

HORTICULTURE

Preparing and Maintaining Farm Tools, Implements, Simple Equipment and Facilities

This instructional material was collaboratively developed and reviewed by educators from public and private schools, colleges, and or/universities. We encourage teachers and other education stakeholders to email their feedback, comments, and recommendations to the Department of Education at action@deped.gov.ph.

We value your feedback and recommendations.

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MODULE 3

Conducting Pre-agricultural Farm Operations

TOPIC: Preparing and Maintaining Farm Tools, Implements, Simple Equipment and Facilities

Content Standards	Performance Standard
The learner demonstrates understanding in preparing and maintaining farm tools, implements, simple equipment and facilities.	The learner independently prepares and maintains farm tools, implements, simple equipment and facilities following standard procedures.



Preparing and Maintaining Farm Tools, Implements, Simple Equipment and Facilities

Introduction

This lesson deals with the maintenance of farm tools, implements, simple equipment, and facilities. It also includes workplace hazards and environmental implications associated with maintenance procedures.

Learning Competencies/Objectives

At the end of the quarter, the students are expected to:

1. Enumerate the types of hazards in the workplace;
2. Explain the principles of HACCP;
3. Perform maintenance activities on tools, implements, simple equipment, and facilities; and
4. Identify the factors to consider when maintaining farm facilities, tools, and equipment.

Pre-Diagnostic Assessment:

A. Multiple Choice

Directions: Choose the letter of the correct answer and write it in your quiz notebook.

1. Maintenance is work done regularly to keep our tools in good condition. Which of the following is the first and foremost task in maintenance?
 - A. Inspect tools before using them
 - B. Clean tools every after use
 - C. Keep workplace clean and orderly
 - D. Use tools, implements, and equipment properly

2. The following are important reasons why we maintain our tools, implements, and equipment except:
 - A. To properly dispose hazardous waste
 - B. To extend the life of tools, implements, and equipment
 - C. To attain aesthetic beauty of the workplace
 - D. To assure the operational readiness of the tools, implements, and equipment and maximum return on investments

3. Which of the following is **not** a benefit from maintaining the facilities?
 - A. Ensure safe environment
 - B. Prolonged life of facilities
 - C. Reduced operational cost and production
 - D. Prompt delivery of services/products

4. The 5S with several philosophies are pre-requisites for any improvement program. Which of the following is **not** a philosophy of 5S?
- A. Simplifies work environment
 - B. Effective workplace organization
 - C. Waste of time and effort
 - D. Reduces waste while improving quality and safety
5. A maintenance performed to prevent or find defects before they develop into a breakdown refers to:
- A. Corrective maintenance
 - B. Preventive maintenance
 - C. Emergency maintenance
 - D. Time-based maintenance

B. Sequencing

Directions: Arrange in order the four-step processes of risk management by assigning number in every step.

Assess the risk

Review the process

Identify the hazard

Control the risk

C. Identification

Directions: Identify the different examples of hazards by placing a check mark (✓) under the types of hazard in the table below.

Examples of Hazards	Safety Hazard	Biological Hazard	Physical Hazard	Ergonomic Hazard	Chemical Hazard	Work Organization Hazard
1. Lack of respect						
2. Pesticides						
3. Sexual Harassment						
4. Insect bites						
5. Spills on floors						
6. Poor posture						
7. Improperly aligned chairs						
8. Flammable materials						
9. Radiation						
10. Confined spaces						



What to KNOW:

Activity 1

In the past lesson, you were able to identify defective tools, implements, and simple equipment. We agreed not to use defective tools to avoid accidents. We need to restore these tools in order that we will have enough tools to use in the laboratory.

Have you ever met an accident before? Or have you seen someone involved in an accident?

In our next lesson, we will be discussing hazards, risks or accidents in our workplaces in relation to the maintenance of tools, implements, and simple equipment.

Again, go to your Learning Barkada and pick one topic for you to discuss.

1. What are hazards, risks, and accidents? What are the types of hazards that you know?
2. What is Republic Act 9003? As students, what are your roles to attain the objectives of the RA 9003?
3. What maintenance activities should you undertake to prolong the life and effectiveness of your tools?
4. Enumerate materials needed in maintaining your tools, implements, and simple equipment.

Reading Resources and Instructional Activities

Safety Precautions in Handling Farm Facilities

Horticultural farm operations involve a lot of activities in the different workplaces. While performing these activities, workers expose themselves to a lot of risks. Workplace hazard is a major cause of accident, injury, or harm to a worker who performs such task. These hazards should be the major concern of all who are involved in a certain task or activity.

When undertaking risk management, it is important to distinguish hazard from risk and exposure.

- *Hazard* is the potential for harm, or adverse effect on an employee's health. Anything which may cause injury or ill health to anyone at or near a workplace is a hazard.
- *Risk* is the likelihood that a hazard will cause injury or ill health to anyone at or near a workplace. The level of risk increases with the severity of the hazard and the duration and frequency of exposure.
- *Exposure* occurs when a person comes in contact with a hazard.

What is a hazard?

Hazard is anything in the workplace that has the potential to harm people. Hazards in the workplace should be identified and the risk of the hazard causing an injury should be assessed.

Types of Hazards

1. Safety hazards

These are the most common hazards in a workplace occurring at one time or another. They include unsafe conditions that can result in injury, illness or death.

Examples:

- Spills on floors
- Working from heights, including ladders, scaffolds, roofs, or any raised area
- Unguarded machinery and moving machinery parts
- Electrical hazards like frayed cords, missing ground pins and improper wiring
- Confined spaces

2. Biological hazards

These are associated with working with animals, people, or infectious plant materials.

Examples:

- Insect bites
- Fungi/mold
- Bacteria and virus
- Plants
- Animal and bird droppings
- Blood and other body fluids

3. Physical hazards

These are factors within the environment that can harm the body without necessarily touching it.

Examples:

- Extreme temperature – hot and cold
- Constant loud noise
- High exposure to sunlight/ultraviolet rays
- Radiation including ionizing and non-ionizing (microwaves and radiowaves)

4. **Ergonomic hazards.** These occur when the type of work, body positions and working conditions put a strain on your body. These are the hardest to spot since you don't always immediately notice the strain on your body or the harm that these hazards pose. Short term exposure may result in "sore muscles" and long-term exposure can result in serious illness.

Examples:

- Improperly adjusted workstations and chairs
- Frequent lifting
- Poor posture
- Awkward movements, especially if they are repetitive
- Repeating the same movements over and over
- Vibration
- Having to use too much force, especially if done frequently

5. **Chemical hazards.** These are present when a worker is exposed to any chemical preparation in the workplace in any form (solid, liquid, gas). Chemicals can cause illness, skin irritation or breathing problems.

Beware of:

- Pesticides
- Cleaning products, paints, acids, and solvents

- Flammable materials, like gasoline and explosive chemicals
- Vapors, like fumes that come from welding
- Gases, like acetylene, propane, carbon monoxide and helium

6. Work organization hazards

Hazards or stressors that cause stress (short-term effects) and strain (long-term effects). These are hazards associated with clean workplace issues such as, workload, lack of control and/or respect.

Examples:

- Workplace violence
- Workload demands
- Lack of respect
- Flexibility
- Social support/relations
- Control or say about things
- Sexual harassment

Risk management

Risk management is a four-step process.

1. Identify the hazard

Hazard identification is the first step in reducing the possibility of an accident. It means identifying all situations or events that could cause injury or illness. Eliminating or minimizing workplace hazards needs a systematic approach. It is essential to try and anticipate all possible hazards at the workplace known as the '*what if?*' approach.

Methods that are useful in identifying hazards. These include:

- Reviewing your workers' compensation data and checking the incidence, mechanism and agency of injury, and the cost to the organization.
- Staying informed on trends and developments in workplace health and safety, via the internet or OHS publications.
- Reviewing the potential impact of new work practices or equipment introduced into the workplace in line with legislative requirements.
- Doing walk-through surveys, inspections or safety audits in the workplace to evaluate the organization's health and safety system.
- Considering OHS implications when analyzing work processes.
- Investigating workplace incidents since in some cases there may be more than one hazard contributing to an incident.
- Getting feedback from employees/workers who can often provide valuable information about hazards, based on their experience in their work area.

2. Assess the risk associated with the hazard

This step involves gathering information and making decisions. It is important to consider the causes and impact of hazards in a workplace. To avoid endangering the workers' health, introduce some precautionary measures.

3. Control the risk

The third step in effective risk management involves establishing and maintaining systems which give an opportunity for regular evaluation and review procedures. Evaluation entails examining control measures to ensure that risks are eliminated or reduced.

There are three categories of control measures you might take. You can eliminate the hazard, minimize the risk, and introduce 'back-up' controls when all other options in the previous categories have been exhausted.

4. Review the process.

The review system applies to the overall risk management process. It checks if the process is working effectively

Basic Principles of Hazard Analytical and Critical Control Point (HACCP)

1. Conduct a hazard analysis.

Identify hazards and assess the risks associated with them at each step in the commodity system. Describe possible control measures.

2. Determine the Critical Control Points (CCPs).

A critical control point is a step at which control can be applied and is essential to prevent or eliminate safety hazard, or reduce it to an acceptable level.

3. Establish critical limits.

Each control measure associated with a CCP must have an associated critical limit which separates the acceptable from the unacceptable control parameter.

4. Establish a monitoring system.

Monitoring is the scheduled measurement or observation at a CCP to assess whether the step is under control.

5. Establish a procedure for corrective action, when monitoring at a CCP indicates a deviation from an established critical limit.

6. Establish procedures for verification to confirm the effectiveness of the HACCP plan.

Such procedures include auditing of the HACCP plan to review deviations and product dispositions, and random sampling

and checking to validate the whole plan.

7. **Establish documentation concerning all procedures and records appropriate to these principles and their application**
(www.fao.org/docrep/005/y1390e/y1390e09.htm retrieves)

Maintaining Farm Tools, Equipment, and Facilities

According to Ladia, et. al (2012), **maintenance** is work that is done regularly to keep tools, equipment, and facilities in good condition and working order. We need to learn the different kinds of maintenance in order to identify the activities and proper procedures in the management of facilities as well as of the time, money and materials involved.

The proper use of training tools, equipment, and facilities is the first and foremost task in maintenance. It used in accordance with the manufacturer's manual, as this would evidently extend the life of the tools, equipment, and facilities. The manual would indicate the part and the way to maintain it. We must always refer to it for reference.

Types of Maintenance

1. *Preventive maintenance* – maintenance performed to prevent or find defects before they develop into a breakdown.
2. *Corrective maintenance* – maintenance tasks initiated as a result of the observed condition of an asset or system, before or after functional failure to correct a problem. It is performed **to repair, restore, replace** or **correct** a failure.
3. *Emergency maintenance* – maintenance performed to put the item on hand **immediately** to avoid serious consequences, such as *loss of production, disrupted schedule, extensive damage to assets, idle worker or for safety reasons*. This should be requested as soon as you become aware of a problem.

Why Maintain?

- To extend the useful life of tools, equipment and facilities
- To assure the operational readiness of equipment and maximum possible return on investments
- To properly discard hazardous waste
- To ensure the safety of the user

What Can We Gain From Maintaining Our Facilities?

- Ensure a safe environment
- Improved morale of human resources
- Reduced operational cost
- Increased production
- Prolonged life of facilities
- Prompt delivery of services/products

Factors to Consider When Maintaining Farm Tools, Equipment, and Facilities

1. Manpower
2. Money (financial resources)
3. Methods and system
4. Machines (facilities)
5. Materials and supplies

Maintenance Program – includes all maintenance activities to be undertaken, manpower needed, maintenance methods to be used, all the materials and supplies needed and cost involved in the maintenance.

Maintenance Schedule – is a list allocating specific maintenance of an area, including tools and equipment for a specified period. It is also just a part of the maintenance program.

Maintenance Checklist – is a list of maintenance tasks typically derived through some analysis, generated automatically as work orders at a predetermined frequency.

Tools Maintenance and Safety Rules

According to Asuncion (1991), tools will last longer when properly kept and maintained. A good worker keeps and takes good care of his tools. The following are some pointers to follow in keeping tools in good condition:

1. Be sure to inspect tools before using them to check if they are in good working condition. This can be detected when they are used smoothly with ease and speed. The sharpness of bladed tools and tips of pointed ones should always be maintained, while non-bladed or non-pointed tools should always be kept clean to prevent them from rusting.
2. After using a tool, clean it thoroughly with a damp cloth before keeping it in the tool cabinet. To keep the tool from rusting, make sure that the tool is dry before storing it.
3. Oil the metal parts of a tool to prevent any form of damage that may be caused by air, water, or rust.

Safety Rules to Strictly Follow to Avoid Accidents

1. Avoid wearing loose clothing when working. Sleeves should be fitting and shirts tucked in as much as possible. Remove ties and jewelry.
2. Injuries or accidents that occur should be reported immediately to the teacher.
3. Never use your lips to fold small materials like fasteners or any small metal articles when working.
4. Never throw tools of any type around. Make sure the sharp edge of cutting tools is away from the edge of the work table or work bench.
5. Keep working areas clean and free from shavings of any kind.
6. Ensure the safety of your classmates when carrying long and heavy tools to avoid accidents.
7. Never use dull or damaged tools.

8. Keep fingers away from the edge of sharp cutting tools.
9. Know and observe safety measures specific of each tool or operation.
10. Convenience outlets and power tools used should be checked before and after each use. Switch off the power before leaving the shop.
11. Keep tools in their proper places.

Practice 5 S

According to Ladia, et al. (2012), 5S is the name of a workplace organization methodology that uses a list of five (5) Japanese words which are *seiri*, *seiton*, *seiso*, *seiketsu*, and *shitsuke*. Translated into English, they all begin with the letter “S”. The list describes how items are stored and how the new order is maintained.

Seiri (Sort)- taking out and disposing of unnecessary items

Seiton (Systematize) - arranging tools, equipment, and materials
in order for the easiest and most efficient access

Seiso (Sweep)- cleaning even if things are **not** dirty

Seiketsu (Standardize)- maintaining the workplace in high standard
housekeeping

Shitsuke (Self-discipline)- doing things spontaneously without being
told

Below are samples of maintenance schedules and checklists:

Table 2. Operational Procedure

OPERATIONAL PROCEDURE	
Equipment Type	Hand Tractor
Equipment Code	HT100
Location	Shop Building
Operation Procedure:	
<p>Conduct pre-operative check-up on the following:</p> <ol style="list-style-type: none"> 1. Check engine oil. 2. Check loose bolts and missing parts. 3. Check fuel and water. 4. Check the accessories if they are properly mounted. 	

Table 3. Housekeeping schedule

HOUSEKEEPING SCHEDULE							
Qualification	Agricultural Crop Production NC II	Station/Bldg.		GREENHOUSE			
Area/Section	PRACTICAL WORK AREA						
In-charge							
ACTIVITIES	Responsible Person	Schedule for the Month of _____					
		Daily	Every other day	Weekly	Every 15th Day	Monthly	Remarks
1. Clean and maintain greenhouse surroundings by sweeping/removing fallen	Trainee	X					

leaves, branches, debris and clearing pathways of obstructions.							
2. Empty trash and compost cans.	Trainee	X					
3. Sanitize and disinfect houses between uses	Trainee			X			Every Friday
4. Clean and check wash area: <ul style="list-style-type: none"> • Walls/floors-free from molds and stains • Drainage system is functional • Water system is functional ; no dripping faucets or leaking pipes • Free from rags or other unnecessary objects 	Trainee	X					

Table 4. Equipment Maintenance Schedule

EQUIPMENT MAINTENANCE SCHEDULE							
Equipment Type	Hand Tractor						
Equipment Code	HTI00						
Location	Shop Building						
ACTIVITIES	Manpower	Schedule for the Month of					Remarks
		Daily	Every other day	Weekly	Every 15th Day	Monthly	
1.Check engine oil	Trainee/Trainer			✓			Every Monday
2.Check loose bolts and missing parts	Trainee/Trainer			✓			Every Monday
3.Check fuel and water	Trainee/Trainer			✓			Every Monday
4.Replace engine oil	Trainee						As the need arise
5.Clean air cleaner	Trainee/Trainer					✓	End of the Month
6.Engine tune-up	Engine Technician					✓	End of the Month
Special Instructions:							
Trainer:							

Table 5. Workshop Inspection Checklist

WORKSHOP INSPECTION CHECKLIST			
Qualification		Agricultural Crop Production NC II	
Area/Section		Greenhouse	In-Charge
Yes	No	INSPECTION ITEMS	
X		Did you...	
X		1. clean the surroundings and remove obstructions? 2. properly segregate and dispose of waste materials, such as empty bottles of chemical?	
Remarks:			
Inspected by:		Date:	

Table 6. Equipment Maintenance Inspection Checklist

EQUIPMENT MAINTENANCE INSPECTION CHECKLIST			
Equipment Type		: HAND TRACTOR	
Property Code/Number		: HTI00	
Location		: PRACTICAL WORK AREA	
Yes	No	INSPECTION ITEMS	
X		Did you...	
X		1. check the engine oil?	
X		2. check if there are loose bolts and missing parts?	
X		3. check the fuel and water?	
X		4. clean the air cleaner?	
Remarks:			
Inspected by:		Date:	

Table 7. Waste Segregation Checklist

WASTE SEGREGATION CHECKLIST			
Qualification	AGRICULTURAL CROP PRODUCTION NC II		
Area/Section	GREENHOUSE		
In-Charge			
GENERATED/ACCUMULATED WASTE	WASTE SEGREGATED METHOD		
	RECYCLE	COMPOSED	DISPOSE
Cut weeds		✓	
Plant residues		✓	
Seedling trays	✓		
Plastic bags	✓		
Empty bottles of chemicals			✓
Empty seed cans or sachets			✓



What to PROCESS:

Activity 2

There is a saying which runs thus, “Work and work without play, makes Juan a dull boy,” so this time, let us play. The title of our game is “Act and Tell.” Actors will come from each Learning Barkada, round robin.

Example:

LB 1 will do an action about maintenance of tools and members from other LBs will guess the action. If the action not correctly identified, the score goes to the “Act” group. But if it was identified correctly; the merit goes to the “Tell” group. The Tell group which gave the correct answer will have the chance to act to be answered by the other LBs. The number of correct items they got will be their score.



What to REFLECT and UNDERSTAND:

Activity 3

This time, you are not going to work by groups. This is an individual pursuit to assess how much you have learned from the lessons.

Select one of the topics listed below and develop it into a composition with 100 words only.

1. 5S and Me
2. Hazards and Me
3. Why do I maintain my tools

Activity 4

Every Learning Barkada will prepare a poster of safety precautions to be displayed in the classroom.



What to TRANSFER:

Activity 5

Let's get physical. Each one of you go to the tool room and get a tool that needs cleaning and/or simple repair. You may also bring your own tool for this activity. Apply what you have learned about maintaining tools, implements, and simple equipment. Before you start doing your task, assess your workplace. Identify the possible hazards and do something about them to ensure your safety. While doing your task, observe safety precautions to prevent untoward incidents from happening.

Summative Assessment

A. Multiple Choice

Directions: Choose the letter of the correct answer. Write your answer on your quiz notebook.

1. The 5S with several philosophies are pre-requisites for any improvement program. Which of the following is **not** a philosophy of 5S?
 - A. Simplifies work environment
 - B. Effective workplace organization
 - C. Waste of time and effort
 - D. Reduces waste while improving quality and safety
2. Which of the following is **not** a benefit from maintaining the facilities?
 - A. Ensure safe environment
 - B. Prolonged life of facilities
 - C. Reduced operational cost and production
 - D. Prompt delivery of services and products

3. A maintenance performed to prevent or find defects before they develop into a breakdown refers to:
 - A. Corrective maintenance
 - B. Preventive maintenance
 - C. Emergency maintenance
 - D. Time-based maintenance
4. The following are important reasons why we maintain our tools, implements, and equipment **except**:
 - A. To properly dispose hazardous waste
 - B. To extend the life of tools, implements, and equipment
 - C. To attain aesthetic beauty of the workplace
 - D. To assure the operational readiness of the tools, implements, equipment and maximum return on investments
5. Maintenance is work done regularly to keep our tools in good condition. Which of the following is the first and foremost task in maintenance?
 - A. Inspect tools before using them
 - B. Clean tools after use
 - C. Keep workplace clean and orderly
 - D. Use tools, implement, and equipment properly

B. Sequencing

Directions: Arrange in order the four-step processes of risk management by assigning a number to every step.

Assess the risk

Review the process

Identify the hazard

Control the risk

C. Identification

Directions: Identify the different examples of hazards by placing a check mark (✓) under the types of hazards in the table below.

Examples of Hazards	Safety Hazard	Biological Hazard	Physical Hazard	Ergonomic Hazard	Chemical Hazard	Work Organization Hazard
1. Lack of respect						
2. Pesticides						
3. Sexual Harassment						
4. Insect bites						
5. Spills on floors						
6. Poor posture						
7. Improperly aligned chairs						
8. Flammable materials						
9. Radiation						
10. Confined spaces						

Summary/Synthesis/Feedback

“An ounce of prevention is better than a pound of cure”: An adage which always reminds us of our safety in everything we do.

Any place we go, any work we undertake, we are exposed to risks or hazards. To avoid such, we must be extra careful of our actions and decisions. See to it that the workplace meets the OHS standards.

Tools, implements, and equipment must be maintained and secured in their proper places to be safely used next time.

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