Spice and Herbs Processing Level-II

Based on May 2020, Version 2 Occupational standards

Module Title: - Operating Conditioning and Polishing Process

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LG #46	LO #1- Prepare the Spice Conditioning and Polishing 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 conditioning and polishing materials
- Identifying and confirming cleaning and maintenance requirements and status.
- Fitting and adjusting conditioning and polishing machine components
- Entering processing/operating parameters
- Checking and adjusting all conditioning and polishing equipment performance
- Carrying out pre-start service

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:

- Conditioning and polishing materials are confirmed and available to meet operating requirements
- Cleaning and maintenance requirements and status are identified and confirmed
- Conditioning and polishing machine components and related attachments are fitted and adjusted to meet operating requirements
- Processing/operating parameters are entered as required to meet safety and production requirements
- All conditioning and polishing equipment performance is checked and adjusted as required
- Pre-start service was checked are carried out as required by workplace requirements

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 conditioning and polishing materials

1.1. INTRODUCTION

Dried turmeric, detergents, galvanized vessels; turmeric polisher machine should be confirmed for conditioning and polishing spice and herbs. Turmeric polishing is a post processing operation carried out on turmeric rhizome like cleaning, curing, dryings, polishing and grinding. Dried turmeric is polishing to remove the outer dirty skin, root and soil particles and soil particles and transformed into relatively smooth bright and yellow rhizomes. Traditionally polishing is carried out by hand polishing in which labors who have to rub turmeric finger on hard surface or trample them under feet wrapped in gunny bags where in chances of damage to turmeric product results. Whereas in machine polishing when the drum filled with the turmeric is rotated polishing is effected by abrasion of the surface against the mesh as well as by mutual rubbing against each other as they roll inside the drum. Machine polishing enables greater quality of production. It also avoids wastages of turmeric. There are several methods of turmeric polishing, which have been adopted. They include manual, machined methods.

1.2. Polishing

In order smoothen the rough and hard outer surface of the boiled dried turmeric and also to improve its color, it is subjected to polishing. There are two types of polishing, hand polishing and machine polishing.

Figure 1: Hand-operated polishing method

1.3. Hand polishing

The method of hand polishing is simple, which consists of rubbing turmeric fingers on hard surface or trampling them under feet wrapped in gunny bags. The improved method is by using hand operated barrel or drum mounted on a central axis, the sides of which are made of expanded metal mesh. When the drum filled with turmeric is rotated, polishing is effected by abrasion of the surface against the mesh as well as by mutual rubbing against each other as they roll inside the drum.

Figure 2: Paddle-operated polishing method

1.4. Machine polishing

This method consists of an octagonal or hexagonal wooden drum mounted on a central axis and rotated by power.

Figure 3: Turmeric polishing machine

Turmeric is known as the “golden spice” as well as the “spice of life.” It has been used in India as a medicinal plant, and held sacred from time immemorial. Turmeric has strong associations with the sociocultural life of the people of the Indian subcontinent. This “earthy herb of the Sun” with the orange-yellow rhizome was regarded as the “herb of the Sun” by the people of the Vedic period.

No wonder the ancients regarded turmeric as the Oushadhi, the healing herb, the most outstanding herb, the one herb above all others. Turmeric has at least 6000 years of documented history of its use as medicine and in many socio-religious practices.

Turmeric is probably a native of Southeast Asia, where many related species of Curcuma occur wildly, though turmeric itself is not known to occur in the wild. Turmeric is cultivated most extensively in India, followed by Bangladesh, China, Thailand, Cambodia, Malaysia, Indonesia, and Philippines. On a small scale, it is also grown in most tropical regions in Africa, America, and Pacific Ocean Islands. India is the largest producer, consumer, and exporter of turmeric.

Figure 4: Turmeric

The name turmeric has originated from the Medieval Latin name terramerita, which became terre merite of French, meaning deserved earth or meritorious earth, a name by which powdered turmeric was known in commerce. Ancient Indians had given many names for turmeric, each one denoting a particular quality as listed below;

- *Ranjani* Denotes that which gives color
- *Mangal prada* Bringing luck
- *Krimighni* Killing worms, antimicrobial
- *Mahaghni* Indicates antidiabetic properties
- *Anestha* Not offered for sacrifice or *homa*
- *Haridra* Indicating that it is dear to *Hari* (Lord Krishna)
- *Varna-datri* That gives color, indicating its use as enhancer of body complexion
- *Hemaragi* Having golden color
- *Bhadra* Denotes auspicious or lucky
- *Pavitra* Holy
- *Hridayavilasini* Giving delight to heart, charming
- *Shobhna* Brilliant, indicating the brilliant color

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: Write true or false.

1. Dried turmeric and detergents should be confirmed for conditioning and polishing spice and herbs.
2. Galvanized vessels and turmeric polisher machine should be confirmed for conditioning and polishing spice and herbs.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

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

Blades, electric motor, power transmission systems, rotary shaft, bear, flat plate, nut & bolt, bush, circular disk, wire mesh and gear cleaning and maintenance requirements and status should identify.

It is important to carry out a series of checks before using a piece of machinery (polisher machine). This is particularly important in situations in which a number of people use the same machine. Larger companies and organisations usually have a system of checks, and a maintenance department that will deal with reported defects. Individuals working alone or in small teams will be responsible for checking and maintaining their own machines. Learners should be able to follow a checklist to ensure that they complete all the necessary checks. This may mean using either a pre-set format like the one shown on the focus page or the list from an operator manual.

Table 1: Identify and reporting maintenance requirement of polisher machine

Interval	**Task**	**Action**
Every day before and after work	Check all belts	Replace worn or damaged belts
Every day before and after work	Check blades	Sharpen or replace blades
Every day before and after work	Check electric motor	Repair or replace motor
Every day before and after work	Check Power transmission systems	Repair power transmission systems
Every day before and after work	Check rotary shaft	Repair or replace shaft
Every day before and after work	Check bear	Repair or replace bear
Every day before and after work	Check flat plate	Repair or replace flat plate
Every day before and after work	Check nut & bolt	Repair or replace nut & bolt
Every day before and after work	Check bush	Repair or replace bush
Every day before and after work	Check circular disk	Repair or replace circular disk

Every day before and after work	Check wire mesh	Repair or replace wire mesh
Every day before and after work	Check gear	Repair or replace gear

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: Short Answer Questions

1. What type of action will take for electric motor maintenance problem?
2. What type of action will take for circular disk maintenance problem?
3. What type of action will take for gear maintenance problem?
4. What type of action will take for power transmission systems maintenance problem?

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

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

Information Sheet 3- Fitting and adjusting conditioning and polishing machine components

The following polisher machine components should fitting and adjusting:

- Belts
- Blades
- Electric Motor
- Rotary Shaft
- Bear
- Flat Plate
- Nut & Bolt
- Bush
- Circular Disk
- Wire Mesh
- Gear

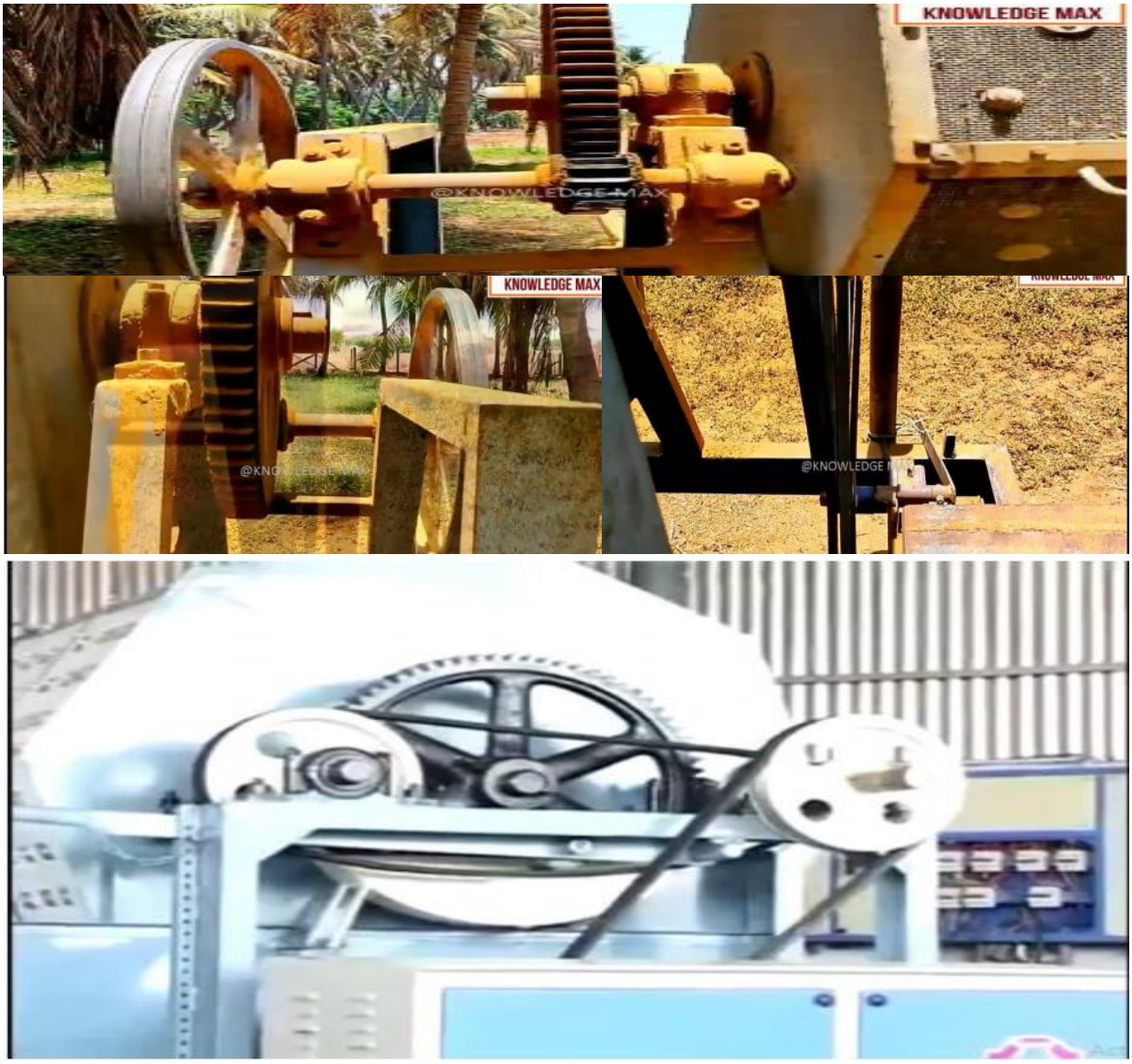

Figure 5: Fitting and component of polisher machine

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: choose the best answer.

1. Which of the following is a not component of polisher machine?
   A. Belts and blades
   B. Power Transmission Systems
   C. Electric motor and rotary shaft
   D. Bear and flat plate

2. Which of the following is a not component of polisher machine
   A. Nut & Bolt
   B. Bush and circular disk
   C. Wire mesh and gear
   D. All of the above
   E. A and C

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

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

Information Sheet 4- Entering processing/operating parameters

The operating parameter polisher machine is differ depends up on type of machine.

Some of parameters are listed below as follow:

- Material processed
- Amount processed
- Operating time
- Capacity
- Labour requirement
- Breakdown of equipment
- Test result
- Overall performance

Figure 6: rpm for turmeric machine

Self-check 4	Written test

Name…… ID…… Date…….

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

Test: Choose the best answer (4 point)

1. Which one of the following is not parameter for polishing machine?
   A. Material processed
   B. Amount processed
   C. Operating time
   D. Capacity
   E. None
2. Which one of the following is parameter for polishing machine?
   A. Labour requirement
   B. Breakdown of equipment
   C. Test result
   D. Overall performance
   E. all

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below 10 points**

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

Information Sheet 5- Checking and adjusting all conditioning and polishing equipment performance

The boiling is done in galvanized iron vats or pans or other containers of a suitable size. A pan of 1 m length, 0.62 m breadth and 0.48 m depth is found to be suitable.

The cleaned fingers (approximately 50 kg) are placed in a trough, which is 0.9 m x 0.55 m x 0.4 m in size and made of GI sheets with an extended parallel handle. This perforated trough in which the fingers are placed is then immersed in the pan.

The functional parts of the polisher machine are power source, power transmission, rotating drum, mainframe and collection tray. It will be check and adjust.

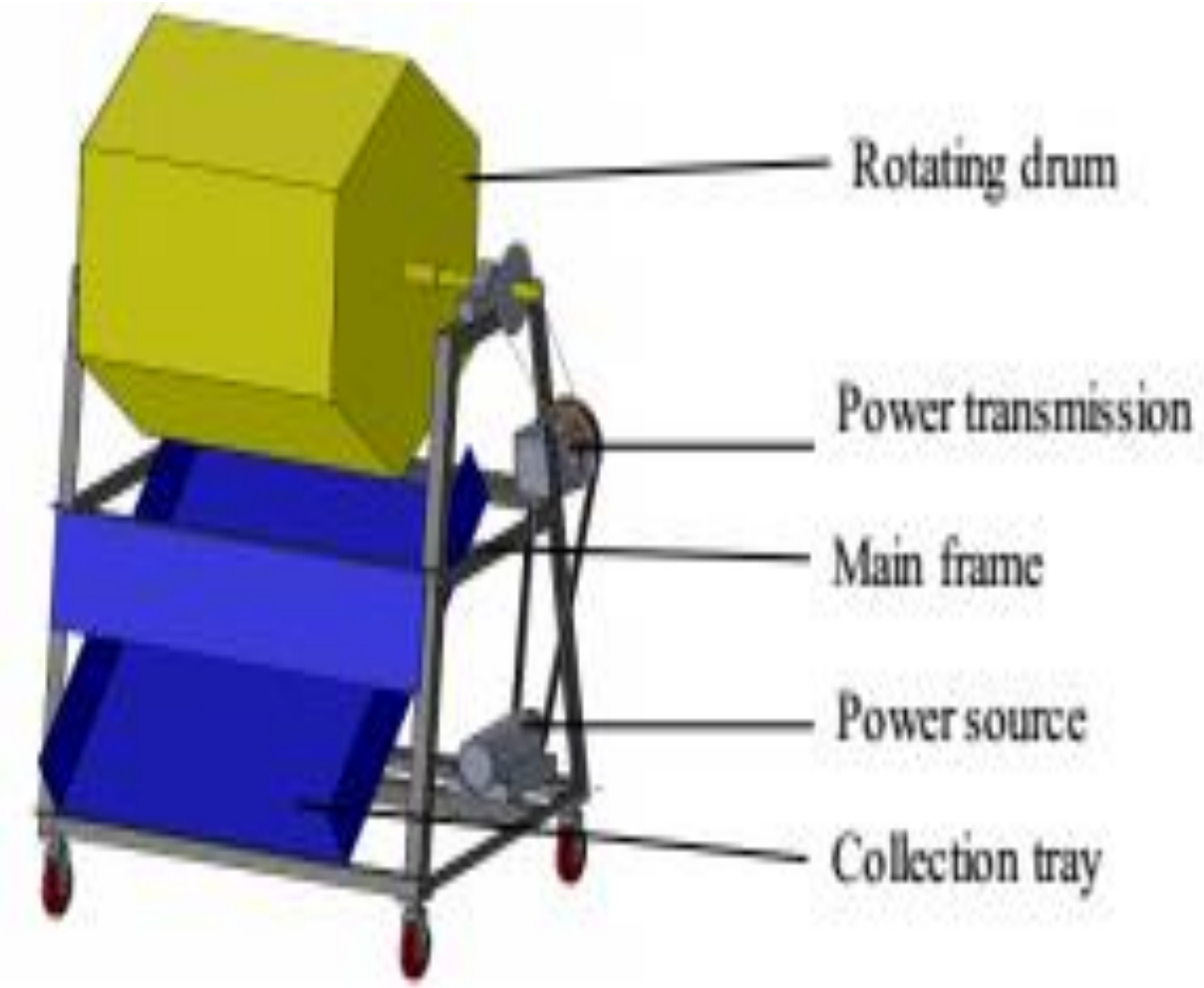

Figure 7: The schematic isometric view of the turmeric polisher

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: Short Answer Questions

1. List components of polisher machine. (5 point)

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

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

Information Sheet 6- Carrying out pre-start service

Clean food contact surfaces can be sterilized by exposure to high temperature water under pressure, or saturated steam, or other appropriate treatments. Temperatures reached during the sterilization cycles should be determined by accurate temperature measuring devices, e.g., calibrated thermocouples, at the critical points in the system or at least at the slowest heating (coldest point) of the system. Sufficient temperature measurements should be taken during establishment of pre-production sterilization procedures to ensure that the coldest point in the system has been identified. Valve clusters, which may be used on reservoirs and as flow diversion devices, should be evaluated when identifying the coldest point in the system. If the valve cluster is found to be the coldest point in the system, temperature should be measured and recorded at this point. If surge tanks or reservoirs and fillers are sterilized separately, appropriate temperature sensor locations should be identified using similar techniques.

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: Short Answer Questions

1. Temperatures reached during the sterilization cycles should be determined by accurate …… measuring devices. (1 point)
2. Sufficient …… measurements should be taken during establishment of pre-production sterilization procedures to ensure that the coldest point in the system has been identified. (1point)
3. …… clusters, which may be used on reservoirs and as flow diversion devices, should be evaluated when identifying the coldest point in the system. (1 point)

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

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

Operation Sheet 1- Cleaning polisher machine

Polisher machine clean every day before and after work

1. Wash in detergent and water
2. Dry thoroughly
3. Saturate in engine oil and squeeze out excess

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 **1** hour. The project is expected from each student to do it.

Task-1 Perform Clean Polisher Machine.

LG #47	LO #2- Operate and Monitor the Conditioning and Polishing Process

Instruction sheet

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

- Monitoring conditioning and polishing machinery/equipment
- Conditioning spice (turmeric product) by using water
- Conducting continues polishing processes.
- Conditioning and polishing take in place for removing of husk
- Identifying and maintaining variation in equipment operation requirements
- Monitoring to confirm condition and polish product.
- Storing condition and polish product.

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**:

- Conditioning and polishing machinery/equipment is monitored to identify variation in operating conditions
- Spice (turmeric product) will be conditioned by using water to easy removing of roots and husk by increase moisture content
- Continues polishing processes is conducted until product reached required quality
- The process of conditioning and polishing of spice and herbs take in place for removing of husk and impart quality color of product especially turmeric
- Variation in equipment operation is identified and maintenance requirements are reported according to workplace reporting requirements
- The process is monitored to confirm that conditioned and polished product meets grist moisture and colour full product specifications before further processes.
- Conditioned and polished product is stored according to food safety requirements
- Out-of-specification product/process outcomes are identified, rectified and/or reported to maintain the process within specification
- The workplace has been achieved housekeeping standards

- Workplace records are maintained according to workplace

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Information Sheet 1- Monitoring conditioning and polishing machinery/ equipment

1.1. Introduction

Conditioning can be defined as treatment of spice with water and heat before grinding in order to change its structural and biochemical properties. Polishing is the process of creating a smooth and shiny surface by rubbing it or using a chemical action.

The whole raw Turmeric (agricultural produce) is dug out from the undergrounds. Boiling of the raw Turmeric, drying, polishing for fresh colour are some of the important post-harvest processing activities being performed at the farm level. Now a day's power-tiller is used to all-out the raw produce. In certain cases the automatic equipments are adjusted to the tractors.

Tilled out Turmeric contains the whole raw mother rhizomes and seed rhizomes. If they are dashed down to floor ground fingers and mother rhizomes are separated from each other. The large sized rhizomes, subsidiary rhizomes, fingers, sora rhizomes and damaged rhizomes are categorized and heaped separately for the farmers' convenience. The first stage of processing the raw turmeric is washing.

1.2. Washing

The harvested rhizomes are cleaned of other extraneous matter adhering to them and the roots are removed. Only the good fingers separated from the rhizomes are used for curing.

Turmeric rhizomes after harvesting are washed thoroughly to remove adhering soil, spray residues and other foreign materials. Soaking and water spray types of washers are used. Turmeric is soaked in still water overnight and next day is sprayed over it for its cleaning water spray varying. From low-pressure wide angle to very high pressure directed jets are very effective. Rotary drum type washers are ' also used. During washing, the green rhizomes are stored out into mother rhizomes and fingers.

1.3. Curing

Curing of green rhizome is the next operation after harvesting. Curing involves boiling fresh rhizomes in water and dried in the sunshine. This process is also known as blanching. Curing gives good colour, increases the keeping quality of Turmeric and prevent it from deterioration and insects, it also reduces various inconveniences that would be experienced in transporting it to the market. After curing the produce can be stored for a long period.

Curing is the process that kills the vitality of fresh rhizomes, serves to obviate the raw order, reduce the drying time, gelatinize the starch and provide a more uniformly coloured produce. After the rhizomes had been removed from the ground, curing must be completed within 10 days to secure maximum usable product. Initial high moisture content in the fresh rhizomes lowers the curing percentage and reduces the quality. In India curing method consists of

a) Boiling, steaming or cooking the fresh rhizomes in water.
b) Drying them in sunlight or with a mechanical drier.
c) Polishing or peeling the dried tissue.

A) Boiling:
Boiling operations have varied in different areas. The curing by boiling process has advantage of sterilizing the rhizomes before drying. Some boiling systems are as follows.
(i) Madras System: Cooking of rhizomes is done on a small scale in earthen pots and tin container, or cm a large scale in Gur boiling pans of 2 to 4 meter in diameter. The dimensions of the boiling utensils depend upon the quality of rhizomes, but as a general rule boiling of 100 kg fresh rhizpmes requires a drum with a volume of one cubic meter. The containers are fitted over a furnace and the fresh rhizomes are immersed either directly into water or placed in immersion trays (made with a perforated base) that are dropped into the water. The water level is maintained by a constant replacing previously, cow dung is added to the boiling water with belief that this protects the cured Turmeric from insect damage and modified the colour of rhizomes core to the designed

to the desired yellow orange. This unhygienic practice has been stopped, and the tops of the containers are covered to prevent extraneous material from entering the boiling water. When the vapor starts to exit out of the pan, the rhizomes are tested for completion of the cooking. Improperly cooked rhizomes are sometimes attacked by insects during storage. So, care has to be taken up for extending the durability of the Turmeric. (Lyle Craker)

(ii). Bombay system:

The sides of the vessel containing boiling water are lined with dry Turmeric leaves and the container is filled with fresh Turmeric. Water is poured in to the container until the Turmeric is completely covered. The container is then covered with dry Turmeric leaves and plastered with mud from top to bottom. The steam generated by the boiling water cooks the Turmeric in 1.5 to 2 hrs. (Ibid)

(iii). Ganjam agency system:

The oven consists of an opening on the ground for feeding fuel, with 2 or 3.round holes on the surface for placing earthen pots. The earthen pots are filled with water and green Turmeric for boiling. When the Turmeric becomes soft and flat while pressed between the first finger and the thumb, the boiling is assumed to be completed. (Ibid)

There are various traditional methods of boiling. However, there are three economically, beneficial methods suggested by Agricultural Research Centre, Kasbe Digraj (Dist. Sangli)

(a).Turmeric boiling in a large sized pan:

The large sized pan is specially designed of 16 gauge iron sheeted base with 4 to 5 feet diameter and 2.5 to 3 feet height, and has a capacity of boiling the raw rhizomes up to 200 to 1000 kg.

The raw rhizomes are filled in the pan and filled with water up to the level of 2.5 to 3 inches. The rhizomes are covered with leaves of Turmeric and gunny cloths so as to keep steam within the vessels. After 2.5 to 3 hrs of heating, the raw Turmeric is cooked. The cooked

Turmeric has a typical flavor released out of the pan through vapour. If the match stick is centrally pushed into the cooked rhizomes and if it easily enters and passed other side, it is assumed that the Turmeric is fully cooked.

The demerits of this method are as under:-

1. While removing the rhizomes from the pan the rhizomes get damaged and loose its value.
2. Half of the-boiled water has to be removed from the pan...
3. The soil saturated at the base cannot be removed every time.
4. The quality of rhizomes looses.

(b).Turmeric boiling by cooker:

With the help of a thick iron plate, a special type of cooker (two meter length and two meter height) is designed 'for choking the rhizomes. The lid for cooker is designed to avoid that steam does not go out. The trays of 2 * 2 or 3 * 3 feet's size with porous base are designed by iron sheet, so as to store them in the cooker. These trays are filled with raw Turmeric and inserted in the cooker on the iron stand. Water is filled up to 6 to 9 inches at the base of the cooker. Turmeric is cooked by steam oniy. So, no damage of rhizomes exists. Within 20 to 413 minutes of heat, 1000 to 2000 kg of Turmeric is cooked. The demerits of the earlier method are recovered in this system.

(c). Modem method of cooking the Turmeric:

The large size pan, as in the first case is used in this method. The pan is filled by 374th of water. The drums (oil barrels cut in the middle) are filled by Turmeric and put them in the pan containers. Drums have been fitted with 9 to 12 inch heights of lifting hooks at the opposite sides. Around 55 to 60 kg of Turmeric is filled in one drum. In a round of the cooking process, nearly 250 to 300 kg of Turmeric is cooked within 30 to 35 minutes. There is no need to remove the water in this method; the boiled water can be reused for next rounds; - But in every round 3 to 4 buckets of water has to be added. This method is more convenient, economical and maintains the quality of the Turmeric. Besides, the Turmeric is cooked uniformly within a short time and also it goes very easy to get it polished at the later stage.

Of late, new technology, based on experiences has been developed. The new technology is envisaged as follows:

(d). Improved method of cooking the Turmeric by using the tank:

In this method, 122 cm. breadth and 50 cm heighten tank is made of by 18 gauge iron plates. For this a heavy base iron bars are wielded at specific distance to the base of the tank. Iron lid to cover the tank tightly is designed with two iron hooks fitted on opposite sides. The degree of boiling point can be observed through a small watching door with a rubber gasket fitted around the door. A special tap is fitted to drain out the used water so as to keep the base clean.

1.4. Polishing

This operation is done in order to smooth the rough and hard outer surface of the boiled and dried turmeric. It also improves the colour of the product from a dirty-brown to a bright-yellow. There are two types of polishing; they are Hand polishing, and Machine polishing.

1.4.1. *Hand polishing*

This method is simple and involves rubbing the turmeric fingers wrapped in several folds of gunny cloth on a hard surface with the hands or by trampling them under the feet or shaking the rhizomes mixed with stones in a long narrow gunny bag or in a bamboo basket.

- The improved method is through the use of a hand-operated barrel or drum mounted on a central axis, the sides of which are made of expanded metal mesh.
- When the drum filled with turmeric is rotated, the abrasion of the surface against the mesh as well as by mutual rubbing against each other will polish them effectively.

1.4.2. Machine polishing

- The machine used for polishing consists of a hexagonal wooden drum, mounted on a central axis and rotated by power.

- These power-driven drums are gaining popularity because a higher degree of polishing (smoothness) can be attained by this method.
- The capacity of these drums is also high compared to the hand-operated ones and, hence, the output is also higher.

1.5. Colouring

- The colour of turmeric always attracts buyers.
- Thus, giving the required colour externally to the rhizome is an important step in the processing of turmeric.
- For this, the boiled, dried and half-polished fingers are placed in a basket, which is shaken continuously in a prepared emulsion.
- They are later sun-dried.
- The colour emulsion comprises of alum (0.04 kg), turmeric powder (2 kg), castor seed (0.14 g) or sodium bisulphate (30 g) and concentrated HC1 (30 m1).

To compare the performance with manual methods, manual polishing was done with the same sample in both the stations. The moisture content of the turmeric will be 11-12% (wb). The polisher will fill with turmeric (Fig. 2.1). It was then operated for specific time it depends on the manufacture guide line. After every operating duration, the polished turmeric was discharged (Fig. 2.2) and the color was measured with chromameter/ by observation to identify the optimum operating time.

Figure 1.1: Feeding of turmeric in the polisher

Figure 1.2: Discharging of turmeric from the polisher

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: Short Answer Questions

1. What is polishing?
2. What is conditioning?
3. What is the aim of polishing?
4. List type of polishing?

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 2- Conditioning spice (turmeric product) by using water

2.1. Introduction

The rhizome with rough surface and with poor surface colour is polished to obtain the better surface finish. Polishing can be done either by mechanically or by manually. In case of mechanical polishing the mechanical drum is used, whereas in case of manual polishing rhizome is placed in bags and rubbed with the help of stones.

Dried turmeric is polished to remove the outer dirty skin, roots and soil particles, and transformed into relatively smooth, bright and yellowish rhizomes. Polishing can be done by hand or by beating the rhizomes in a gunny bag. This operation is carried out manually, which is slow, tedious and labor-intensive. The quality of turmeric powder depends upon the initial quality of rhizomes and the practices adopted in various post-harvest operations. Washing and polishing are two primary processes for quality enhancement. Mechanically-washed turmeric rhizomes in a rotary machine were useful for efficient washing and bruising. At the rotational speed of 40 rpm for 20 minutes, the color improved from dark yellowish brown to desirable olive yellowish color with increase in the surface smoothness. Polishing drums are being used at many places of the world for cleaning and polishing of various agricultural products.

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: Filling the blank

1. Dried turmeric is …… to remove the outer dirty skin, roots and soil particles, and transformed into relatively smooth, bright and yellowish rhizomes. (1 points)
2. …… can be done by hand or by beating the rhizomes in a gunny bag. (1 points)
3. …… and …… are two primary processes for quality enhancement. (2 points)
4. ……turmeric rhizomes in a rotary machine were useful for efficient washing and bruising. (1 points)
5. Polishing drums are being used at many places of the world for …… and …… of various agricultural products. (2 points)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 3- Conducting continues polishing processes

3.1. Conducting work according with legislative

Sorting and grading of spice and herbs should be conducted according food standards code, including labeling, weights and measures legislation covering food safety, environmental management, OHS, anti-discrimination and equal opportunity. Every operator or processer has a legal and moral responsibility to ensure that processed spice and herbs offered for human consumption is safe to eat. Risks to food safety can be minimized if basic good processing and good hygiene practices are followed in processing and throughout the postharvest handling operations.

Legislative are applicable to all the spice and herbs sorting and grading operators at all stages in the processing of spice and herbs products and without prejudice to more specific requirements relating to food hygiene. The regulation reinforces the responsibility to ensure food safety and lays down general rules for the in the hygiene of food taking particular account of the following principles:

- Primary responsibility for spice and herbs safety rests with the sorting and grading operation
- Necessity to ensure food safety throughout the processing chain starting from the primary production
- Provide assurance by the sorting and grading operation that the food is fit for human consumption and maintain confidence in nationally and internationally traded food
- Spice and herbs which cannot be stored at ambient temperature shall be under controlled conditions.

Implementation of procedures based on the HACCP principles (Hazard Analysis Critical Control Points), fully supported with Good Hygiene Practices (GHPs) that are necessary to maintain hygienic environment throughout the food chain, suitable for the production, handling and processing of clean and safe end product, fit for human consumption.

Ensure consumers" clear and transparent information through proper sorting and grading about the use and handling of the products for safe consumption.

In the processing area the rules and procedures for Food Hygiene and Handling Produce are usually documented and available for staff reference. You should be aware of the sorting and grading rules and work procedures and ensure that the rules and procedures are known, understood and implemented by all the workers in your team. In relation to sorting and grading procedures; methodology and standards are based on the type of produce, operation circumstances, (scale of operation and equipment available), Industry Good Practices and Client or market requirements.

3.2. Conducting work with policy and procedure

Work is carried out according to company policies and procedures, regulatory and licensing requirements, legislative requirements, and industrial awards and agreements. Adaptability & scalability of best practices to improve the quality & safety standards' for spices & spices products can be heavily contaminated with micro-organisms and can be below standards because of the environmental and processing conditions under which they are produced. Ensuring the safety of these products, hence food safety, and comply with standards is a first step to enter global market. As a result of this, countries with well-established food safety assurance systems could export and trade their products without any barriers and become competitive in the global trade.

In Ethiopia regulatory system is very little developed and is not able to effectively support the production, supply & distribution of safe and quality spice products to the domestic consumers and to the export market. By large, regulating food safety is a shared responsibility of Ministry of Health, Ministry of Agriculture and Ethiopia Standards Authority. Food, Medicine and Health Care Administration and Control Proclamation No. 661/2009 and the establishment of Ethiopian Food, Medicine and Health Care Administration and Control Authority under Regulation No, 189/2010 are important milestones in institutionalizing the legal system and hence better reacting to contemporary situation. In connection with this Ethiopian Standards Authority has prepared standards, identical with ISO, for major spices to this end it is possible to sum

up there is yet more to be done in policies and regulatory activities in assuring the quality and safety of food and food additives supplied to domestic consumers and foreign markets. Making the policies more robust and avoiding fragmented linkages among the regulatory body and help them function very well by providing legal and structural framework through formulation and benchmarking with best practice countries is widely requires public intervention.

Hazard Analysis Critical Control Point (HACCP):

HACCP allows processors/regulator to look at what happens during the process to ensure safety. Major Concepts of HACCP;

1. A preventive system of control particularly on biological hazards
2. A system approach for estimating the risk in producing a food product
3. Universally recognized system as the most effective way to prevent food borne illness
4. Science - based systematic, identified specific hazards and measures for their control to ensure food safety
5. Capable of accommodating change, such as advances in equipment design, processing procedures, or technological developments that can be applied throughout the food chain from the primary producer to the final consumer
6. Applicable to establishments that produce, process, treat, pack, trade, transport, serve, or involve in food production

Seven (7) HACCP Principles

1. Hazard analysis
2. Identify critical control points
3. Establish Control limits
4. Monitor critical limits
5. Establish corrective actions in case of deviation from established critical limits
6. Establish verification procedure to ensure that the system is consistent
7. Establish record keeping procedures

General Hazards Characteristics

- The product contains sensitive ingredients, which can be assumed as potential sources of contamination under normal circumstances.
- The manufacturing process does not contain controlled processing steps that effectively destroy harmful bacteria.
- There is substantial potential for microbiological abuse in distribution or in consumer handling that could render the product harmful when consumed.
- Product is subject to contamination after processing and before packaging.
- No terminal heat process after packaging.

HACCP Pre-Requisite Programs

Good Manufacturing Practices (GMP): GMPs are systems put in place to ensure that food prepared in a plant is sound and free of contamination. GMPs include:

- Plant grounds and building facilities emphasize pest control;
- Equipment design provides ease in cleaning and maintenance;
- Personal hygiene practices and facilities are set;
- Storage and warehousing are free from contamination.

Sanitation Standard Operating Procedures (SSOP): SSOP are components of GMP that emphasize sanitation procedure. They include:

- Safety of water that gets in contact with food and food surfaces;
- Measures to prevent contamination;
- Employee hygiene practices;
- Control of employee health conditions that could result in contamination of food and food surfaces;
- Protection of food and food contact surfaces from adulteration with toxic and other harmful components;
- Proper labelling and storage and use of toxic; and Control of pests.

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 seven principles of HACCP.
2. What are the major concepts of HACCP?

Test II: Short Answer Questions

1. Which one of the following is not including Good manufacfuring practice?
   - A. Plant grounds and building facilities emphasize pest control;
   - B. Equipment design provides ease in cleaning and maintenance;
   - C. Personal hygiene practices and facilities are set;
   - D. Storage and warehousing are free from contamination
   - E. None
2. Which one of the following is not including Sanitation Standard Operating Procedures (SSOP)?
   - A. Safety of water that gets in contact with food and food surfaces;
   - B. Measures to prevent contamination;
   - C. Employee hygiene practices;
   - D. Control of employee health conditions that could result in contamination of food and food surfaces;
   - E. None

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

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

Answer Sheet

Score = _____
Rating: _____

Name: _____ Date: _____

Information Sheet 4- Conditioning and polishing take in place for removing of husk

The need to develop such type of machine is raise due to the following reasons:
Turmeric needs to be polished and cleaned before 48 hours after harvesting to avoid loss in its nutrient values since it is not every time possible to have this much man power to enable hand polishing, machine polishing was required. Machine polishing enables greater and furnished quality of turmeric which may or may not be possible in hand polishes.

There are some where drums are used but this development in the machine can provide simple and easier to operate whose working would be easily understood by the local farmers. This development tries to make machine smaller and compact so that space constrain should be satisfied also employ a gear pair to run the machine under power cut conditions which is being run by motor in normal conditions so that power cut would not hamper the production capacity.

Turmeric rhizomes can be mechanically washed as well as polished in a portable, electric power operated, rotary drum type turmeric washing and polishing machine. The machine when operated at optimum rotational speed for optimum time can wash 50 kg of turmeric rhizomes. At optimum performance parameters, i.e.75 rpm for 15-20 min. there is no bruising of turmeric rhizomes. The same machine can be used for polishing turmeric with some modification.

During rotation of the drum, polishing was done by rubbing the turmeric finger against the inside-expanded wire mesh surface. The outer skin, rubbed by polishing, fell through the perforation of the drum. The holding capacity of the turmeric polisher was generally kept 50% of volume of the drum to facilitate turning and proper mixing of dried rhizomes during polishing. Turmeric is polished by abrasive hard surface and against rough perforated surface when the turmeric-filled drum rotates as well as by rubbing rhizomes against each other.

- Developed a human powered polisher having a flywheel and motor bicycle drive mechanism with speed-increasing gear pair, a flywheel and torque-increasing gear pair that drove the process unit with square jaw. But, dusts were spread with rotation that polluted the working environment.
- Developed a mechanical turmeric polisher, which consisted of 880 mm diameter mild steel drum with wire meshes wrapped one above the other. The polisher rested on ball bearings at the two ends on a rectangular stand having 600-700 kg/h capacity. It was operated by a 2-hp three-phase electrical motor. A turmeric polisher operated by 35 hp tractor, 5 hp diesel engine and electricity. All of them were made with octagonal metallic drum.
- A pedal operated hexagonal drum polishing machine, which allowed raw skin of polish turmeric to spread in working environment. In Bangladesh, small and useful polisher is yet not available. Therefore, this study was undertaken to design and develop a low-cost and laborsaving turmeric polisher for turmeric growers and small entrepreneurs, and to evaluate its technical and economic performance. Performance of the polisher was tested in laboratory as well as in the field.

Self-Check – 4	Written test

Name…… ID…… Date…….

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

Test: Filling the blank

1. Turmeric rhizomes can be mechanically washed as well as polished in a portable, electric power operated, rotary drum type turmeric ……and …… machine.
2. The holding capacity of the turmeric polisher was generally kept 50% of volume of the drum to facilitate turning and proper mixing of dried rhizomes during polishing.
3. Turmeric is …… by abrasive hard surface and against rough perforated surface when the turmeric-filled drum rotates as well as by rubbing rhizomes against each other.

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 5- Identifying and maintaining variation in equipment operation requirements

The quantity of polished turmeric received in total time, including feeding, polishing and discharging time, was noted for machine output calculation as

$$M_0 = \frac{W_p}{t_P + t_c + t_{ul}} = \frac{W_p}{W_T}$$

where

M_0 is machine output (kg/h),

W_P is weight of polished turmeric (kg),

W_T is total polishing time (t_p+ t_c+ t_{ul}, h),

t_p is time of polishing (h),

t_c is feeding time of raw turmeric (h) and

t_{ul} is time of discharging of polished turmeric (h).

Polishing efficiency is increase with the polishing time as well as increase in rotational speed of the machine. Polishing duration increased the polishing efficiency. Similarly, for same polishing duration increasing in rotational speed result efficiency.

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: Short Answer Questions

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 6- Monitoring to confirm condition and polish product

The surface colour of turmeric is determined using Munsell colour chart. The colour displayed on the individual colour charts are of constant Hue, designated by a symbol in the upper right hand corner of the card. Vertically, the colours become successively lighter from the bottom of the card to the top in visually equal step, their value increases. Horizontally they increase in Chroma from left to right. The value notation of each chip is indicated by vertical scale in the far left column of the chart. The Chroma notation is indicated by the horizontal scale across the bottom of the chart.

In using the colour charts, accurate comparison is obtain by holding the turmeric sample direct behind the apertures separating the closest matching colour chips. Figure shows procedure to determine surface colour of turmeric, turmeric rhizomes are matching with colour chart available from colour chart Table shows reading for raw turmeric and Table shows reading for polishedly turmeric.

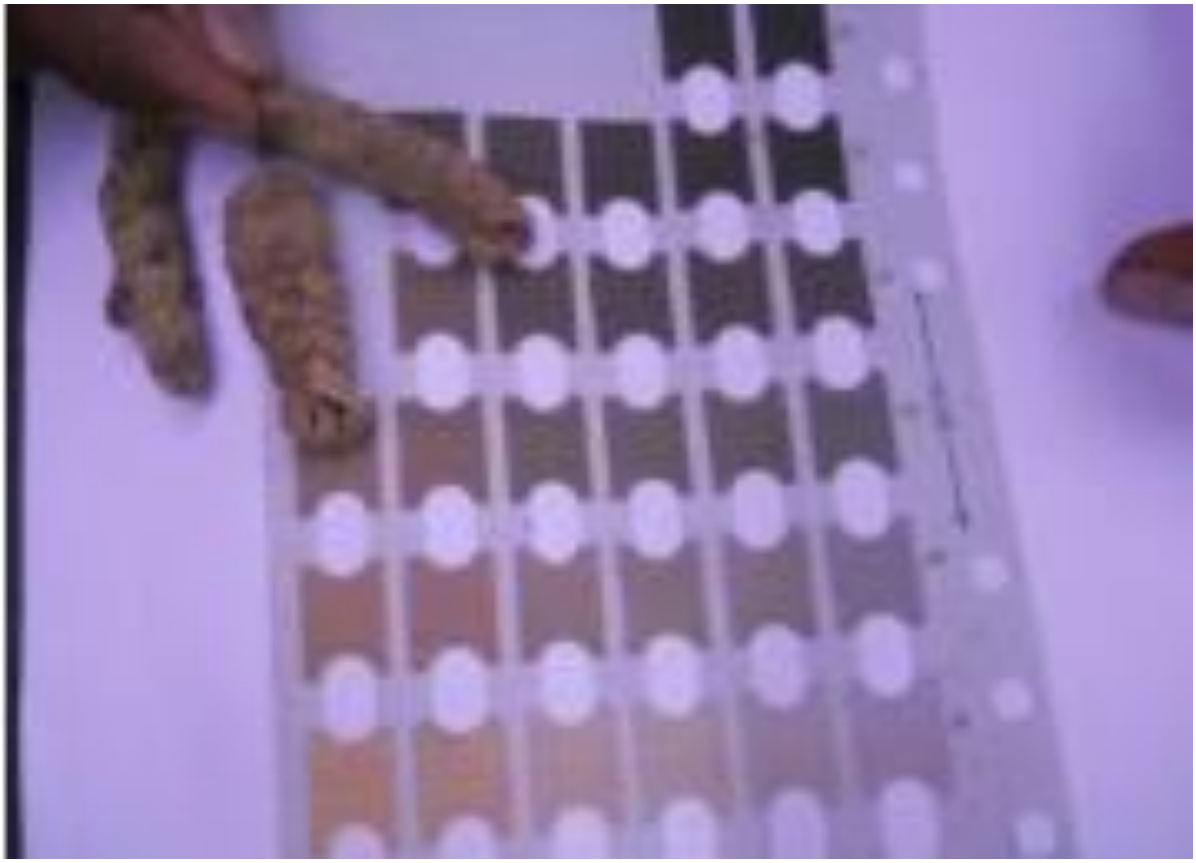

Figure 6.1: Determination of Surface color with the help of Munsell color charts

Figure 6.2: Color of un-polished dried turmeric

Figure 6.3: Color of turmeric polished

Figure 8: Turmeric bulb and fingur

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: Short Answer Questions

1. The surface colour of turmeric is determined using …… colour chart.
2. The …… displayed on the individual colour charts are of constant Hue, designated by a symbol in the upper right hand corner of the card.
3. ……, the colours become successively lighter from the bottom of the card to the top in visually equal step, their value increases.
4. …… they increase in Chroma from left to right.

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 7- Storing condition and polish product

Storage of bulk rhizomes should always be in cool and dry environment so as to prevent moisture absorption and chemical degrading.

Turmeric has traditionally been adulterated with related *curcuma* spices, specifically *c.xanthorrhiza, roxburg, c. aromatiea* and *c. zedoaria*. However, due to strong competition between spices' processors, the quality of Turmeric destined to the western markets is usually guaranteed by the exporter in contracts negotiated between the buyer and the seller.

Figure 9: Local storage of polished turmeric

Self-Check –7	Written test

Name…… ID…… Date…….

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

Test: Filing the blank

1. …… of bulk rhizomes should always be in cool and dry environment so as to prevent moisture absorption and chemical degrading.

2. Turmeric has traditionally been……with related curcuma spices, specifically c.xanthorrhiza, roxburg, c. aromatiea and c. zedoaria.

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 8- Identifying, rectifying and/or reporting out-of-specification product/process outcomes

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.

- Dark yellowish brown to desirable olive yellowish color with increase in the surface smoothness.
- Moisture content
- Microbial

Table 2: Cleanliness specifications for turmeric

Whole Insects, dead	**Excreta, Mammalian**	**Excreta, Other**	**Mold**	**Insect Defiled/Infested**	**Extraneous Foreign Matter**
by count	by mg/kg	by mg/kg	% by weight	% by weight	% by weight
3	11.1	11.1	3	2.5	0.5

Extraneous matter includes but is not restricted to: stones, dirt, wire, string, stems, sticks, non- toxic foreign seeds, excreta, manure, and animal contamination.

Equipment should not be used for both treated and untreated products without adequate cleaning and disinfection before use with treated products. Persons handling raw materials or semi-processed products capable of contaminating the end-product should not come into contact with any end-product unless and until they discard all protective clothing worn during the handling of the material at earlier stages of the processing and have changed into clean protective clothing.

Hands should be washed and disinfected thoroughly before handling products at different stages of processing. Out of specification such off flavor, contaminated, discolored products should be report to responsible person. Inspecting fresh produce throughout the processing stream for field contaminants, this may not have been noticed during the incoming produce. Removing from the processing stream damaged

or decomposed produce, extraneous matter, and produce that appears to be contaminated by animal feces, fuel, machine grease or oil.

Self-Check – 7	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. Why should a grinding fluid be used in very copious quantities when performing wet grinding?
2. What are the common causes of grinding accidents?

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 9- Achieving workplace housekeeping standards

9.1. Maintaining 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.

9.2. Service checking of tools, equipment and machinery

Tools, equipment and machinery shall be kept in proper operating condition and used only for the purpose for which they were designed. If proper and safe tools are unavailable, this should be reported to the supervisor. 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, tagged and not used again until restored to proper working condition.

Self-Check – 9	Written test

Name…… ID…… Date…….

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

Test: Short Answer Questions

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Information Sheet 10- Maintaining workplace records

Maintaining workplace records

Readings should be made and legible records maintained for the following:

1. Temperature indicating device(s);
2. Temperature recorder at the final heater outlet (entering the hold section or tube);
3. Differential pressure recorder, if a product-to-product regenerator is used;
4. Back pressure recording, if a back pressure monitoring system is used;
5. Product flow rate
6. Proper performance of polisher
7. Machine speed
8. During polishing,
9. Operating time,
10. Physical appearances
11. Check for leakage;
12. The product formulation, pH, water activity or other factors of each batch of product (if critical to the process);
13. Production date and code mark of the containers;
14. Records of each diversion;
15. Cleaning and resterilization records for the system following diversion;
16. Other conditions or factors critical to the adequacy of the scheduled process.

Self-Check – 10	Written test

Name…… ID…… Date…….

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

Test: Short Answer Questions

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Operation Sheet 1- boiling and polishing of spice and herbs (turmeric)

1. Boil/ steam cook the turmeric for 5-20 minutes

Figure 10: Boil/ steam cook the turmeric

2. Sun drying the boiled turmeric for 15- 20 days

Figure 11: Sun drying the boiled turmeric

3. Load/ feed the dried turmeric in to polisher

Figure 12: Load the dried turmeric

4. Turn on the turmeric machine

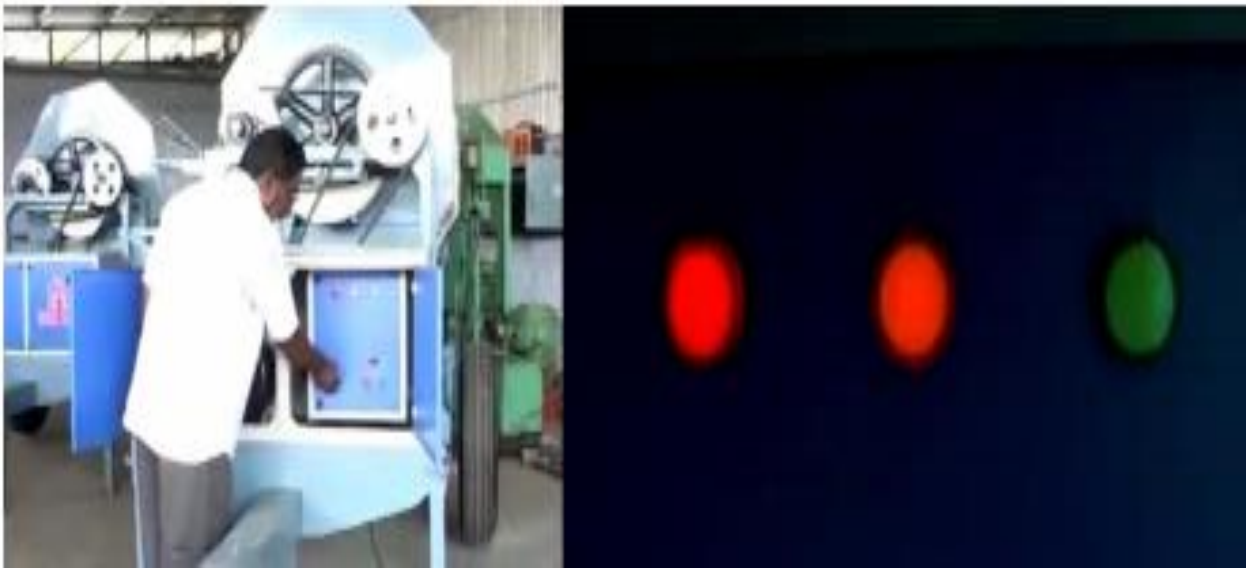

Figure 13: Turn on the polisher machines

5. Polish the dried turmeric to remove surface roughness by removing the surface scales, small rotlets and removes soil particals.

Figure 14: polishing the turmeric machine

6. Removed unwanted things from portion of the machine

Figure 15: Remove unwanted things/ dusts

7. Unloading/discharge the polished turmeric from the machine

Figure 16: Discharge the polished turmeric

8. Put the polished turmeric in to jute bags (package)

Figure 17: Putting the polished turmeric in to jute bags

9. Store the polished turmeric in to jute bags

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 **20** days. The project is expected from each student to do it.

Task- boiling and polishing of spice and herbs (turmeric)

LG #48	LO #3- Shut Down the Spice Conditioning and Polishing Process

Instruction sheet

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

- Identifying shutdown procedure
- Shutting down the process.
- Identifying and reporting maintenance requirements

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**:

- The appropriate shutdown procedure is identified
- The process is shut down according to workplace procedures
- Maintenance requirements are identified and reported according to workplace reporting requirements

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 shutdown procedure

3.1. Shutting down the process

- 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

3.1.1. 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 chopping and other mechanical operations
  - ✓ Removing or flushing waste materials from the processing workplace

3.1.2. Maintenance shutdown

- When maintenance to the polishing equipment is required, the equipment may need to be entered so that work can take place.
- The shutdown should be a scheduled or planned shutdown 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.

3.1.3. 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: Choose the best answer

1. The types of shutdowns used in a plant unit are_____, _____, and _____. (3 points)
2. _____is initiated in the event of a fire, instrument failure, power failure, unexpected hazard or total loss of the processes. (2 points)
3. A planned unit/plant shutdown wills prevent_____, _____ and_____. (3 points)
4. _____ is initiated by the operator during normal operation of the unit when, maintenance is required. (2 points)

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

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

Information Sheet 2- Shutting down the process

The polishing operation in spice and herb processing plant should be shut down after completion of work every day according to the standards and procedures of the industry. Cleaning and sanitizing steps are listed below:

- Remove heavy debris from floors with brooms or shovels and dry clean processing equipment, if needed
- Pre-rinse the equipment with adequate quality water
- Clean remaining debris from floor
- Rinse floor and drains with adequate quality water using a low pressure hose
- Use dedicated brushes to scrub floor and drains with an effective cleaner, applying adequate quality water as needed
- Foam and scrub the equipment with an effective cleaner and scrub using dedicated brushes
- Thoroughly rinse the equipment, floors, and drains with adequate quality water using a low pressure hose
- Remove excess water from floors
- Sanitize (according to manufacturer directions) the equipment and floors

Work from top down for cleaning and sanitizing activities. Some equipment may need to be disassembled before cleaning and sanitizing followed by reassembly.

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: Short Answer Questions

1. Write the steps we follow during cleaning and sanitizing processing plant/workplace. (5 points)
2. Why equipments are disassemble before cleaning and sanitizing. (5 points)

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

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

Information Sheet 2- Identifying and reporting maintenance requirements

- 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 programmes.
- 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.
- Planned maintenance is work having benefited from information issued by manufacturers and suppliers, the experience and knowledge of the service department staff, and reports and records from previous service visits.
- Preventive maintenance is work to be carried out at a specific frequency as indicated by potential failures or known reduction in efficiency of the plant and equipment, thereby avoiding failures or a decrease in performance.
- Scheduled maintenance is work based on known information, such as number of operations, hours run, etc., and can therefore be carried out at a predetermined time interval.

- Corrective maintenance is work carried out following the failure of the plant and equipment, and is so designed to return the component to its normal operating condition.
- 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.

Test: Choose the best answer

1. The benefits to be accrued from the implementation of a program of planned maintenance. (2 points)
   A. Efficient and economical operation of the plant equipment
   B. The utilization of resources
   C. Reduce personnel injury
   D. All
   E. None
2. _____ is work carried out following the failure of the plant and equipment, and is so designed to return the component to its normal operating condition. (2 points)
   A. Scheduled maintenance
   B. Corrective maintenance
   C. Preventive maintenance
   D. Emergency maintenance
3. Maintenance systems depends on: (2 points)
   A. The location of the plant
   B. The location of the equipment
   C. Company policy
   D. All
   E. None

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

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

LG #49	LO #4- Record information

Instruction sheet

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

- Recording workplace information.
- Signing all records
- Communicating the record information
- Keeping workplace information Record

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**:

- Record workplace information.
- Sign all records.
- Communicate the record information
- Keep workplace information Record

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- Recording workplace information

The work place information will recording recommended sample temples are shown as follows:

Table 1: Process Information (Template)

S. No.	Description	Progress
1.	Is the house cleaned	x
2.	Is the product is polished	x
3.	Is damaged belts replaced	x
4.	Is blades sharpen	x
5.	Is motor repaired or replaced	x
6.	Is power transmission systems repaired	x
7.	Is shaft repair or replace	x
8.	Is bear repair or replace	x
9.	Is flat plate repair or replace	x
10.	Is nut & bolt repair or replace	x
11.	Is bush repair or replace	x

Table 2: List of Monitoring & Measuring Devices and Records of Calibration (Template)

S. No.	Name of Equipment	ID. No.	Location	Range	Least Count	Count Frequency of Calibration	In house calibration Done On	In house calibration Due On	Remarks	Sign

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: Choose the best answer

1. Which one types of testing or testing for conformance of the machined.

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

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

Information Sheet 2- Signing all records

All records should be signed as follows:

Table 3: sample of signed records

S. No.	Description	Progress
1.	Is the house cleaned	x
2.	Is the product is polished	x
3.	Is damaged belts replaced	x
4.	Is blades sharpen	x
5.	Is motor repaired or replaced	x
6.	Is power transmission systems repaired	x
7.	Is shaft repair or replace	x
8.	Is damaged belts replaced	x
9.	Is flat plate repair or replace	x
10.	Is nut & bolt repair or replace	x
11.	Is bush repair or replace	x

Name: Mr. z _____ Signature: _____

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: Write true or false.

1. Is damaged belts replaced?
2. Is damaged belts replaced?
3. Is the house cleaned?

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

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

Information Sheet 3- Communicating the record information

It is important to always let the supervisor know when the information recorded so that:

1. The house is cleaned
2. The product is polished
3. Damaged belts replaced
4. Blades sharpen
5. Motor repaired or replaced
6. Power transmission systems repaired
7. Shaft repair or replace
8. Bear repair or replace
9. Flat plate repair or replace
10. Nut & bolt repair or replace
11. Bush repair or replace
12. Circular disk repair or replace
13. Wire mesh repair or replace
14. Gear repair or replace

Figure 18: communicating the record information

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: Write true or false

1. It is not important that the supervisor to know whether power transmission systems are repaired or not.
2. It is important that the supervisor to know whether bush is repair or replace.
3. It is not important that the supervisor to know whether bush is shaft repair or replace
4. It is not important that the supervisor to know whether bush is shaft repair or replace
5. It is important that the supervisor to know whether Motor repaired or replaced

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

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

Information Sheet 4- Keeping workplace information records

Records management: – the control of the creation, receipt, maintenance, use and disposal of records in accordance with professional and international standards of practice. Records management is distinct from document management, which is typically concerned with the provision of access, collaborative working and version control of documents, rather than the management of authenticity, reliability, integrity and usability over time.

Electronic records management systems (commonly referred to as EDRMS or ERMS) or Electronic Records Management Systems – systems specifically designed to manage the maintenance and disposition of records. They maintain the content, context, structure and links between records to enable their accessibility and support their value as evidence. Electronic records management systems are distinguished from business systems, for the purpose of this document, because their primary function is the management of records.

Records management metadata – an inextricable part of records management, serving a variety of functions and purposes. In a records management context, metadata is defined as data describing the context, content and structure of records and their management through time (ISO 15489 – 1: 2001, 3.12). As such, metadata is structured or semi-structured information that enables the creation, registration, classification, access, preservation and disposition of records through time and within and across domains. Records management metadata can be used to identify, authenticate and contextualize records and the people, processes and systems that create, manage, maintain and use them, and the policies that govern them. Initially, metadata defines the record at its point of capture, fixing the record into its business context and establishing management control over it. During the existence of records or their aggregates, new layers of metadata will be added because of new roles in other business or usage contexts. This means that metadata continues to accrue information relating to the context of the records management and the business processes in which the records are used, and to structural changes to the record or its appearance. Metadata can be sourced or re-used by multiple systems and for multiple purposes. Metadata applied to records during their active life may also continue to apply when the records cease to be required for current

business purposes but are retained for ongoing research or other values. The purpose of records management metadata is to ensure authenticity, reliability, usability and integrity over time, and to enable the management and understanding of information objects, whether these are physical, analogue or electronic. However, metadata also needs to be managed as a record or as a component of a record.

Records Management has always involved the management of metadata. However, the electronic environment requires a different expression of traditional requirements and different mechanisms for identifying, capturing, attributing and using metadata. In the electronic environment, authoritative records are those accompanied by metadata defining their critical characteristics. These characteristics must be explicitly documented rather than being implicit, as in some paper-based processes.

Documentation and record keeping

- Why is it important?
  - ✓ Records are a management tool that can show trends and improve operational efficiency
  - ✓ Records are essential for reviewing the effectiveness of the HACCP plan
  - ✓ Records provide information for improving the HACCP plan
  - ✓ Record shows the operational process history and provides a proof of adherence to food safety plan

- What documents and records are required?
  - ✓ Documentation used in HACCP plan development
  - ✓ Documentation of methods and procedures
  - ✓ Records of CCP monitoring, verification, deviations and corrective action taken
  - ✓ Records of employee training programmes.

Documents used in HACCP plan development

- HACCP team members and their responsibilities
- The HACCP plan itself including the forms developed during its preparation

- Hazard analysis
- Data used to establish control measures, CCPs, critical limits, corrective measures, etc.
- Correspondence with consultants or other experts concerning HACCP plan development
- Description of the monitoring system for all CCPs, including critical limits and equipment used for monitoring
- Plans for corrective actions
- Description of record keeping, including copies
- Description of verification and validation procedures

HACCP system records

Records of monitoring at all of the CCPs and GMP activities

Records of any deviation and the corrective action taken

Validation records such as in-house inspection, equipment testing and calibration

These are official records – they must be accurately completed, clearly coded, signed, counter-signed and dated

Records of who has received training and when

Documentation related to training programme content and duration

Employees must be trained to understand and correctly fulfil their roles in the HACCP system

Self-Check – 4	Written test

Name…… ID…… Date…….

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

Test: Short Answer Questions

1. …… the control of the creation, receipt, maintenance, use and disposal of records in accordance with professional and international standards of practice.
2. …… management systems are distinguished from business systems, for the purpose of this document, because their primary function is the management of records.
3. …… is distinct from document management, which is typically concerned with the provision of access, collaborative working and version control of documents, rather than the management of authenticity, reliability, integrity and usability over time.
4. …… can be sourced or re-used by multiple systems and for multiple purposes.
5. …… Management has always involved the management of metadata.
6. The electronic environment requires a different expression of traditional requirements and different mechanisms for ……, ……, ……and using metadata.

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

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

Reference Materials

Book:

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4. Jayashree E, Kandiannan K, Prasath D, Sasikumar B, Senthil Kumar CM, Srinivasan V, Suseela Bhai R and Thankamani CK. ***Turmeric - Extension Pamphlet.*** ICAR-Indian Institute of Spices Research, Kozhikode, Kerala. 2015.
5. Electronic records management systems - system specifications for public offices version 3 national archives of Malaysia 2011.
6. Dhawle Manuraj S, K. S. (2020). A Review on Post Processing of Turmeric Rhizome. *International Research Journal of Engineering and Technology (IRJET), 07*, 4800- 4803.

Web Addresses

http://www.indianspices.com/post-harvest-improvement-programme.html

http://www.celkau.in/crops/spices/Turmeric/processing.aspx

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