____

2._____

Test II

1._____

2._____

Information Sheet 2- Identifying and confirming cleaning and maintenance requirements and status

2.1. Cleaning raw materials

Not accept or use raw materials which contain or carry parasites, hazardous micro-organisms or toxic substances soaking or blanching process.

- Prepare product from raw materials that are unpolluted, sound, in normal condition and in accordance with these standards.
- Raw materials should, where appropriate, be inspected and sorted prior to processing. Where necessary laboratory tests shall be performed to establish fitness for use. Only sound, suitable raw materials should be used.
- Protected against contamination by pests, physical, chemical or microbiological hazards and other objectionable substances.
- Protected from detrimental changes to temperature and or other physical parameters that may be caused by crushing, abrasion and vibration.
- Not processed or used unless inspected for contamination, spoilage and moulds before processing and found to be in compliance with the accepted criteria in this Standard.
- Raw unprocessed/or unlearned spice and herbs shall be fully separated either physically or by time from the finished or ready to eat foods with effective intermediate cleaning and where appropriate disinfection.

2.2. Hand materials tools use for soaking and blanching

- Different materials use for soaking and blanching of spice
- Sulfur dioxide,
- Sodium sulfite,
- Sodium bisulfite,
- Potassium bisulfite,
- Sodium metabisulfit
- Potassium metabisulfite
- Chlorine
- salt

- Different hand tools use for soaking and blanching of spice
  - ✓ Measuring cup
  - ✓ Measuring spoon
  - ✓ Weighing scale
  - ✓ Knife
  - ✓ Chopping board
  - ✓ Ladles
  - ✓ Tongs
  - ✓ Colanders
  - ✓ Thermometers

Figure: 2.1. Pans use or soaking and blanching process

2.3. Equipment and machine use to soaking and blanching spice and herbs

Traditional unit (TU) blancher, which consisted of a 100-L cast iron drum for blanching, a perforated cast iron sheet suspended on wood or cast iron blocks called “the separator” that was placed in the drum and holds 100 kg of paddy inside the drum during steaming. The separator created a false bottom that separated the water-boiling chamber from the steaming chamber. The drums were neither covered during blanching nor steaming. The improved unit (IU) blancher consisted of a stainless steel tank with a cover for blanching and a stainless steel mesh basket for holding the soaked paddy that is placed inside the tank during steaming. The tank was closed using a tight-fitting lid, which is not completely pressurized.

Figure: 2.2. Traditional blancher

Blancher machine, designed and manufactured as per precision technology standards, these are completely enclosed from all sides so as to provide dust proof operations. The body of machine is made of food grade stainless steel that complies with international standard. This machine is applicable for blanching of leaf herbs, pickled herbs, root herbs, stem herbs, snack food, etc. The heating source of machine is steam heating that with automatic water temperature control device to reduce energy waste to the greatest extent. The belt moving speed can be set according to the technical requirement. The blanching time can be also adjusted according to the different products, greatly improving the blanching success rate. These rotary sieving machines work on principle of centrifugal action and allow excellent sieving, blanching and grading standards.

Figure: 2.3. Blanching machine

Figure: 2.4. Continuous steam blancher

2.4. Cleaning tools, equipment and machinery

Tools, equipment, and machinery should be designed to facilitate cleaning and disinfection with little or no water and, when wet cleaning is required, to allow thorough drying before reusing the tools, equipment, and machinery for spices and dried aromatic herbs. Alternatively the design should allow disassembly such that parts can be taken to a room designed for wet cleaning and disinfection, when applicable. The equipment and machinery design should be as simple as possible, with a minimal number of parts and with all parts and assemblies easily accessible and/or removable for inspection and cleaning. Equipment should not have pits, cracks, corrosion, crevices, recesses, open seams, gaps, lap seams, protruding ledges, inside threads, bolt rivets, or dead ends. Hollow areas of equipment as well as cracks and crevices should be eliminated whenever possible or permanently sealed. Items such as bolts, studs, mounting plates and brackets should be continuously welded to the surface and not attached via drilled and tapped holes. Welds should be ground and polished smooth. Push buttons, valve handles, switches and touch screens should be designed to ensure product and other residues (including liquid) do not penetrate or accumulate in or on the enclosure or interface. Equipment should be installed so as to allow access for cleaning and to minimize transfer of dust particles to other pieces of equipment or to the environment. The risk of contamination from equipment should be assessed and controlled.

2.5. Maintenance of tools, equipment and machinery

Maintenance of all tools, equipment and machinery should be carried out in accordance with the manufacturer's recommendations.

When carrying out maintenance activities remember:

- Turn the machine OFF and DISCONNECT from the electricity before starting work
- Do not put your head and hands into moving machinery
- Replace the safety guards are cleaning
- Only work on tasks and machinery that you are authorized to work on
- Account for all tools, equipment and machinery parts on completion of the job.

Self-check 2	Written test

Name…… ID……. Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. List the importance chemical use to soak and blanch spice and herbs? (3pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Maintenance of all tools, equipment and machinery should be carried out in accordance with the manufacturer's recommendations. (2pts)

2. Rotary sieving machines work on principle of centrifugal action and allow excellent sieving, blanching and grading standards.(2pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory – 6 below points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer sheet

Test I

1._____

Test II

1._____

2._____

Information Sheet 3- Fitting and adjusting machine components and related attachments

3.1. Methods of machine safeguarding

There are many ways to safeguard soaking and blanching equipment or machines. The type of soaking and blanching, the size or shape of stock, the method of soaking and blanching, and the physical layout of the soaking and blanching area, the type of material, and production requirements or limitations will help to determine the appropriate safeguarding method for the individual equipment or machine. As a general rule, power transmission apparatus is best protected by fixed guards that enclose the danger areas. For hazards at the point of operation, where moving parts actually perform work on stock, several kinds of safeguarding may be possible. One must always choose the most effective and practical means available.

3.2. Adjusting machine component

The openings of these barriers are determined by the movement of the stock. As the operator moves the stock into the danger area, the guard is pushed away, providing an opening which is only large enough to admit the stock. After the stock is removed, the guard returns to the rest position. This guard protects the operator by placing a barrier between the danger area and the operator. The guards may be constructed of plastic, metal, or other substantial material. Self-adjusting guards offer different degrees of protection. The point consider when fitting and adjusting machine component and related attachment

- Become familiar with the equipment or machine before the first operation. Read the manual that came with the machine
- Never leave the machine unattended while the engine is running. Keep children away from the machine. Keep hands and feet away from moving parts
- Do not fill the tank while the engine is running
- Keep all flammable materials (including dry straw) away from the engine
- Do not oil, grease, or adjust the machine during operation. Wait until all moving parts have stopped before servicing
- Do not wear loose fitting clothing that may be picked up by moving parts

- While operating, keep all shields and guards in place
- Never extend hands or feet into the feed opening of the machine
- Never operate your machine in a closed shed or garage. Exhaust fumes are dangerous to your health
- Do not operate machine with loose peg teeth, bolts and nuts. Loose peg teeth may be ejected at high speeds, causing injury to operators and damage to the thresher
- Keep a first-aid kit at hand
- Tie up long hair to prevent entangling
- Do not wear neckties or other garments that may be wrapped into moving parts of the machine.

3.3. Fitting machine component

Fitting are threaded or snap-lock attachments allowing connections between different machine components. Made of stainless steel, fittings have various pressure ratings that are usually higher than the components being connected. This allows for fail-safe operation at a possible weak point in the circuit. The only repair on a fitting is replacing any failed seals. Otherwise, a failed fitting must be replaced. As fittings are attached with swage pressure (connecting fittings with compression), the components attached to the fitting (hose or tube) are distorted. Replacing a fitting usually means also replacing the connected piece.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. List the point consider when fitting and adjusting machine component and related attachment?(3pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Never extend hands or feet into the feed opening of the machine. (2pts)

2. Keep all flammable materials (including dry straw) away from the engine.(2pts)

Note: Satisfactory rating - 7 points **Unsatisfactory - below 7 points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer sheet

Test I

1._____

Test II

1._____

2._____

Information Sheet 4- Enter processing and operating parameters

A spice and herbs soaking and blanching technician must have the ability to plan, organize, prioritize, calculate and handle pressure. The individual must possess reading, writing and communication skills. In addition, the individual must have personal and professional hygiene.

During soaking and blanching of spice and herbs, enterprise work procedures describe how to do the various soaking and blanching/ tasks on spice and herb to be used is based on soaking and blanching parameter. In some case these processers are handed down by 'word of mouth' but now in most large processing area the procedures are documented to ensure that all operators know what to do and that work is done using the correct procedures. Your supervisor or line manager will be able to provide advice and guidance about the procedures to use and your role will be organizing activities and ensuring that all the enterprise work procedures are followed correctly by yourself and your supervisor.

The requirements of the client and the target market will determine the standards to be used for various soaking and blanching operations, e.g**.** quality of raw materials, produce accepted and type of processing to be used. For some markets these requirements may be defined in Law but for others buyer preference dictates the price and raw material producer respond to their requirements to secure good price. For contract sales, client requirements will be listed in the contract. In a large processing area the owner of manager will meet with the buyers and the processer manager will be informed of the standards to be used for produce processing. These requirements will then be explained to all supervisors and quality assurance staff involved and this team will be responsible to explain to workers and ensure that the required standards are achieved.

Self-Check – 4	Written test

Name……ID…… Date…….
Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Short Answer Questions

1. What guideline follow while performing various processing operations / tasks?(3)

Note: Satisfactory rating - 3 points Unsatisfactory - below 3 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer sheet

1._____

_____

Information Sheet 5- Checking and adjusting equipment performance

5.1. Checking tools, equipment and machinery

The purpose of checking of equipment and machinery is to identify whether work equipment can be operated, adjusted and maintained safely with any deterioration detected and remedied before it results in a health and safety risk. Not all work equipment needs formal check to ensure safety and, in many cases, a quick visual check before use will be sufficient. However, inspection and checking is necessary for any equipment where significant risks to health and safety may arise from incorrect installation, reinstallation, deterioration or any other circumstances. The need for inspection and inspection frequencies should be determined through risk assessment. The importance of checking a tools equipment and machinery;

- To perform soaking and blanching operation without any interruption
- In order to separating functional & un functional tools & equipment
- Ready for repaired & maintenance
- Care for environmental condition
- Disposing or sale out of depreciated/ retied equipment
- For kaizen application
- To know loss equipment
- To separate well cleaned & un-cleaned tools
- To maintain personnel health and safety

5.2. Adjusting tools, equipment and machinery performance

Adjustments; various adjustments are required before starting machine operation. The machine is to be installed on clean level ground and is to be set according to task conditions. Any piece of equipment (including tools and furniture) identified as unsafe, either in normal day-to-day activities or during a safety inspection, must be promptly tagged using a tag out. Then further action must be taken for repair or disposal.

Equipment identified as faulty should be disconnected and tagged, and appropriate service people contacted to arrange repair or replacement to improve the performance.

Think, plan and check

- Lockout procedure must be employed whenever a piece of equipment is being repaired and there is the possibility of that equipment being switched on without the knowledge of the repairer.
- Identify all parts of any equipment or system that needs to be shut down.
- Find the switches, valves or other devices that need to be switched off.
- Follow the correct procedure for the shutdown of equipment so you don't endanger anyone.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. The list importance of checking a tools equipment and machinery? (3pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Follow the correct procedure for the shutdown of equipment so you don't endanger anyone. (2pts)

2. Equipment identified as faulty should be disconnected and tagged, and appropriate service people contacted to arrange repair or replacement to improve the performance. (2pts)

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer sheet

Test I

1._____

Test II

1._____

2._____

Information Sheet 6- Carryout pre-start checks

6.1. Pre-start checks of equipment and machine

A responsible operator, running a pre-start check on your plant or machinery before you start the day is the best way to ensure the job gets done safely and without delay. Undertaking a pre-start check on your machine before you start a day work happens in three stages.

- Visual inspections of important features prior to starting the machine
- Visual & function tests while the machine is turned on but stationary
- Testing the machine's functions during a short drive

Check all the tools and equipment before use.

- Are all the tools and equipment functional and sufficient enough in number?
- Are all free from any contaminants?
- Is there any tools and equipment which needs maintenance?
- Is the tools and equipment function coincides with the given task?
- Then check and report to your supervisor the condition of these tools and equipment.
- After reporting the condition of tools and equipment, your supervisor will guide you what to do if there is insufficient of tools and equipment to perform this particular work.

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. List the importance of service checking of tools, equipment and machinery? (1pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Tools, equipment and machinery shall be kept in proper operating condition and used only for the purpose for which they were designed. (2pts)

2. All tools, equipment and machineries should be inspected at regular intervals, and any tool that develops defects while in use shall be taken from service and not used again until restored to proper working condition. (2pts)

Note: Satisfactory rating - 5 points Unsatisfactory - below 5 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer sheet

Test I

1._____

Test II

1._____

2._____

LG #43	LO #2- Operate and monitor the soaking and bleaching process

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Starting and operating the process
- Monitoring the equipment to identify variation
- Identifying variation in equipment operation and reporting maintenance requirements
- Monitoring soaking and blanching process
- Identifying, rectifying and reporting out-of-specification product/process
- Achieving housekeeping standards
- Maintaining workplace records according to workplace

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, **you will be able to**:

- Start and operate the process
- Monitor the equipment to identify variation
- Identify variation in equipment operation and reporting maintenance requirements
- Monitor soaked and blanched process
- Identify, rectify and report out-of-specification product/process
- Achieve housekeeping standards
- Maintain workplace records according to workplace

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets”
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Starting and operating the process

1.1. Soaking/washing of spice and herbs

Soaking or emersion is the process of immersing the spice and herbs in water. Soaking /washing most commonly takes place when fresh spice/herbs are delivered to the processing unit. Spices are rarely washed, but notable exceptions are nutmegs which are dipped in water to remove unsound nuts or "floaters", and cardamom which may receive a sodium bicarbonate dip to preserve its green color. In the case of herbs it is most important to wash them as soon as they arrive in order to remove 'field heat' and thus slow down the growth of micro-organisms.

The importance of soaking/washing

- It is important to remove pesticide spray residue and dust from spice and herbs.
- One gram of soil contains 1012 spores of microorganisms. Therefore, removal of microorganisms by washing with water is essential.
- Spice and herbs can be washed in different ways. Root and rhizome spice that loosen in soil are washed by soaking in water containing 25 to 50 ppm chlorine (as detergent).
- Other methods of washing are spray washing, steam washing, etc.

Washing or spraying for a minute or so with chlorinated water removes most soils and reduces microbial levels. Quick washing only wets the surface and a short re-drying period is all that is required to reduce the moisture to the required level. Chlorine levels should be monitored to avoid flavor taints in the finished product and simple test kits are available. If available, special disinfecting/cleaning agents are superior to chlorinated water. These usually contain chemicals known as quaternary ammonium compounds that have a stronger, longer lasting action than chlorine. They are usually supplied pre-mixed with wetting detergents that produce better washing. Washing may be achieved at a small scale in large shallow tanks that allow operators to move the produce freely through the water. If concrete tanks are used they should ideally be tiled. Soil and other foreign matter are washed off the raw materials and frequent changes of water are therefore needed. A better method is to continuously circulate water through a filter.

Ideally several tanks should be used, the first for removal of heavy soiling and subsequent cleaner tanks for final washing.

At a larger scale continuous washers are more appropriate. Here a moving conveyor picks up the produce and carries it under powerful sprays of water. Recirculation through a filter is normal to reduce water consumption. Although spices are rarely washed in most processing units, rapid washing and re-drying offers the greatest potential to improve quality. Most contamination by micro-organisms and soils on spices such as black pepper, cardamoms and pimento is surface contamination.

Figure: 1.1. Soaking machine

There are three types of soaking methods,

(1). Hot soak method,

(2). Traditional soak method, and

(3). Quick soak method.

1. Hot soak

Hot soaking is recommended method. The hot soak method is the recommended method because it reduces cooking time and gas-producing compounds the most and it produces consistently tender spice.

- Advantages

  Reduces cooking time and gas-producing compounds; consistently yields tender spice

- Disadvantages

  Long soaking time, requiring some planning

2. **Traditional Soak**

- Advantages

  No boiling required; reduces

  Gas-producing compounds with long soak

- Disadvantages:

  Long soaking time, requiring planning ahead of time

3. **Quick soak**

- Advantages

  Much faster soaking time, requiring less planning

- Disadvantages: Fermentation may take place if left in hot water for too long; potential loss of some folate.

Figure: 1.2. Soaking of green pepper

Figure: 1.3. Soaking of fenugreek

Figure: 1.4. Soaking of ginger

1.2. Blanching of spice and herbs

Blanching is achieved in hot water for a short period of time or in an atmosphere of steam. In water blanching, the product is moved through water usually maintained at a temperature between 88 and 99 ^{o}C. Blanching is used to destroy enzymatic activity in spice and herbs prior to other processing like freezing or dehydration or canning or thermal processing. It is a pre-treatment by mild heat for a specific time followed by rapid cooling or passing immediately to the next processing stage. The time and temperature combination varies from product to product, the condition and size of product.

The following factors are affecting blanching time:

- The type of spice or herbs.
- The size spice or herbs.
- The blanching temperature and
- The method of heating

After washing, certain spice and herbal materials may undergo a parboiling or blanching process in which they are put into boiling water for a brief period without being fully cooked. Such a heating procedure may serve several purposes, such as improving storage life of the processed materials by gelatinizing the starch, preventing mould or insect contamination, easily drying, destroying enzyme activity to prevent the alteration of certain chemical constituents, and facilitating further processing such as removal of the seed coat of almonds. Blanching is almost universally practiced in spice and herbs drying and dehydration chiefly for the in activation of enzymes, but exceptions are celery, garlic, onion and parsley, which are valued primarily for their specific flavors, since blanching destroys the very enzymes involved in the generation of their respective flavors. In chilies and ginger blanching is not desirable. However, blanching or simmering is a commercial practice in the case of turmeric, particularly in the presence of a small quantity of alkali.

1.2.1. Processing Conditions for blanching

It is essential to control the processing conditions accurately to avoid loss of texture, weight, color and nutrients. All water-soluble materials, including minerals, sugars, proteins and vitamins, can leach out of the tissue, leading to nutrient loss. In addition, some nutrient loss (especially ascorbic acid) occurs through thermal liability and to a lesser extent oxidation.

Ascorbic acid is the most commonly measured nutrient with respect to blanching, as it covers all eventualities, being water soluble and hence prone to leaching from cells, thermally labile, as well as being subject to enzyme breakdown by ascorbic acid oxidase during storage. Wide ranges of vitamin C breakdown are observed, depending on the raw material and the method and precise conditions of processing. The following factors must be considered for deciding processing conditions of blanching:

- Spice or herbs properties, especially thermal conductivity, which will be determined by type, cultivar, degree of maturity etc.
- Overall blanching effect required for the processed product, which could be expressed in many ways including: achieving a specified central temperature, achieving a specified level of peroxidase inactivation, retaining a specified proportion of vitamin C.
- Size and shape of food pieces
- Method of heating and temperature of blanching medium

Time/temperature combinations vary very widely for different foods and different processes and must be determined specifically for any situation. Holding times of 1–15 minutes at 70–100 ºC are normal. Blanching is carried out to inactivate enzymes such as peroxidase (POD), polyphenol oxidase (PPO) and pectin methyl esterase (PME), which in turn helps in improving color, texture and overall acceptability of the product. It also reduces microbial load and removes gases from the plant tissue that assists drying and packaging.

Table1.1. Enzymes response to quality deterioration

Quality defect	Responsible enzymes
Off-flavor development	lipoxygenase lipase protease
Color changes	polyphenol oxidase chlorophyllase peroxidase (less extent) lipoxygenase
Nutritional changes	ascorbic acid oxidase thiaminase

1.2.2. Methods of blanching

The two most widespread commercial methods of blanching involve passing food through an atmosphere of saturated steam or a bath of hot water. Both types of equipment are relatively simple and inexpensive. Microwave blanching is not yet used commercially on a large scale. There have been substantial developments to blanchers in recent years to reduce the energy consumption and also to reduce the loss of soluble components of foods, which reduces the volume and polluting potential of effluents and increases the yield of product. Conventional steam blanching consists of conveying the material through an atmosphere of steam in a tunnel on a mesh belt. Uniformity of heating is often poor where food is unevenly distributed; and the cleaning effect on the food is limited.

However, the volumes of waste water are much lower than for water blanching. Fluidized bed designs and 'individual quick blanching' (a three-stage process in which vegetable pieces are heated rapidly in thin layers by steam), held in a deep bed to allow temperature equilibration, (followed by cooling in chilled air) may overcome the problems of no uniform heating and lead to more efficient systems.

1.2.3. Equipment for blanching

A) Steam blanchers

At its simplest a steam blancher consists of a mesh conveyor belt that carries food through a steam atmosphere. The residence time of the food is controlled by the speed of the conveyor. In conventional steam blanching, there is often poor uniformity of heating in the multiple layers of food. To overcome this Individual Quick Blanching (IQB) was introduced which involves blanching in two stages. In the first stage food is heated in single layer to a sufficiently high temperature. In the second stage a deep bed of food is held for sufficient time to allow the temperature at the center of each piece to increase to that needed for enzyme inactivation.

B) Hot Water blanchers

There are a number of different designs of blancher each of which retains the food in hot water at 70 – 100^{o}C for a specific time and thus removes it to a dewatering-cooling section. It has three sections:

- Pre-heating stage
- Launching stage
- Cooling stage.

The food is preheated with water that is circulated through a heat exchanger. After blanching a second re-circulation system cools the food. The two systems pass water through the heat exchanger and this heats the pre-heat water and simultaneously cools the cooling water. A re-circulated water-steam mixture is used to blanch the food and final cooling is done by cold air.

1.2.4. Steam blanching

Conventionally, blanching is carried out using hot water or steam and the process has two steps, namely, heating (and holding) to required temperature to inactivate enzymes and cooling in water to prevent degradation of material quality. Water blanching is usually carried out in hot water at a temperature ranging from 70-100°C. Low temperature long time (LTLT) blanching and combinations of LTLT with high temperature short time (HTST) blanching are the most widely employed industrial method. In the case of steam blanching, spice or herbs are exposed to steam at

~100°C. But these methods suffer from many drawbacks such as a large amount of energy requirement, waste water generation, significant losses of water soluble solids, nutrients, phytochemicals and sensorial attributes (texture, taste, flavor and color). Due to these reasons, it is desirable to keep blanching treatment conditions at a level sufficient enough to cause inactivation of the deleterious enzymes, to minimize quality losses. This is particularly relevant for herbs intended to be stored frozen and eaten raw after thawing because thermal blanching can cause considerable deleterious effects on texture. This limitation has been a driving force for food processors to look for other processing technologies that can substitute the conventional thermal blanching which at the same time cause less damaging effects on spice and herbs.

In conventional steam blanching, there is often poor uniformity of heating in the multiple layers of food. To overcome this Individual Quick Blanching (IQB) was introduced which involves blanching in two stages. In the first stage food is heated in single layer to a sufficiently high temperature. In the second stage a deep bed of food is held for sufficient time to allow the temperature at the center of each piece to increase to that needed for enzyme inactivation.

Figure: 1.5. Continuous steam blancher

1.2.5. Hot water blanching

There are a number of different designs of blancher each of which retains the food in hot water at 70 – 100^{o}C for a specific time and thus removes it to a dewatering-cooling section. It has three sections:

- Pre-heating stage
- Launching stage
- Cooling stage.

The food is preheated with water that is circulated through a heat exchanger. After blanching a second re-circulation system cools the food. The two systems pass water through the heat exchanger and this heats the pre-heat water and simultaneously cools the cooling water. A re-circulated water-steam mixture is used to blanch the food and final cooling is done by cold air.

The major purpose of blanching is frequently to inactivate enzymes, which would otherwise lead to quality reduction in the processed product. For example, with frozen foods, deterioration could take place during any delay prior to processing, during freezing, during frozen storage or during subsequent thawing. Similar considerations apply to the processing, storage and rehydration of dehydrated foods. Enzyme inactivation prior to heat sterilization is less important as the severe processing will destroy any enzyme activity, but there may be an appreciable time before the food is heated to sufficient temperature, so quality may be better maintained if enzymes are destroyed prior to heat sterilization processes such as canning.

It is important to inactivate quality-changing enzymes that are enzymes which will give rise to loss of color or texture, production of off odors and flavors or breakdown of nutrients. Many such enzymes have been studied, including a range of peroxidases, catalases and lipoxygenases. Peroxidase and to a lesser extent catalase are frequently used as indicator enzymes to determine the effectiveness of blanching. Although other enzymes may be more important in terms of their quality-changing effect, peroxidase is chosen because it is extremely easy to measure and it is the most heat resistant of the enzymes in question. More recent work indicates that complete inactivation of peroxidase may not be necessary and retention of a small percentage of the enzyme following blanching of some vegetables may be acceptable.

Blanching causes the removal of gases from plant tissues, especially intercellular gas. This is especially useful prior to canning where blanching helps achieve vacuum in the

containers, preventing expansion of air during processing and hence reducing strain on the containers and the risk of misshapen cans and/or faulty seams. In addition, removing oxygen is useful in avoiding oxidation of the product and corrosion of the can. Removal of gases, along with the removal of surface dust, has a further effect in brightening the color of some products, especially herbs.

It is important to control the time/temperature conditions to avoid over processing, leading to excessive loss of texture in some processed products. Calcium chloride addition to blanching water helps to maintain the texture of plant tissue through the formation of calcium pectate complexes. Some weight loss from the tissue is inevitable as both water and solutes are lost from the cells. A further benefit is that blanching acts as a final cleaning and decontamination process. It also removes pesticide residues or radionuclides from the surface of herbs, while toxic constituents naturally present (such as nitrites, nitrates and oxalate) are reduced by leaching. Very significant reductions in microorganism content can be achieved, which is useful in frozen or dried foods where surviving organisms can multiply on thawing or rehydration. It is also useful before heat sterilization if large numbers of microorganisms are present before processing.

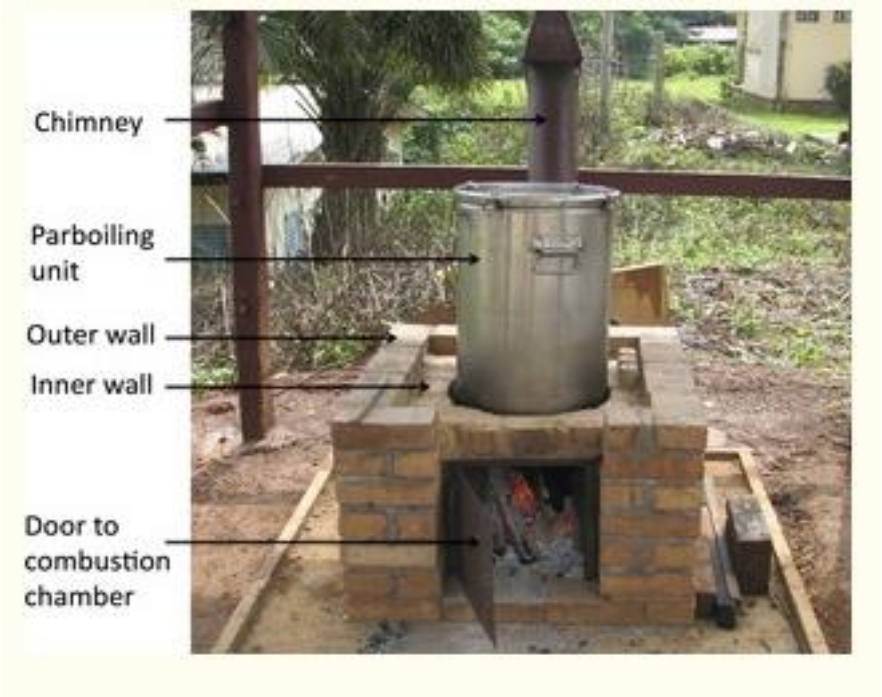

Figure: 1.6. Hot water blancher

1.2.6. Microwave blanching

In microwave (MW) blanching, food materials are exposed to MW for a known period to inactivate oxidative enzymes. The MW power and material composition decides the rate of heating of food material exposed to it. The food materials like spice and herbs contain water, a dipolar molecule and ionic substances, which results in rapid heating of foods, which in turn reduce processing time and helps to retain product quality. A number of reports on MW blanching of spice and herbs (marjoram and rosemary) and comparison of performance with other methods of blanching are available and are discussed below.

Chemical blanching

Many types of chemical treatments such as alkali treatments, antioxidant treatment, blanching by liming treatment, sulphuring by sulphur fumes, and sulphitation or treatment with SO_2, or hydrogen peroxide are employed by the industry for different spices –for example, alkali treatment for cardamom, liming or bleaching of ginger, bleaching of cardamom by sulphuring or sulphitation, and curing of turmeric with appropriate chemical solutions, as discussed briefly below.

However some people have severe allergic responses to sulfur compounds thus should not eat or work with dried spice pretreated with sulfur or sulfite compounds.

- Sulfur dioxide treatments, is very effective for retarding oxidation.
- Almost all commercially produced light-colored spice
- Spice flavor and storage life may also improve.
- Prepare a solution of water and a sulfiting agent and then soak the spice in the solution.

Sulfiting agents include:

- sulfur dioxide,
- sodium sulfite,
- sodium bisulfite,
- potassium bisulfite,
- sodium metabisulfite,and
- potassium metabisulfite

Alkali blanching

The attractive green color of cardamom is due to chlorophyll, can be stabilized to a great extent by steeping the cardamom in 2% sodium carbonate solution for 10minutes. Alkali treatment has also been found useful in drying of chilies particularly in conjunction with olives. Lime treatment s used for bleaching of ginger, as will be discussed briefly later under cardamom treatment.

Antioxidant blanching

The attractive red color of capsicums or chilies, which is due mostly to carotenoids, is stabilized to a great extent by treatment with a suitable antioxidant. Several scientists have also studied the effects of other factors such as Initial composition, light, air temperature, condition (whole or ground), harvesting practices, and pre-drying treatments on the retention of color in capsicum during drying and storage.

Effects of blanching

- Blanching is a mild heat process; however, nutrient loss during blanching can occur because of other effects such as leaching.
- Depending on the method of blanching, commodity and the nutrient concerned, the loss caused by blanching can be up to
    - ✓ 40% for minerals and vitamins (especially vitamin C and thiamin),
    - ✓ 35% for sugars and
    - ✓ 20% for proteins and amino acids
- In addition to nutrients,
    - ✓ The naturally present in toxic constituents the herbs may also be leached.
    - ✓ The level of contaminating microorganisms may be reduced, which advantages are gained by blanching.
- Blanching may result in some undesirable color changes
- Low-temperature blanching has been shown to improve the texture of some products owing to inactivation of pectin methyl esterase.

Example of blanching of spice

Bleaching black pepper

Black pepper of commence is produced from whole, ripe but fully developed berries. After threshing, they are spread on suitable drying floor for sun drying. Berries are raked to ensure uniform color and to avoid mould development. Drying takes about 3-5 days by which time moisture content will be brought down to 10-12 %. The dried berries are garbled, graded and packed in double lined gunny bags. The pepper berries are blanched by placing in boiling water for about 10 minutes which causes them to turn dark brown or black in about an hour. Blanching accelerates the drying and browning of the berries, but the cost of fuel for heating water may be prohibitive for the very small scale processor. Blanching berries in boiling water for one minute prior to drying accelerates browning process as well as rate of drying. It also gives a uniform lustrous black color to finished product and prevents mouldiness of berries. But prolonged blanching should be avoided, since it can deactivate enzymes responsible for browning process. The black color that pepper acquires on drying is due to oxidation of colorless phenolic compounds present in skin. Dry recovery varies from 29 to 38 % among cultivars. Solar driers and mechanical driers are now available for drying pepper.

- The blanched berries require only 2 days for drying in the sun.
- The dry pepper has an attractive uniform black color.
- Blanching minimizes microbial contamination and thus gives a more hygienic product. Likewise, for the preparation of dried dehydrated green pepper as well as white pepper, hot water treatment is given in several countries.

Bleaching of cardamom

Bleached cardamom is creamy white or golden yellow in color. It can be done with either the dried capsule or freshly harvested capsules. It is prepared using sulphur dioxide, potassium metabisulphite (25% containing 1% HCl for 30 min) and hydrogen peroxide (4–6% at pH 4.0). However bleached cardamom tends to lose more volatile oil. There is some demand for bleached cardamom, though mainly it is sold with its natural green color. It is creamy white or golden yellow in color. Fresh capsules are soaked in 20% potassium metabisulphite solution containing one% hydrogen peroxide for one hour. For dry capsules, bleaching agents used are bleaching powder, sulphurdioxide,

potassium metabisulphite and hydrogen peroxide. In the conventional method prevalent still, bleaching of cardamom is carried out by steeping dried capsules in soap nut water *(Sapindus saponaria).* Bleached cardamom is inferior in quality (low volatile oil content), but its keeping quality is slightly better. In fact, cardamom capsules that do not have uniform green color are less valuable, and such capsules are put through a bleaching process to produce a uniform color, Bleaching powder, sulphur dioxide, or hydrogen peroxide is generally used for bleaching. Sulphur dioxide is obtained either through burning sulphur or by wet sulphitation -that is steeping in dilute solutions of water soluble salts of so_2. Bleaching is also done by hydrogen peroxide. However, SO bleached cardamom samples have shown variations in $S0_2$ content from 20 ppm to 3 ppm. There is, therefore, need for standardization of the method of sulphuring or sulphitation.

Figure: 1.7. Cardamom bleaching

Blanching of ginger

To prepare blanched ginger (white), the fresh rhizomes are peeled off and soaked in 2 per cent lime water for about 6 hours. The produce is then removed and dried for 5-6 days and rubbed with a piece of gunny cloth to give the desired dried appearance. They are then drained and sundried on mats, barbecues, or on a clean cement floor. This liming or bleaching of ginger not only improves its color, but also helps to preserve it better. Care should be taken to use the best quality slaked lime in order to get better whiteness. Besides, liming is reported to retard insect infestation. The application of

these chemicals requires proper control, especially in the blanching of ginger. It is necessary to know the extent picked up by ginger during blanching. Blanching also involves rehydration, and therefore careful control of the final moisture content is essential for prevention of insect infestation during storage. It is thus necessary to prescribe scientifically controlled procedures to obtain uniformity in product batches and at the same time to safeguard against the indiscriminate use of such chemicals. Peeled ginger is treated with calcium hydroxide [Ca(OH)2] for producing bleached ginger.

The advantage of ginger blanching;

- To get good appearance and color,
- Minimize shrinkage and pest attacks, and
- Improved physical and chemical quality of dried ginger.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Write the advantage soaking spice and herbs soaking?(2pts)

2. Write the advantage of spice and herbs of blanching? (2pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Blanching is the process of destroy enzymes which would otherwise cause changes in colour, flavour and texture. (2pts)

2. Bleached cardamom is creamy white or golden yellow in color. (2pts)

Note: **Satisfactory rating - 5 points** **Unsatisfactory - below 5 points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating:

Answer sheet

Test I

1._____

2._____

Test II

1._____

2. _____

Information Sheet 2- Monitoring the equipment to identify variation

2.1. Monitoring equipment/machine

Equipment used in the soaking and blanching of spice and herbs varies widely according to the specific produce, its intended use, the nature of any particular enterprise and the point that produce has reached within the post-harvest processing system. Equipment should be designed to facilitate cleaning and disinfection with little or no water and, when wet cleaning is required, to allow thorough drying before reusing the equipment for spices and dried aromatic herbs. Alternatively the design should allow disassembly such that parts can be taken to a room designed for wet cleaning and disinfection, when applicable. The equipment design should be as simple as possible, with a minimal number of parts and with all parts and assemblies easily accessible and/or removable for inspection and cleaning.

Equipment should not have pits, cracks, corrosion, crevices, recesses, open seams, gaps, lap seams, protruding ledges, inside threads, bolt rivets, or dead ends. Hollow areas of equipment as well as cracks and crevices should be eliminated whenever possible or permanently sealed. Items such as bolts, studs, mounting plates and brackets should be continuously welded to the surface and not attached via drilled and tapped holes. Push buttons, valve handles, switches and touch screens should be designed to ensure product and other residues (including liquid) do not penetrate or accumulate in or on the enclosure or interface. Equipment should be installed so as to allow access for cleaning and to minimize transfer of dust particles to other pieces of equipment or to the environment. The risk of contamination from equipment should be assessed and controlled. Wherever possible, forklifts, utensils, and maintenance tools for the finished product and packaging areas should be different from those used in the “raw” material area (e.g. prior to the microbial reduction treatment).

Equipment should be designed to facilitate cleaning and disinfection with little or no water and, when wet cleaning is required, to allow thorough drying before reuse of the equipment for spices. Alternatively, the design should allow disassembling such parts

that can be taken to a room designated for wet cleaning and disinfection, where applicable.

- The equipment designed should be as simple as possible, with a minimal numbers of parts which are easily accessible and/or removable for inspection and cleaning.
- Equipment should not have pits, cracks, corrosion, crevices, recesses, open seams, gaps, lap seams, protruding ledges, inside threads, bolt rivets, or dead ends. Hollow areas of the equipment as well as cracks and crevices should be eliminated whenever possible or permanently sealed.
- Equipment should be installed so as to allow access for cleaning and to minimize transfer of dust particles to other pieces of equipment or to the environment.
- The risk of contamination from equipment should be assessed and controlled. Wherever possible, forklifts, utensils, and maintenance tools for the finished product and packaging areas should be different from those used in the “raw” material area.
- Equipment and containers that come in contact with food and used for handling, storage, processing and packaging shall be made of corrosion free materials which do not impart any toxicity to the food material.
- Equipment and containers for waste, by-products and inedible or dangerous substance, shall be specifically identifiable and suitably constructed.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Write true if the statement is correct and false if the statement is incorrect

1. Equipment should be installed so as to allow access for cleaning and to minimize transfer of dust particles to other pieces of equipment or to the environment.(2pts)

2. Equipment should not have pits, cracks, corrosion, crevices, recesses, open seams, gaps, lap seams, protruding ledges, inside threads, bolt rivets, or dead ends.(2pts)

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Answer sheet

1._____

2._____

Information Sheet 3- Identifying variation in equipment and reporting maintenance

3.1. Identifying variation in operation of equipment

Spice soaking and blanching processes have many factors that influence their success, and in each, the possibility of variation is introduced. The specific types of variation depend on what is being processed for example and adhesive is affected by factors unlike those that affect a machine. In general, however, the outcome-specific factors fit into five major areas.

3.1.1. Variation due to raw materials

All the processes begin with raw materials, whether it's ore from the ground or the end result of previous manufacturing processes. If the raw materials change, that change can create variations in the overall process. There might be a difference in quality from the same supplier, which may fall within the specified limits but is still enough to cause variation in the next process, or material from a different supplier may not be identical to the one from the first supplier.

3.1.2. Variation due to equipment

Whether a manufacturing process uses simple or complex equipment, changes in the equipment can cause variation. Variations occur with the use of more than one piece of equipment to complete the same task because even two pieces of equipment bought at the same time from the same company will not always behave exactly the same over time. Variations are also introduced in the performance of an individual piece of equipment, which can begin to break down or drift from the calibration point.

3.1.3. Variation due to human actions

Even with the best controls, an individual operator can have a bad day and introduce variations from one day to the next. Two different operators trained in the same way might have slightly different actions or criteria for decision making, which causes variation. Not all variation caused by human action can be considered human error, although that possibility also exists.

1.3.4. Variation due to environment

Changes in temperature and humidity affect various processes and some agro-food processes require a clean room environment and the introduction of particles from outside the clean room can cause variation. Changes in the environment have the ability to trigger changes in raw materials, equipment and human action, even if the environmental changes do not directly affect the manufacturing process.

1.3.5. Variation due to method

A manufacturing process is defined by a series of steps. Variation can be introduced if the time between the executions of the steps changes, the order of the steps changes, one is missed or a change is made in carrying out the step for example, if the step says to heat to a certain temperature but a different one is selected. Some variations in method can be tracked to variations in human action, but others may be approved alternatives.

3.2. Reporting variation of equipment

If soaking and blanching equipment or machine loose rapid speed of operation, high accuracy of positioning, high structural rigidity, flexibility of operation, user friendliness and safety, you should report to your supervisor or manufacturer to maintaining according to manufacture guidelines. Each piece of equipment/machine which required maintenance should have reported to the concerned person/supervisor/ manufacturer.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Question

1. List down the five specific factors that create variation of equipment? (2pts)

2. List down the importance knowing variation? (2pts)

Test II: Write true if the statement is correct and false if the statement is incorrect

1. Changes in the environment have the ability to trigger changes in raw materials, equipment and human action. (2pts)

2. If the raw materials change, that change can create variations in the overall process. (2pts)

Note: **Satisfactory rating - 7 points** **Unsatisfactory - below 7 points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Answer sheet

Test I

1._____

2._____

Test II

1._____

2. _____

Information Sheet 4- Monitoring soaking and blanching process

Monitor soaking and blanching process to determine, how well our plans are being implemented. You cannot monitor soaking and blanching if you do not have a plan or basic structure of how the process should be done, or a defined goal or target. Soaking and blanching process refer to the work itself and includes systems and procedures, staff performance, and levels of service in the workplace. Many soaking and blanching processing operations require skilled operators and a multi-disciplinary team to complete all the necessary operations efficiently and on time. Move raw materials in to soaking and blanching processing area and loading transport needs operators who are fit and strong as heavy lifting is involved. The team must have sufficient literacy to read labels, complete records and update the stores raw materials inventory. Soaking and blanching needs workers who handle produce gently, have a good eye for detail and can work quickly. Scale operators need good literacy to be able to keep records. Personnel allocated to quality control need a very good understanding of the quality and quality control of raw material to be processed. Personnel involved in soaking and blanching processing operation of spice and herbs need to have received training in the safe and correct way. Supervisors need good organizational and people management skills to ensure that targets are met, and standards maintained. Equipment and machinery maintenance and electrical work is done by dedicated specialists.

Many of these people will learn the necessary skills in processing area so the management and supervisory team need to actively engage in organizing and providing training. In addition to allocating tasks to suitably skilled and experienced workers, achievement of targets and maintaining the timeliness of operations to soaking and blanching processing requires that the correct number of workers is allocated to each task.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Write true if the statement is correct and false if the statement is incorrect

1. Monitor soaking and blanching process to determine, how well our plans are being implemented. (2pts)

2. Personnel involved in soaking and blanching processing operation of spice and herbs need to have received training in the safe and correct way. (2pts)

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Answer sheet

1._____

2._____

Information Sheet 5- Identifying, rectifying and reporting out-of-specification product/process outcome

5.1. Identifying and rectifying out-of-specification product/process outcome

The organization shall establish and maintain documented procedures that specify appropriate actions to identify and eliminate the cause of detected nonconformities, to prevent recurrence, and to bring the process or system back into control after non conformity is encountered. All out-of-specification products must be clearly identified, rectified, and reported to prevent unauthorized release. Identifying, rectifying and reporting of out-of-specification adhere to the following guidelines for control of non-conforming product.

Out- of-specifications during soaking and blanching:

- Out of specification of the product, such as unwashed, off flavor, off aroma, not true type shape, too big or too small size, too long too thin, under or over weight, no true to type color, over maturity or not enough mature, too ripeness or unripen, rotten, insect damaged, bruised, cracked and contaminated.

- The client may also specify the soaking and blanching materials, type of media for soaking and blanching, soaking and blanching techniques. This means that soaking and blanching is a skilled operation requiring workers to have good observation skills, the ability to make quick decisions to accept or reject, fast reflexes and good hand eye coordination. Workers engaged in soaking and blanching is often but not exclusively female.

6.2. Reporting out-of-specification product/process outcome

- Products that are reported as non-conforming (undesirable particle size; present of on products mould, spoilage, micro-organism, over and under matured, un-recommended moisture content and etc.)
- Clearly label and isolate “on hold” products so that they are not accidentally released.

- Products should only be released after necessary controls are made and specification limits are achieved.
- If non-conformance does not affect the use or safety of the product, then corrective action completes the response.
- If non-conformance affects the safety of the product, recall is initiated with management approval.
- Until the recall is completed, products from the same lot cannot be shipped and must be quarantined.
- Determine the corrective action required to eliminate non-conformance of future product, i.e., through re-work or other means. Upon completion, re-check the quality of the product to ensure the elimination of the non-conformance and seek approval for shipment.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Write true if the statement is correct and false if the statement is incorrect

1. If non-conformance does not affect the use or safety of the product, then corrective action completes the response.(2pts)

2. Identifying, rectifying and reporting of out-of-specification adhere to the following guidelines for control of non-conforming product. (2pts)

Note: Satisfactory rating - 4 points Unsatisfactory - below 4 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating:

Answer Sheet

Name: _____ Date: _____

1. _____
2. _____

Information Sheet 6- Achieving housekeeping standards

6.1. Achieving work area housekeeping

On sites, for example, tidying up tends to be left until the end of the shift. But that just means you're exposing yourself and others to trip hazards all day long – and that's when the accidents will happen. So here are 10 housekeeping rules for a tidy site. Implement these, and you should see a reduction in slip and trip accidents and near misses to your workforce.

1. **Designate an area for rubbish and waste:** After all, if you want your work area free from waste materials, you need somewhere to put them. This could be a skip or other waste disposal bin depending on the amount of waste. Best practice is to segregate waste types for reuse, recycle or landfill.
2. **Stack and store materials safely:** You need materials and tools for use throughout the project, store them safely. Poorly stacked materials can block access routes or topple over causing crushing injuries or damage to property.
3. **Maintaining a safe work area:** Check your work area at regular intervals throughout the day and clear up as you go along. If trip hazards and mess is starting to build up, sort it out sooner rather than later.
4. **Keep access routes clear:** A safe work area includes access and egress. Do not leave materials/tools/benches in gangways/corridors where they might impede someone's escape or cause a trip hazard (it might be you or a colleague who needs to get out in a hurry).
5. **Put tools away when you are done:** If tools or equipment are out of use, put them away. It's easy to leave items lying around, but if you won't need them again in a hurry, put them away. If it's out of use, it should be out of sight, or at least out from under your feet!
6. **Set a tidy:** Just because it's not yours, doesn't mean it's not your responsibility. If you see anything lying on floors, stairways, passages that could cause people to trip and fall, pick it up and put it in a safe place – DON'T WAIT FOR SOMEONE ELSE TO MOVE IT.
7. **If it is broken, fix it:** Fix it, or ditch it. Good housekeeping is also about keeping things in good working order on site. Damaged tools or equipment must be taken out

of use and immediate steps are taken to have them repaired and put them somewhere safe.

8. **Don't let cables trip you up:** Trailing leads and cables from equipment are common trip hazards, particularly when using portable equipment. You may not have a socket close the working area, but make sure you route the lead away from walkways or access points. Route cables where they do not cause a trip hazard to you or to others.
9. **Avoid fire risks:** Make sure waste or the storage of materials does not build up in fire escapes as you may need to use these escapes at some point. Don't allow waste materials to be stored close to sources of ignition. If all rubbish is regularly collected and put into the skip, in the event of the fire, the danger is confined and more easily dealt with.
10. **Make others aware:** A tidy work area requires commitment from everyone. Raise awareness on site with our free good housekeeping toolbox talk. Gets everyone practicing the same good housekeeping techniques and you will be on your way to a tidy and safe site, for everyone.

Self-Check – 6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Short Answer Questions

1. List the 7 good housekeeping rules?(7pts)

Note: Satisfactory rating - 7 points Unsatisfactory - below 7 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

1. _____
   _____

Information Sheet 7- Maintaining workplace records

7.1. Maintaining workplace record

Accurate records are essential for evaluating your soaking and blanching operation. Accurate analysis requires accurate data. Operational/ workplace records about products and practices can be helpful to firms. First, such records help ensure consistency of production/ soaking and blanching processing operations and end-product quality and safety. They are more reliable than human memory and serve as a useful tool to identify areas where inconsistencies occur in operations and corrective actions or employee training may be needed.

Furthermore, maintaining adequate documentation and records could assist in identifying or ruling out potential contributing factors of contamination if product implicated in an outbreak is traced to a particular farm or facility. Every workplace is different and requires different types of information to keep it running smoothly, efficiently and profitably. Different soaking and blanching processing operation of spice and herbs and by using different types quality raw materials should be recorded for future use as reference. Workplace records in operating soaking and blanching of spices and herbs include:

- Quantity of raw material
- Quantity control of raw material
- soaking and blanching equipment/machine
- soaking and blanching methods
- Primary processing condition
- Employee training records
- Equipment monitoring and maintenance records
- Calibration records
- Sanitation records
- Product processing batch records
- Corrective action records
- Pest control records
- Distribution records
- Inspection records (e.g., incoming product, facility, production area)
- Microbiological contamination records (e.g., food contact surfaces, equipment)

Self-Check – 7	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Short Answer Questions

1. List some workplace records in operating soaking and blanching of spices and herbs include?(2)

2. Write the importance of maintaining workplace record?(3)

Note: Satisfactory rating - 5 points Unsatisfactory - below 5 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

1. _____
2. _____

_____

Operation Sheet 1- Soaking of spice and herbs

An objective of soaking spice and herbs is to:

Ensure that you practice and acquire the skills needed to prepare for implementation of soaking spice and herbs.

Procedures to wash spice and herbs

Step 1 Wash hands properly before beginning to wash any spice and herbs

Step 2 Wearing PPE

Step 3 Selection of raw materials: spice and herbs for soaking

Step 4 Remove any damaged, decaying, or bruised areas.

Step 5 Scrub the surface of firm spice or herbs using a clean and sanitized brush designated for this purpose.

Step 6 Transfer washed produce to sanitized water to soak or wash, avoiding any potential cross-contamination that may occur from splashing wash water into sanitized water solution.

Step 7 Rinse washed and sanitized produce in clean cold water.

Operation Sheet 2- Blanching of green pepper in hot water

An objective of soaking spice and herbs is to:

- Ensure that you practice and acquire the skills needed to prepare for implementation of blanching of pepper.

Procedures for blanching of pepper

1. Selection of raw materials: pepper for emersion should be fully-ripened but firm and sound. Unripe pepper is poor in texture and lack flavor and color. Sort pepper for size and ripeness.
2. Prepare the produce per the recipe or personal preference.
3. Use a steamer or make a steamer out of a kettle with a tight-fitting lid.
4. The stockpot should be about 2/3 full of water.
5. Set the water to boiling over high heat on the stove
6. Transfer the peppers to the boiling water and let them sit there for a brief period.

Figure: 2.1. Immersing of pepper in hot water

7. Once the water returns to a boil, begin timing for the length of blanching recommended, which is usually just a couple of minutes (Steaming will take about 1 1/2 times longer than boiling).
8. After drain the pepper, use for process

Figure: 2.2. Drain of pepper

Operation Sheet 3- Blanching of ginger

An objective of blanching of ginger is to:

- Ensure that you practice and acquire the skills needed to prepare for implementation of blanching of ginger

Procedure of ginger blanching

Step 1 Wash fresh ginger to remove debris and dirt

Step 2 Peel of the rhizomes and soaked in 2 per cent lime water for about 6 hours

Step 3 Placing the ginger rhizomes in pots of water so that all the rhizomes were submerged ensuring that no parts of the rhizomes were above the water level.

Step 4 Boil ginger for 15 minutes

- Alternatively, remove them from the ice water with a slotted spoon and lay them out on layers of clean paper towel.

Figure: 3.1. Blanching of ginger

LAP TEST	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **12** hour. The project is expected from each student to do it.

Task-1 Soak spice or herbs in accordance with the standards and target

Task-2 Blanch pepper in accordance with the standards and target market

Task-3 Blanch ginger in accordance with the standards and target

LG #44	LO #3- Shut down the soaking blanching process

Instruction sheet

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Identifying the appropriate shut down procedure
- Shutting down process according to workplace procedures
- Identifying maintenance requirement and reporting according to workplace
- Organizing spices and herbs products and wastes properly

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, **upon completion of this learning guide, you will be able to**:

- Identify the appropriate shut down procedure
- Shut down process according to workplace procedures
- Identify maintenance requirement and report according to workplace
- Organize spices and herbs products and wastes properly

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”

Information Sheet 1- Identifying the appropriate shutdown procedure

1.1. Shut down procedure

Shut down is the act of closing equipment/ machine or stopping of equipment/a machine. Refer to your standard operating procedures for the correct way to operate each type of processing unit in your workplace. The standard operating procedures for each type of equipment must be adhered to when shutting a processing down.

The types of shutdowns used in a plant unit are:

- Scheduled shutdown
- Maintenance shutdown
- Emergency shutdown

1.1.1. Scheduled shutdown

A scheduled shutdown is initiated by the operator during normal operation of the unit when, maintenance is required. The shutdown procedure will depend on the type of equipment and the process to be done. Some steps taken in a unit/process shutdown may include:

- Shutting off the feeds to stop processes and heat generation particularly if processes are produce heat
- Shutting off heating or cooling to the unit/ processing operation
- Shutting off soaking, blanching and other mechanical operations
- Removing or flushing waste materials from the processing workplace

1.1.2. Maintenance shutdown

When maintenance to the soaking and blanching equipment is required, the equipment may need to be entered so that work can take place. The shutdown should be a scheduled or planned shut down as per standard operating procedures where equipment is:

- Isolated (process, mechanical and electrical)
- Cooled and depressurized
- Cleaned
- Electric tested on a continuous basis prior to and during entry.

- A planned unit/plant shutdown will prevent:
  - ✓ plugging of lines or equipment
  - ✓ possible damage to equipment
  - ✓ Possible injury.

1.1.3. Emergency shutdown

An emergency shutdown is initiated in the event of a fire, instrument failure, power failure, unexpected hazard or total loss of the processes. Emergency shutdown procedures must be followed during a shutdown sequence. Where a shutdown will affect upstream or downstream process units, advanced warning must be given to the appropriate personnel to allow them to prepare for, and react to, the changing conditions.

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I short answer

1. Define shutdowns procedure?(3)

Test II Write true if the statement is correct and false if the statement is incorrect

1. The shutdown procedure will depend on the type of equipment and the process to be done.(2pts)

2. Emergency shutdown procedures must be followed during a shutdown sequence. (2pts)

3. An emergency shutdown is initiated in the event of a fire, instrument failure, power failure, unexpected hazard or total loss of the processes. (2pts)

Note: Satisfactory rating - 9 points Unsatisfactory - below 9 points

Score = _____

Rating: _____

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Name: _____ Date: _____

Test I

1. _____
   _____

Test II

1. _____
2. _____
3. _____

Information Sheet 2- Shutting down process according to workplace procedures

The soaking and blanching process of spice and herb should be shut down after completion of work every day according to the standards and procedures of the industry. A shutdown is temporary in nature, which means that it has a specific start and finish. There will be a preferred sequence of implementation for the shutdown tasks. The shutdown is a unique, one-time undertaking; it will never again be done exactly the same way, by the same people, and within the same environment. During normal running of the plant, experienced people usually carry out familiar tasks using well-defined procedures, but during plant shutdown, one could come across hazardous procedures and unfamiliar events. In such situations, the probability of accidents increases.

Major shutdowns in process industries typically happen infrequently and take several days to complete. In general, these shutdowns should have two objectives:

- To repair problems identified during previous major shutdowns, and
- To inspect parts of the plant not accessible during operation in order to identify problems that will be repaired during future planned shutdowns.

Major shutdowns provide an opportunity for the people in the maintenance department to demonstrate how well they can perform under pressure. A well-planned and executed shutdown can be an exciting and satisfying experience. A strong operations or maintenance partnership will be a key. Finally be sure to include all operations and maintenance activities in an integrated shutdown schedule, which should be under constant review and revision during the shutdown period.

The documentation for a major shutdown can be extensive. It may include the list of shutdown work, critical-path schedules, the process inventory plan, permits and other safety documentation, the shutdown budget, all isolation and vessel-entry procedures (complete with detailed schedules and resource plans), as well as a list of the people responsible for all aspects of the shutdown (including their work schedules.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I short answer

1. List the objective of shutdowns should process?(2)

Test II Write true if the statement is correct and false if the statement is incorrect

1. The soaking and blanching process of spice and herb should be shut down after completion of work.(2pts)

2. There will be a preferred sequence of implementation for the shutdown tasks. (2pts)

Note: Satisfactory rating - 6 points Unsatisfactory - below 6 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Test I

1. _____

_____

Test II

1. _____
2. _____

Information Sheet 3- Identifying and reporting maintenance according to workplace

3.1. Identifying and reporting maintenance requirement

Any activities which require maintenance should be identified properly and reported immediately as soon as possible. Maintenance procedures and other work-related documents should identify preconditions and precautions, provide clear instructions for work to be done, and be used to ensure that maintenance is performed in accordance with the maintenance strategy, policies and programs. The procedures should normally be prepared in cooperation with the designers, the suppliers of plant and equipment, and the personnel conducting activities for quality assurance and technical support. The benefits to be accrued from the implementation of a program of planned maintenance can be found in the efficient and economical operation of the plant and equipment and the utilization of resources (i.e. plant and equipment and manpower) while also maintaining a sound standard of safe working and environmental conditions for operators, other occupants and employees within the workplace. Maintenance systems vary, depending on the location of the plant and equipment and/or company policy. Systems can range from the complete maintenance of plant and equipment using all available methods to their replacement on failure.

3.2. Types of maintenance

Breakdown maintenance

This refers to the maintenance strategy, where repair is done after the equipment failure/stoppage or upon occurrence of severe performance decline. This concept has the disadvantage of unplanned stoppages, excessive damage, spare parts problems, high repair costs, excessive waiting and maintenance time and high trouble shooting problems.

Preventive maintenance

Preventive maintenance (PM) comprises of maintenance activities that are undertaken after a specified period of time or amount of machine use. This type of maintenance relies

on the estimated probability that the equipment will breakdown or experience deterioration in performance in the specified interval. The preventive work undertaken may include equipment lubrication, cleaning, parts replacement, tightening, and adjustment. The production equipment may also be inspected for signs of deterioration during preventive maintenance work.

Predictive maintenance

This is a method in which the service life of important part is predicted based on inspection or diagnosis, in order to use the parts to the limit of their service life. Compared to periodic maintenance, predictive maintenance is condition based maintenance. It manages trend values, by measuring and analyzing data about deterioration and employs a surveillance system, designed to monitor conditions through an on-line system.

Corrective maintenance

This is a system in which the concept to prevent equipment failures is further expanded to be applied to the improvement of equipment so that the equipment failure can be eliminated (improving the reliability) and the equipment can be easily maintained (improving equipment maintainability). The primary difference between corrective and preventive maintenance is that a problem must exist before corrective actions are taken.

The purpose of corrective maintenance is improving equipment reliability, maintainability, and safety; design weaknesses (material, shapes); existing equipment undergoes structural reform; to reduce deterioration and failures, and to aim at maintenance-free equipment.

Emergency maintenance

Emergency maintenance is that work which is required to be performed without delay due to a failure of a component which, if not implemented, would lead to further failures or even permanent damage, resulting in the total loss of the plant and equipment. Plant and equipment in such a condition may also be dangerous to personnel.

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Write true if the statement is correct and false if the statement is incorrect

1. Preventive maintenance (PM) comprises of maintenance activities that are undertaken after a specified period of time or amount of machine use. (2pts)

2. Predictive maintenance is condition based maintenance.(2pts)

3. Emergency maintenance is that work which is required to be performed without delay due to a failure of a component which. (2pts)

Note: Satisfactory rating - 6 points Unsatisfactory - below 6 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

Test I

1. _____
2. _____
3. _____

Information Sheet 4- Organizing spices and herbs products and wastes properly

4.1. Organizing spice and herbs products

Spices and dried aromatic herbs should be cleaned properly to remove physical hazards (such as the presence of animal and plant debris, metal and other foreign material) through manual sorting or the use of detectors, such as metal detectors. Raw materials should be trimmed to remove any damaged, rotten or mouldy material. Spices and dried aromatic herbs or their source plants should not be accepted by the establishment if they are known to contain contaminants which will not be reduced to acceptable levels by normal processing procedures, sorting or preparation. Precautions should be taken to minimize the potential for contamination of the establishment and other products from incoming materials that may be contaminated. Plants, parts of plants, spices and dried aromatic herbs suspected of being contaminated with animal or human faecal material should be rejected for human consumption. Special precautions should be taken to reject spices and dried aromatic herbs showing signs of pest damage or mould growth because of the potential for them to contain mycotoxins such as aflatoxins. Raw materials should be inspected and sorted prior to processing (foreign matter, odour and appearance, visible mould contamination).

Spices and dried aromatic herbs and blends of these are often manufactured without a step that would inactivate pathogens. Spices and dried aromatic herbs should be obtained from approved suppliers. An approved supplier is one that can provide a high degree of assurance that appropriate controls in accordance with this Code have been implemented to minimize the possibility that chemical, physical and microbiological contamination occurs in the ingredient. Because of the diversity of production practices for spices and dried aromatic herbs, it is important to understand the controls in place for production of the incoming material. When the control measures used to produce the spices and dried aromatic herbs are not known, verification activities such as inspection and testing should be increased.

Consideration should be given to a program for testing spices and dried aromatic herbs to be used without a lethality step for relevant pathogens, e.g. Salmonella. Spices and dried

aromatic herbs in which Salmonella is detected should not be used unless they are subjected to an effective microbial reduction treatment.

4.2. Organize spice and herbs wastes properly

Organizing of all waste streams by type or category will avoid potentially of undesirable combined effects and will facilitate the reuse, recycling, recovery and/or disposal of the various spice and herbs waste during soaking and blanching. Waste management strategies aim at reducing wastage, recover resources and treat waste before final disposal. The high volumes of solid wastes generated in the agro-food industry are not only a potential environmental problem but also an economic burden for companies in terms of their management. Therefore, the advantages of proper waste management go beyond environmental benefits, and include cost savings and resource efficiency. To minimize costs, food industry will have to concentrate on waste avoidance. Utilization of by-products and wastes as raw materials are the next most preferable methods. When the quantity of material removed is relatively small, containers, such as bins or portable hoppers, can be used to accumulate the solid waste. If the material quantity is large, equipment should be provided to continuously remove the waste from the operation and to convey it to an appropriate on-site storage area; belt, screw, and drag chain convey, as well as pneumatic systems are quite suitable for most types of wastes removed. Peels from spices produce finely divided particles of solid waste which are difficult to separate from water. The peel slurry can be collected in waste bin and transported to waste disposal area.

The initial washing of raw spices and herb is primarily to remove dust and dirt adhering to the produce. These become mixed in the water as settle able or suspended solids and can be transported from the operation only in water. However, other extraneous materials, such as leaves and vines, often accumulate as floating debris in wash tanks and flumes. These waste materials should be skimmed from the water, either manually or by mesh belt or other skimming devices, and deposited into large containers. Preventing these materials from entering the gutter system will minimize the volume of water required to transport wastes generated at this operation. Intermediate and final washing of

prepared product are normally provided to remove fragments and unwanted components (such as peel and seeds) from the primary product flow.

Most spices and herbs are classified into various size ranges; the size grading operation does not generate a large quantity of residuals from most products. However, some leaves, stems, crushed and undersized product and similar materials are normally separated from the usable product. These materials should be collected in large containers or transported by mechanical or pneumatic conveyors, thereby eliminating the need for water and preventing the generation of an organic load due to leaching of soluble matter. Solid residuals from processing operation will contribute significantly to the organic load if placed in water. So each undesirable fragments/wastes of the product is normally separated from the desired material/spices and herbs, especially soaking and blanching process.

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Write true if the statement is correct and false if the statement is incorrect

1. Waste management strategies aim at reducing wastage, recover resources and treat waste before final disposal. (2pts)

2. Undesirable fragments/wastes of the product is normally separated from the desired material/spices and herbs, especially soaking and blanching process.(2pts)

Note: Satisfactory rating - 4 points Unsatisfactory - below 4 points

You can ask you teacher for the copy of the correct answers.

Score = _____

Rating: _____

Answer Sheet

Name: _____ Date: _____

1. _____
2. _____

Reference Materials

Book:

1. Mariwa J V 1974 Processing of pepper. Proc. Symp: Dev. Prospects for Spice Industries, 1974, 17. Nair P C S and Mathew L 1969.
2. Abraham P 1965 The cardamom in India. Farmers Bull. 37. lCAR, New Delhi. American Spice Trade Association, New of turmeric
3. Pruthi J S 1991c Spices and Condiments 7th Edn. 1991. National Book Trust, New Delhi. Pruthi J S et *al.* 1959
4. Barrett, d.m. and theerakulkait. 1995. quality indicators in blanched, frozen, stored spice

WEB ADDRESSES

1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4708646/
2. http://digitalcommons.unl.edu/foodscidiss/54
3. https://bizfluent.com/info-8505404-five-sources-process-variation-manufacturing.html
4. https://detail.en.china.cn/provide/ p141281914.html

AKNOWLEDGEMENT

We would like to express our appreciation to the TVET instructors and experts of regional TVET bureau, TVET College, and Federal Technical and Vocational Education and Training Agency (FTVETA) who made the development of this learning module with required standards and quality possible.

We wish thanks and appreciation to the representatives of BEAR II UNESCO PROJECT who covers the financial expenses, scarifying their time and commitments to develop learning module.

The trainers who developed this learning guide

No	Name	Qualification	Educational background	Region	Phone Number	E-mail
1	Tesfaye Tekola	A	Agronomy	Benishangul	0910550651	tttekola@gmail.com
2	Kelemu Dessie	A	Horticulture	Amhara	0921846332	kelemudessie2013@gmail.com
3	Yared Mulugeta	A	Food Process & Preservation Technology	SNNPR	0913256626	yayaet84@gmail.com
4	Bogale Tesfaye	A	Food Security & Development Study	Addis Ababa	0920308594	bogalt19@gmail.com