RWANDA POLYTECHNIC

TVET LEVEL II

AGRICULTURE

Maintain Farm Tools

TRAINER MANUAL

RWANDA POLYTECHNIC

Approved by: Workforce Development Authority

USAID FROM THE AMERICAN PEOPLE

EDC Education Development Center

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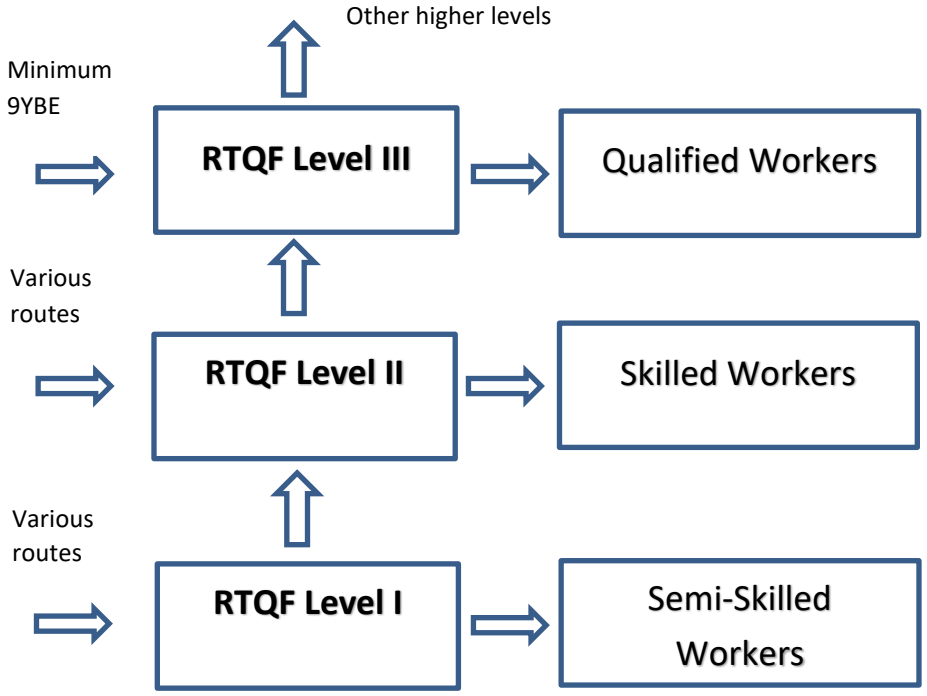
Introduction to RTQF Level II Training Modules

Background

Rwanda Polytechnic, with support of and in collaboration with USAID Huguka Dukore Akazi Kanoze, has developed RTQF TVET Level II programs that combine basic education, soft skills and vocational skills modules. Bridging the gap between Level I and Level III programmes, Level II aims to prepare learners who have a minimum education level of Primary 6 or equivalent to continue with their education or become skilled workers in the labour force.



Following the Workforce Development Authority (WDA) curriculum development process that involved experts from Rwanda Polytechnic, Rwanda Education Board, Ministry of Agriculture, technical vocational institutions, Education Development Center, Akazi Kanoze Access and other technical experts, training modules were developed in basic education, soft skills (work readiness) and, initially, agriculture. Additional vocational areas will be added over time. Trainees will be trained in all Basic Education and Soft Skills modules listed below, as well as in 6 - 8 modules that make up their chosen technical vocational programme.

Module Requirements:

Basic Education	Soft Skills	Vocational Skills
• English • Kinyarwanda • Mathematics	• Basic Entrepreneurship Skills • ICT Essentials • Communication Skills	• Vocational programmes will have a set of 6 – 8 required technical modules.

• Integrated Science (Physics, Chemistry, Biology)	• Safety, Health and Sustainable Environment • Personal Development and Career Guidance	E.g. Food Crop Production and Processing includes the following modules: 1. Food Crop Production 2. Small Scale Post-Harvest Operations 3. Growing Medium 4. Food Safety and Sanitation 5. Food Preservation and Storage 6. Flour Processing

Organization of the Training Manuals

For each module there is a Trainer Manual and a Trainee Manual. These manuals, based on the curricula for each subject, are divided into Learning Units, and each Learning Unit includes 3 – 5 Learning Outcomes. The learning outcomes make up the essential skills, knowledge and attitudes to be acquired by trainees. To make the Trainee Manual more user friendly, Unit and Topic are used respectively for Learning Unit and Learning Outcome. The number of hours per training module varies, ranging between 30 and 120 hours.

Teaching & Learning Methodology of RTQF Level II 2 TVET Materials

The teaching and learning methodology used in the materials is based in experiential and adult learning. Activities are designed to engage trainees, build upon what they know and learn and provide them with opportunities to build their skills in the classroom and in the workplace. More specifically, guiding principles in the development of the manuals include:

- Building on participants' knowledge, skills and experiences
- Facilitating a learning process through active engagement of participants rather than through lecturing
- Providing opportunities to practice – inquiry based and hands on practice, both in the classroom and workplace
- Using simple and clear language
- Connecting to the real world: use local resources and the environment for learning
- Promoting critical thinking through properly debriefing activities and asking questions that get learners to think, analyze, relate issues and topics to their own lives and come up with solutions

- Applying social inclusion principles: Finding ways to include all types of youth (and trainers) – males and females; different cultural/ethnic/religious backgrounds, people with disabilities (PWD); people with different types of health status …

- Encouraging risk taking – promote questioning and being free to explore

- Promoting habits of mind that support life-long learning: curiosity and wonder, open mindedness, creativity

These principles are reflected in the layout and flow of activities in the manuals:

1. **Key Competencies:** Table found at the beginning of each Learning Outcome that describes the main knowledge, skills and attitudes to be gained by the end of the activities.

2. **Self-Assessment:** Conducted at the beginning and end of each Learning Unit to get a sense of trainees' knowledge and skills going into it and what they have gained by the end of the Learning Unit (and steps they need to take to further their understanding and skills).

3.  **Getting Started Activity:** Typically, a quick activity or questions to 1) give the trainer a sense of trainees' existing knowledge and skills; 2) spark the interest of trainees in the topic; 3) introduce the objectives and key competencies of the topic.

4.  **Problem Solving Activity:** A challenging activity to get trainees engaged and to learn through discovery instead of memorization of facts. A variety of teaching and learning methodologies are used, including individual and group work such as reading real life work-based scenarios and answering accompanying questions to activities such as identifying proper tools and equipment from the school workshop to conduct a certain activity. Following the sharing of responses, the trainer guides trainees through the content and processes being introduced.

5.  **Guided Practice Activity:** Building on the concepts and skills gained in the Problem Solving Activity, the trainer guides trainees through practical examples.

6.  **Application Activity:** Consolidates trainees' knowledge and skills through a real-life application of the topic in the classroom, community or workplace. Trainees are given more independence in applying what they have learned.

7. **Key Facts boxes:** Throughout the Trainee Manual, one will find Key Facts boxes. These contain the main information or content for a given Learning Outcome. They are there for the trainees' reference and are used throughout the different types of activities.

8.  **Points to Remember:** List of the top key learning points or "take-aways" from the topic.

9.  **Formative Assessment:** Questions and activities to assess trainees' level of understanding of the concepts introduced.

10.  **Summative Assessment:** Based on the integrated, real life situation approach used in other TVET levels, this is done at the end of every module for agricultural modules and, with some variations, at the end of each Learning Unit for Basic Education and Soft Skills modules.

11.  **Self-Reflection:** Trainees re-take the Self-Assessment given at the beginning of the Learning Unit and identify their strengths, challenges and actions to improve their level of competence.

The Trainer and Trainee Manuals are meant to be used in conjunction with each other and are well coordinated through the headings and labelling of activities. The trainer will always be able to refer trainees to specific activities by the coordinated numbering system. For instance, a specific exercise might be labelled Topic 1.2 Task 2. The Topic is the number of the Learning Outcome and the task is the specific exercise to be done. The Key Facts are also numbered for easy reference. These nor the Self-Assessment tables are in the Trainer's Manual so the trainer should have a copy of both manuals.

The Trainer's Manual includes answers (or guidelines to the trainer as appropriate) to Formative and Summative Assessments as well as to problems given throughout the activities. Summative Assessments are not included in the Trainee's Manual. These are meant to be used as a guide for those who will be developing a context-appropriative Summative Assessment at the end of the Module or Learning Unit. Basic Education and Soft Skills modules include Summative Assessments at the end of every Learning Unit while the technical modules include it only at the end of the module.

Lastly, there is a section in the Trainer's Manual for additional information to the trainer that includes either specific information or references to information that can help them deepen their understanding of the particular content.

MAINTAINING FARM TOOLS, EQUIPMENT AND FACILITIES

Learning Units	Learning Hours	Learning Outcomes
Learning Unit 1: Select tools and equipment	10	**1.1** Take inventory of tools and equipment
		1.2 Select tools and equipment
		1.3 Identify criteria for selection of tools and equipment
Learning Unit 2: Clean tools and equipment	15	**2.1** Select materials for cleaning tools and equipment
		2.2 Identify cleaning techniques
		2.3 Clean tools and equipment
Learning Unit 3: Repair tools and equipment	15	**3.1** Select spare parts based on damaged parts
		3.2 Identify repairing techniques of tools and equipment
		3.3 Repair tools and equipment
		3.4 Test repaired tools and equipment
Learning Unit 4: Adjust and calibrate tools and equipment	15	**4.1** Check tools and equipment for functioning
		4.2 Calibrate tools and equipment
		4.3 Adjust tools and equipment
Learning Unit 5: Maintain farm facilities	15	**5.1** Identify damaged farm facilities
		5.2 Identify materials and spare parts for repairing damaged farm facilities
		5.3 Keep maintenance of farm facilities

Learning Unit 1: Select tools and equipment

Learning Outcomes

By the end of the Learning Unit, trainees will be able to:

1.1 Take inventory of tools and equipment

1.2 Select tools and equipment

1.3 Identify criteria for selection of tools and equipment

Learning Unit 1 Self-Assessment

1. Ask trainees to look at the illustration above (in their Trainee Manuals) and discuss what they see. What topics do they think this unit will include based on the picture? After some brainstorming, share the main topics.

2. Ask trainees to fill out the self-assessment at the beginning of the unit in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning. At the end of the unit, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths, areas that need improvement and actions to take. The self-assessment is not a test!

Learning Outcome 1.1: Take inventory of tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Develop an inventory checklist for farm tools, equipment and facilities

b. Arrange tools and equipment properly according to their specification and codes

c. Use specifications and codes to handle farm tools and equipment

Time Required: 3 hours

Learning Methodology: Small group discussion, brainstorming, demonstration and practical exercises and observations

Materials Needed:

- Items for inventory within the training centre including but not limited to checklists, tables, cupboards, binder, punch, pencil, stapler, bags, papers, printer, and photocopier
- Tools at the training centre
- Copies of different inventories from the community

Preparation:

- ❑ Collect or make samples of inventory checklists to provide when you reach the Key Facts
- ❑ Make sure sample tools and equipment last inventory records are available
- ❑ Supply closet or storage is accessible
- ❑ Inform some farmers that trainees will visit them and ask them to see their inventories

Cross Cutting Issues:

- ✓ **Environment and sustainability:** While arranging and checking farm tools and equipment environment, emphasize the need to put protection measures in place in order to maintain the sustainability of essential resources for the farm.
- ✓ **Inclusion**: Emphasize the importance of placing the tools and equipment within reach of everyone, including those with disabilities.
- ✓ **Standardization culture:** Explain to the trainees that many farms have strict standards to maintain including keeping inventory of tools and equipment.
- ✓ **Financial education:** Emphasize the importance of taking inventory for the financial wellness of the business.

Prerequisites:

- Basic knowledge on farm tools and equipment
- Basic knowledge on records keeping
- Ability to make a simple table

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify checklist for tools and equipment	**1.** Develop inventory checklist for farm tools and equipment	**1.** Attentive
2. Describe ways of arranging farm tools and equipment	**2.** Arrange farm tools and equipment following specifications and codes	**2.** Detail-oriented
3. Explain farm tools and equipment specification and codes	**3.** Use specifications and codes to handle farm tools and equipment	**3.** Responsible

Steps:

Getting Started: What do we know and where are we going?

Topic 1.1 Task 1:

1. Divide the trainees into groups of three to five trainees. Inform each group to think about their daily farm activities using the following questions:
   - **a.** What is the farm activity?
   - **b.** How you perform this farm activity and what tools do you use?
   - **c.** When you are not performing this farm activity, where do you store your tools? Is there an order to where you put them? What order do you put them in? Do you keep written track of the tools?

2. Ask a few groups to share their responses. Try to find a group that organizes their tools and keeps inventory as a good example for the other trainees.

3. Review the Key Competencies table as a large group.

Problem Solving Activity

Topic 1.1 Task 2:

1. Ask the trainees to consider the following questions and write their answers down. Try to pay attention to the most common responses to get a good understanding of the trainee's existing level of understanding of inventory.
   a. How many tools do you think you use?
   b. Have you ever lost or misplaced a tool?
   c. Why do you think people take inventory of their tools?
   d. Do you arrange your tools? In what manner do you arrange your tools? How do you think the manner in which you arrange your tools could be improved?
   e. Do your tools have any specifications or codes? Do you keep track of these specifications or codes?
   f. If your tool had an issue, how would you fix it? For example, if a specific part was broken, how could you find a new one for your specific tool?

2. If possible, show the trainees some tools and ask them how they would organize them. Ask the trainees what the specifications or codes are for each of the tools.

3. Discuss the trainees' responses and emphasize the importance of record keeping.

4. Read **1.1 Key Facts** as a large group. Address any of the trainees' confusion or questions.

Guided Practice Activity:

Topic 1.1 Task 3:

1. Have the trainees attempt to fill out a sample equipment inventory form in their trainee manuals. Encourage them to try to consider at least three tools or pieces of equipment. Explain that it's okay if they cannot fill out all the information. If information is missing, encourage them to consider keeping track of that information the next time they purchase tools or equipment.

Application Activity

Topic 1.1 Task 4:

1. By using the list of all tools and equipment found in school facility.
   a. Ask the trainees, in groups or pairs, to conduct an inventory on the tools and equipment located in the school's facilities with the following phases:
      i. **Requests:** Equipment requests waiting to be fulfilled (they move to 'in use' after formal acknowledgement from the employee)
      ii. **In use**: Equipment currently assigned to an employee
      iii. **Transfers:** Equipment that was put back in stock for any reason (no longer necessary, the employee is no longer working at the schools, etc.)
      iv. **Under repair**: Damaged equipment, undergoing repairs
      v. **Obsolete:** Old, broken or lost equipment, no longer functional

   b. Ask the trainees to arrange the tools and equipment on the school farm storeroom.

   c. Provide them with guidance to arrange the tools by category and their usage. Remind them to place the tools in a manner that they are less susceptible to degradation from dust or other elements.

Topic 1.1 Task 5:

1. Either during the training or as a take home assignment ask the trainees to visit an actual farm and ask to see their farm tools and equipment inventory. While at the farm, the trainees should answer the following questions:
   a. What differences do you observe between the example inventory form and the real farm's inventory form?
   b. How often does the farmer collect inventory?
   c. What does the farmer keep inventory of?
   d. How could the farmer's inventory be improved?
   e. How important does the farmer consider taking inventory to be? What reasons does the farmer provide?
   f. What strategies does the farmer use to arrange their tools?

2. Once the trainees have returned with their answers to the above questions, have them share their findings amongst one another. Discuss their findings as a large group. Then, as a large group, create a list on the board in front of the class of best practices in creating and performing an inventory.

Points to Remember

- Mark each tool or each piece of equipment with a permanent identification number to make taking inventory easier.

- Schedule the dates when you will take inventory.

Formative Assessment

1. An older farmer has been running his farm for many years and while the farm has grown a little, he farms almost the same size plot each year. He hasn't thought of performing inventory and doesn't really understand why he would want to perform it. Explain to the farmer what making an inventory involves and why it is important to make an inventory of his tools and equipment.

Possible Answers:
Making an inventory involves counting and taking a detailed account of all items at the farm.

It is important to make an inventory because it:

- Provides the opportunity to measure success
- Controls expenditure
- Helps in proper planning
- Helps you to respond to customers as quickly as possible
- Helps to identify necessity to update of supplies
- Helps to determine if tools or equipment need to be repaired

2. What are some of the aspects of the tools and equipment you want to keep track of when taking inventory?

Possible Answers:

- The source of equipment including the supplier name and location
- Descriptions of the tool or equipment including model, serial and ID numbers, model number, brand and year
- The acquisition date and unit cost
- The funding source and, if taken on a loan, the percentage paid and the percentage left to pay
- The present location, use, condition (excellent, good, fair or poor) of the equipment, and date the information was reported.

- All pertinent information on the final transfer, replacement, or disposition of the equipment
- Storage location

Further Information for the Trainer

1. http://www.inventoryops.com/
2. http://www.effectiveinventory.com/articles.html
3. http://www.astm.org
4. http://www.gao.gov/new.items/d02447g.pdf
5. RICHARD J.Tersine, 4th edition, Principles of inventory and materials management, publisher: Prentice Hall.
6. David J. Piasecki, inventory accuracy: people, processes& technology, Publisher: Ops Publishing.
7. James Greene, 2nd edition; Production and inventory control handbook, publisher: McGraw-Hill.

Learning Outcome 1.2: Select tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Discover specific agricultural tasks that required tools and equipment

b. Demonstrate the use of tools or equipment for specific tasks

c. Choose correct tools and equipment that are appropriate to a specific agricultural task

Time Required: 3 hours

Learning Methodology: Fields visits, presentation, brainstorming, demonstration, group discussion and practical exercise

Materials Needed:

- Whiteboard/black board, agricultural tools and equipment including but not limited to a pickaxe, wheelbarrow, spade, rake, shovel, hoe, rake, garden fork, panga, sprayer, balance/scale, saw, secateurs, tape measure, binding tape, binding wire, picking crates and baskets, harvest snips and knives

Preparation:

- ❑ Contact farm tools and equipment storekeeper technicians to see if they would be willing to exhibit different tools and equipment.
- ❑ Bring all farm tools and equipment you can find to show the trainees the real equipment and tools.
- ❑ Find some farms that would be willing to have trainees interview them about their tools and equipment.

Cross Cutting Issues:

- ✓ **Financial education:** Emphasize the importance of buying good equipment at the beginning to save money in the long run
- ✓ **Environmental and sustainability:** Explain how some tools take the environment into greater consideration. Try not to cut down or destroy trees when possible.
- ✓ **Gender:** Try not to say that any tools are specifically for boys or girls, gender is not an indicator of whether or not a tool is suitable for somebody

Prerequisites:

- Some knowledge of farming activities

Key Competencies

Knowledge	Skills	Attitudes
1. Identify different farming activities and their associated tools or equipment	**1.** Choose the correct tool or equipment based on the farming activity	**1.** Attentive
2. Explain different categories or types of farming activities	**2.** Apply correct tools to different farming activities according to their purpose	**2.** Detail-oriented
3. Describe the usage of different farming tools in the community	**3.** Find the correct tools in the community for desired farming activities	**3.** Responsible

Steps:

Getting Started: What do we know and where are we going?

Topic 1.2 Task 1:

1. Create the following table in front of the class.

Farm Activity	Tool or Equipment Used in Activity
Example: Watering the plants	Watering can

2. Ask the trainees to list different activities they perform on the farm. List these activities out in a column in front of the class.

3. Ask the trainees to mention a tool they could use to perform each activity.

4. With their nearby peers, ask the trainees to share some stories of times when they used the wrong tool for a farming activity.
   a. What lead them to use that specific tool for the activity?
   b. Were there any negative consequences from using that tool?
   c. What tool should they have used?

Problem Solving Activity

Topic 1.2 Task 2:

1. Ask the trainees to consider more general types of farming activities. The following table provides several general types farming activities. There is space for the trainees to add more types that you believe need to be considered. Under each type, tell the trainees to provide two more specific activities and the tools they would use. Example responses are provided below. Please do not limit the trainees to these provided responses!

General Type of Farming Activity	Specific Farming Activity	Tool Used for Performing the Activity
Land preparation	**1** Clear the soil	Hoe
	2. Adding fertilizer/compost	Spreader
Planting	**1.** Transplanting	Pick to create space to put the roots/bulb into the ground
	2. Spacing for sowing seeds	Measuring tape
Crop Maintenance	**1.** Carrying water and watering	Jerry can
	2. Clearing weeds	Rake
Harvesting and Product Handling	**1.** Secure and move bales of hay	Hook/sickle
	2. Transporting harvest	Wheelbarrow
Soil Erosion	**1.** Stone bund (permeable wall)	Wheelbarrow to carry stones
	2. Putting wiring to hold the bund together	Wire and pliers
_____		

_____		

Topic 1.2 Task 3:

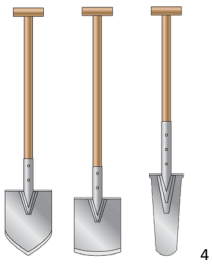
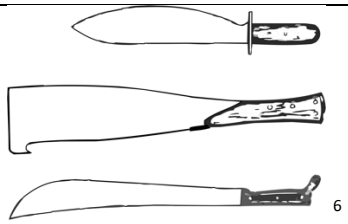
1. Ask trainees to write down the name of the tool and its special use.

No	Picture	Name of Tools/Equipment	Special Use
1	 [1]	Secateurs	Making fences, trimming the wire/cutting branches
2	 [2]	Hammer	Tapping nails, crushing rocks
3	 [3]	Sprayer	Spray insecticides and weed killer

[1] User: KoS. (2006, August 18). *Secateur ouvert* [Photograph]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Secateur_ouvert.jpg

[2] Pandanna Imagen. (n.d.). *Hammer* [Illustration]. Pixabay. https://pixabay.com/vectors/hammer-tool-tools-work-carpenter-4772131/

[3] International Institute of Tropical Agriculture (IITA). (2012, February 17). *Spraying maize with chemicals* [Photograph]. Flickr. https://www.flickr.com/photos/iita-media-library/6891413527 License: https://creativecommons.org/licenses/by-nc/2.0/legalcode

4	 [4]	Shovel	Digging, moving, mixing
5	 [5]	Hoe	Shaping the soil, harvesting root crops such as potatoes
6	 [6]	Machete	Removing heavy weeds
7	 [7]	Wheelbarrow	Transporting

Topic 1.2 Task 4:

1. Place the trainees into small groups. Have them consider the following questions regarding selecting farm tools and equipment for farm activities:
   a. Why do you think it is important to choose the appropriate tools for different farming activities? Choose at least two reasons and explain.

      Possible Answers:

      1. **Reduce the duration of production.** The time of production will significantly be reduced if you have quality of tools and equipment. Quality farm tools and equipment and various equipment will help complete tasks in a shorter amount of time.

[4] User:Arz. (2007, May 17). *Shovels* [Graphic]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Shovels.png License: https://creativecommons.org/licenses/by-sa/3.0/legalcode

[5] User:OpenClipart-Vectors. (n.d.). *Gardening hoe*. Pixabay. https://pixabay.com/vectors/garden-gardening-hoe-tool-2024534/

[6] User: Ehrenburg. (2005, August 18). *Machete* [Drawing]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Machete.png

[7] Dorn, C. (n.d.). *Wheelbarrow cart work garden* [Illustration]. Pixabay. https://pixabay.com/illustrations/wheelbarrow-cart-work-garden-1988038/

2. **Better work:** To optimize space and resources, tools and measurement are essential. If some plants are planted too close together, they may not grown properly. Likewise, if they are not planted at the correct depth, they may not germinate.

b. While it may cost money to buy farm tools, why might it be a smart business decision?
Possible Answer: Saved time means saving money. Buying tools to assist in farming may cost more now but the gains from increased efficiency and productivity can outweigh the initial loss.

2. Read **1.2 Key Facts** together as a large group. Most of the information should be familiar to the trainees. Bring as many of the tools into the training centre as possible to show the trainees.

Guided Practice Activity

Topic 1.2 Task 5:

1. Write the following scenario and questions on the board:

Kagabo, a farmer of Gasaka sector in Nyamagabe District, has 2 hectares of land. Using this piece of land, Kagabo want to grow vegetables especially carrots, cabbage and tomatoes. As an agronomist in the Gasaka sector, you are requested to advise Mr Kagabo on the types of tools and equipment that might be useful in growing these specific vegetables.

a. Put the trainees into small groups and have them list the types of activities associated with growing the different crops. They can list them in the table provided in their manual. Have them emphasize activities that require them to use tools and equipment.

b. Ask trainees to list the name of tools and equipment used for each of the activities.

Topic 1.2 Task 6:

1. In the small groups, have the trainees consider the following tools and equipment and explain each of their usage/function.

Correct responses are included below:

No	Tools and equipment	Functions/use
1	Secateurs	Pruning the plants, cutting wires
2	Saws	Clearing obstacles, cutting woods for fences and other structures
3	Hoe	Shaping the soil, slicing and pulling up the weeds, cutting roots, harvesting
4	Measuring tape	Measuring distances when planting or building structures
5	Pickaxe	breaking ground to prepare it for planting, digging post holes
6	Sprayer pump	Spraying fertilizers and pesticides
7	Axes	Chopping roots to clear for soil preparation

Application Activity

Topic 1.2 Task 7:

1. Write the following scenario and direct the trainees to complete the tasks that follow.
   Scenario: REMA (Rwanda Environment Management Authority), a government institution wants to cover the mountains of Rutsiro district with forest in order to prevent the land degradation in this area. Additionally, to increase soil water and nutrients, REMA wants to create some contour/stone bunds to prevent soil erosion.
   a. Select appropriate tools and equipment needed to install the tree nursery.

   b. Select appropriate tools and equipment require for maintaining seedlings in nursery.

   c. Select the appropriate tools and equipment to build the stone/contour bunds.

Topic 1.2 Task 8:

1. Tell the trainees to consider a farmer that performs farming activities similar to the ones the trainee is interested in. They should choose a farmer that performs in a manner that they want to one day. Have the trainees create a list of their farming activities and the tools they use. Once the trainees have acquired the information from the farmers, have them share the information with their classmates. Try to group people with similar farming interests together so they can compare the different equipment the farmers use for similar activities.

Points to Remember

- Before you select a tool, think about the job you will be doing. Tools are designed for specific purposes. Using a tool for something other than its intended purpose often damages the tool and could cause you pain, discomfort, or injury. You reduce your chances of being injured when you select a tool that fits the job you will be doing.

- Select a tool that can be used within the space available. Uncomfortable postures may cause you to use more force.

Formative Assessment

Answers:

1. Consider the following activities and choose the appropriate tool for each activity.
   a. Transporting soil when preparing beds for seeds: **wheelbarrow**
   b. Pruning plants: **secateurs**
   c. Harvesting root vegetables such as potatoes: **hoe**
   d. Spraying pesticides: **sprayer**
   e. Holding harvest while picking: **picking baskets**

2. Consider the following scenario and provide Mike with some advice so that he can improve his farming.

   Scenario: Mike is growing potatoes. He uses a hammer to arrange the soil to plant the potato spuds. Then for weeding, he uses a panga to chop small plants that pop up. Finally, when he harvests, he uses a pickaxe to break through the ground and pull up the potatoes with his hands.

   What tools could Mike purchase and how should he use them?
   Answer: Mike should purchase a hoe for both arranging the soil to plant the potato spuds and to harvest the potatoes. He should also purchase a rake to remove the small weeds around his crops.

Learning Outcome 1.3: Identify criteria for selection of tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Illustrate tools and equipment necessary for different tasks

b. Demonstrate selection of tools and equipment based on different criteria

c. Observe a piece of land and, given certain circumstances, recommend different tools and equipment and justify those recommendations

Time Required: 4 hours

Learning Methodology: Brainstorming, scenarios, group discussion, real life applications and presentation

Materials Needed:

- Farm tools and farm equipment (if possible)
- Flipchart/black/chalkboard, writing materials

Preparation:

- ❑ Provide pictures of different plots of land as examples to illustrate how different tools are necessary depending of different criteria

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Emphasize the importance of choosing tools and equipment that do not harm the environment
- ✓ **Inclusivity:** Explain how people may need to consider inclusivity as a criterion for choosing different tools and equipment
- ✓ **Standardization culture:** Describe how maintaining a standard of quality by using the correct tools will pay off in the end with higher quality products and higher customer demand

Prerequisites:

- Understanding of different tools and equipment and their purpose
- Basic direction as to what type of farming they plan to do

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe different criteria that influence selecting farm tools and equipment	**1.** Choose farm tools and equipment based on certain criteria	**1.** Decisive
2. Explain the different aspects of land and agrobusiness	**2.** Apply different aspects of land and agrobusiness to one's own community and choose farming tools and equipment based on these aspects	**2.** Realistic
3. Explain the reasons behind choosing different equipment and tools based on different criteria	**3.** After selecting tools and equipment for a real plot of land, justify the reasons for selecting those tools and equipment	**3.** Purpose-driven

Steps:

Getting Started: What do we know and where are we going?

Topic 1.3 Task 1:

1. Ask the trainees: From these pictures, which farmer is completing the task of chopping down the tree more quickly? The farmer with the machete or the farmer with the axe?
Answer: The farmer with the axe.

2. Explain to the trainees how both of the tools are used for chopping. Ask them what criteria defines which tool to use. How do they decide whether to use a machete versus an axe?
   Answers may vary. Allow for an open and creative discussion. The correct answers will be revealed in this learning outcome/topic.

3. Introduce the Key Competencies table and explain the objectives of the lesson.

Problem Solving Activity

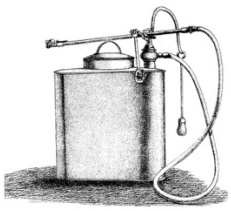
Topic 1.3 Task 2:

1. Tell the trainees to consider the previous topic. While some tools have similar purposes, how do they choose one versus the other? Tell the trainees to fill out a comparison chart between similar tools and explain the different ways in which they would use one tool versus another. They can use the first comparison as an example. The benefits they attribute to each tool are the criteria that define which tool provides an advantage for different tasks.

Answers are written in italics.

Example: Shovel versus spade		**Rake versus garden fork**	
Shovel	Spade	Rake	Garden fork
 [8]	 [9]	 [10]	 [11]

[8] User:JohannPoufPouf. (2014, September 9). *PPShovel01* [Illustration]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:PPShovel01.svg
[9] User:Clker-Free-Vector-Images. (n.d.). *Spade shovel dig farming planting* [Illustration]. Pixabay. https://pixabay.com/vectors/spade-shovel-dig-farming-planting-29876/
[10] *Rake tool* [Illustration]. (2016, March 17). Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Rake_tool.svg
[11] Buckley, B. (n.d.). *Garden fork old rusty tools* [Photograph]. Pixabay. https://pixabay.com/illustrations/garden-fork-old-rusty-tool-4929470/

- Better for softer soil - Better for mixing soil	- Better for harder soil - Better for chopping roots	- *Collect leaves, hay and grass* - *Can loosen soil but not as good at turning soil* - *Light weeding* - *Remove dead grass*	- *Stronger than a rake and can remove weeds* - *Lift potatoes from ground* - *Good for turning over soil*
Pickaxe versus hoe		**Watering can versus sprayer**	
Pickaxe  12	Hoe  13	Watering can  14	Sprayer  15
- *Breaking up tough ground, even rocks* - *Prying or moving heavy objects*	- *Breaking up less tough soil* - *Good for harvesting root crops* - *Removing weeds*	- *Watering plants* - *Can be used to apply pesticides at close range*	- *Applying fertilizer or pesticides to plants* - *Longer, more dispersed range than a watering can*

Topic 1.3 Task 3:

1. Tell the trainees to consider the different environments where one might practice agriculture. Depending on the environment and situation, they will choose the proper tool for each of the following farming activities. Instruct them to provide an explanation based on the provided situation by explaining the criteria that makes this tool especially effective. The situations are listed below. Place particular emphasis on the need to

[12] User:JohannPoufPouf. (2014, September 9). *PPPickaxe01* [Illustration]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:PPPickaxe01.svg

[13] User:OpenClipart-Vectors. (n.d.). *Gardening hoe*. Pixabay. https://pixabay.com/vectors/garden-gardening-hoe-tool-2024534/

[14] Ray, F. (n.d.). *Watering can garden gardener* [Illustration]. Pixabay. https://pixabay.com/illustrations/watering-can-garden-gardener-3340478/

[15] Galloway, B. T. (1980, September 10). *Description of a New Knapsack Sprayer (1890)* [Sketch]. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Description_of_a_New_Knapsack_Sprayer_(1890)_fig._2.jpg

define the contributing criteria to their choice. Have them draw upon their experiences to more thoughtfully consider the tools they would use.

Answers (Refer to 1.2 Key Facts):

a. Preparing/tilling the soil in steep, hilly terrain: **hoe**
Explanation: **Able to shape soil on steep slopes and break up tough soil**

b. Loosening soil on a small plot to harvest onions: **hoe and pickaxe**
Explanation: **Both are used to loosen/break up soil**

c. Removing small weeds from a row of tomatoes: **rake**
Explanation: **Can remove weeks without pulling up seedlings/vines**

d. Tilling and breaking very hard, difficult to break soil: **pickaxe**
Explanation: **Effective at breaking up the soil**

Guided Practice Activity

Topic 1.3 Task 4:

1. Write the following scenario on the board:

Kamugisha is a farmer located in Rilima sector, Bugesera District, he has two hectares of field on hilly, steep where he wants to grow maize. He asks you for advice on the type of tools and equipment he should buy.

a. Ask the trainees to write down the criteria to consider when selecting these tools.
Answer: Refer to **1.3 Key Facts**

b. In groups, have the trainees provide Kamugisha with some advice on tools to purchase. Tell them to consider the whole process from planting seeds to harvesting and selling.

Possible Answers: Hoe to break up and shape soil on steep slopes, and to remove weeds. Fertilization tools—sprayer and balance. Saw for pruning. Harvest knives to remove maize cobs. Picking baskets and crates for transportation of cobs. Additional answers are possible and may be accepted as long as trainees can defend/explain their uses.

2. Write the following scenario on the board:

Gashumba, a farmer of Busogo Sector in Musanze District is facing a problem of low production of vegetables. His plot is on tough, clayey, flat land. He is having a problem with strong, large weeds with deep root systems. Also, he is trying to farm during the dry season. He needs to transport water but doesn't have the equipment.

a. Ask the trainees to write down the criteria to consider when selecting the required tools.
Answer: Refer to **1.3 Key Facts**.

b. In groups, have the trainees provide Gashumba with some advice on tools to purchase. Tell them to consider the whole process from planting seeds to harvesting and selling.

Possible Answers: Shovel to break up and turn tough, clayey soil, and to loosen dirt for weeding. Hoe for pulling up deep roots for weeding. Basin, bucket, or jerry can for carrying water. Additional answers are possible and may be accepted as long as trainees can defend/explain their uses.

Application Activity

Topic 1.3 Task 5:

Instruct the trainees to consider the environment in their respective communities. If they already have land, they should consider their own land for the following questions. Read the following questions together as a large group and provide guidance as needed. Explain to the trainees that this activity will assist them in creating the conditions for success in their future agribusiness!

1. What are some of the criteria to consider for this land?
   a. Type of soil:
   b. Scale of your desired farming operations:
   c. Desired crops to produce/farming activities:
   d. Potential invasive species, weeds:
   e. Type of environment, agroecological conditions:

2. Based on your responses, what tools might you select based on the criteria you provided?

3. After the trainees have completed the above activity, tell them to share their responses with a nearby partner. Next, choose some volunteers that will share the aspects of their

land and the tools they believe will be most suitable to their land and their farming endeavours.

Points to Remember

- Choosing the right tools for your farming activities will save lots of time and money in the long run.
- There are many different criteria to consider when choosing farm tools and equipment, not just the price! If you choose a tool that is not suitable for the soil, it may not last and you will have to buy a different one eventually.
- The most important tool to consider in farming is your own body. Remember to buy tools that are suitable for your body and do not require excessive force or stress.

Formative Assessment

1. What criteria should one consider when selecting tools?

Possible Answers:

- The scale of the farming operations envisaged and on the local farming conditions
- The type of task i.e. the type of farming activity
- Soil types e.g. clay, sandy or silty,
- Crops to be grown e.g. root vegetables, fruit trees, or vines
- Weed species e.g. thick or easily removable
- Agroecological conditions e.g. desert, rainforest, or grasslands

2. For each of the following activities, name a tool or tools that would be suitable for the activity.

Possible Answers:

- Digging a hole in sandy ground: **shovel**
- Cutting the branch from a large fruit tree: **saw or axe**
- Pruning small pepper plants: **secateurs**
- Harvesting bananas: **secateurs and a harvesting basket**
- Carrying a large quantity of dirt across a garden: **wheelbarrow and shovel**

Self -Reflection

1. Ask the trainees to re-take the self- assessment at the beginning of the unit 1. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve.

2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Learning Unit 2: Clean tools and equipment

Learning Outcomes

By the end of the Learning Unit, trainees will be able to:

2.1 Select materials for cleaning tools and equipment

2.2 Identify cleaning techniques

2.3 Clean tools and equipment

Learning Unit 2 Self- Assessment

1. Ask trainees to look at the illustration for **Unit 2** and discuss what they observe. What topics do they think this unit will include based on the illustration? After some brainstorming, share the main topics.

2. Ask trainees to fill out the self- assessment at the beginning of **Unit 2** in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the unit and for them to see what they know or do not know at the beginning. At the end of the **Unit 2**, they will do a self- reflection, which includes re-taking the self - assessment and identifying their strengths, areas that need improvement and actions to take. The self-assessment is not a test!

Learning Outcome 2.1: Select materials for cleaning tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Choose relevant cleaning materials for cleaning tools and equipment

b. Demonstrate the selection criteria of cleaning materials for cleaning tools and equipment

c. Choose appropriate disinfectant used in cleaning processes

Time Required: 5 hours

Learning Methodology: Real life applications, small group discussion, scenarios, brainstorming

Materials Needed:

- Any of the cleaning materials or pictures of them when possible
- Black/chalk board, writing materials for the board

Preparation:

- ❑ Make sure that the sample of cleaning materials specifications for tools and equipment are available
- ❑ Bring in cleaning solutions

Cross Cutting Issues:

- ✓ **Environment and sustainability** some cleaning products may contaminate the ground. Trainees need to be aware of contaminating their crops and the environment
- ✓ **Financial education:** teach the trainees to weigh the financial benefits of importing cleaning tools. While it may not be immediately obvious, sometimes the quality of the cleaning materials will make their tools last longer
- ✓ **Standardization culture:** should be considered while choosing cleaning materials and disinfectant. Emphasize the need to dispose of toxic cleaning materials properly and the potential negative consequences if they aren't.

Prerequisites:

- Knowledge of different farm tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Select cleaning materials	**1.** Choose relevant cleaning materials	**1.** Attentive
2. Describe the criteria for cleaning materials selection	**2.** Demonstrate the selection criteria of cleaning materials	**2.** Willing to seek clarification
3. Select appropriate disinfectants	**3.** Choose appropriate disinfectants	**3.** Decisive

Steps:

Getting Started: What do we know and where are we going?

Topic 2.1 Task 1:

1. Explain that the trainees will have three minutes to write down a list of all the cleaning materials they use for their farm tools and equipment. They need to list as many as possible as it is a competition to see who knows the most. Explain that cleaning materials include anything used in cleaning, not just the cleaning solution but the sponges, brushes, rags, etc.

2. Once the trainees have finished listing their cleaning materials, have a volunteer read off the cleaning materials on his/her list. List each item on the white/black board. Ask trainees who also have that material on their list to cross it off. Once they have no cleaning materials left on their list, they are out of the competition.

3. Continue selecting volunteers until there is only one person left. They are the champion!

4. Read the Key Competencies table together as a large group and address any questions or confusion.

Problem Solving Activity

Topic 2.1 Task 2:

1. Arrange the trainees into small groups. Tell them to then discuss the following:
   a. Why do you think cleaning materials are important?

Possible Answer: Cleaning materials are important to maintain the tools and equipment. By cleaning tools and equipment properly, they can remain in good condition for a long time. Cleaning also prevents malfunctions which can be dangerous.

b. What do we consider when selecting cleaning tools and materials?

Possible Answer: To choose the cleaning tools and materials consider several factors regarding the tools or equipment we want to clean: size of the tool or equipment, material the tool or equipment is made of, the function of the tool or equipment, and the material that has dirtied the tool or equipment.

c. Consider the hoe, rake, pruning shears.

i. What do these tools have in common?
Possible Answer: The tools are all larger and partially or entirely made of metal.

ii. List all kinds of cleaning materials you normally use for cleaning the hoe, rakes, pruning shears.
Possible Answer: Hose with nozzle, putty knife, old towels, working gloves (optional), steel wool, sold or soft rag, sponge, lubricating oil such as boiled linseed old, tung oil, motor oil, lamp oil or cooking oil, scrub brush, wire brush, water, soap

d. Identify the cleaning materials used for cleaning handheld farm tools and equipment such as hammers, screw drivers, saws, and wrenches.

Possible Answer: wire scrub brush, large bucket, hot water, several old towels, heavy duty rubber gloves, steel wool, household oil, soft rag, toothbrush

e. What is the meaning of disinfectants? Can you give some examples? If yes, give at least two examples.

Possible Answers: A disinfectant is a chemical liquid that destroys bacteria. Disinfectants are divided into several groups based on their chemical structure such as:

- Halogens (iodophors and chlorines, halamid®, dettol®)
- Alcohols
- Oxidizing agents (hydrogen-peroxide, hyperox®, virkon®)
- Phenols (fenix®, Prophyl 75®)
- Aldehydes (glutheraldhyde – TH4®, malin)

- Quaternary ammonium compound (Timsen® Medisep®)

2. Read **2.1 Key Facts** together.

Guided Practice Activity

Topic 2.1 Task 3:

1. Tell the trainees to consider each of the cleaning tools/materials and write its function next to it.

Answers (from 2.2 Key Facts):

Cleaning Tool/Material	Function
Stick or stiff brush	**Removes caked soil or debris**
Sandpaper, sanding blocks	**Cleans debris and some rust from metal parts and wood parts (that are dry)**
Penetrating oil	**Used to spray metal parts after cleaning debris to prevent rust**
Lubricating oil or grease	**Keeps parts moving freely**
Boiled linseed oil	**Use once per year to condition wood and prevent it from drying out and cracking**
Files	**Remove metal**
Whetstones	**Remove tough/hard metal**
Water	**Washing off dirt, clay, and weeds**
Small hand shovel or putty knives	**Remove caked-on mud from wet day**
Steel wools or metal bristle brush	**Smooth any pits on metal parts**
Hose with nozzle	**Use to apply powerful stream of water to tools and equipment**
Old towels	**Wipe tools and equipment**
Bucket	**Measure water or cleaning solution**
Working gloves	**Protect your hands**

2. Put the trainees into small groups and have them brainstorm some of the criteria for selecting cleaning materials. Ask the trainees which criteria define the cleaning material they will use for different tools.

3. Ask the trainees what types of disinfectants they have used in the past. What factors pushed them to choose these disinfectants?

Application Activity

Topic 2.1 Task 4:

1. Make a list of the current tools you have or will need in your desired farming activities and the materials you need to clean them. Next write down the disinfectants you can use to clean the tools.

Tool	Necessary Cleaning Materials
Tool	**Necessary Disinfectants**

Points to Remember

- With both the cleaning solutions and tools, always check the manufacturer's instructions on the label to ensure the product will not cause damage or injury.
- When handling cleaning materials and chemicals, make sure you wear the right clothes and Personal protective equipment (PPE).
- Keep all cleaning chemicals in their original containers.

Formative Assessment

Present the trainees with the following scenario:
You oversee an association of farmers who cultivate a large wetland around Nyabarongo river mainly for fruits and vegetables crops. Following the land preparation, the tools and equipment are caked with soils, manure and other substances.
Ask the trainees to answer the following questions:

1. Give reasons for the use of the following cleaning tool/material for removal of cakes of soil from hoes, shovels, wheelbarrow, pick and spade? Use the table below to help.

Possible Answers:

Cleaning Tool/Material	Reason
Stick or stiff brush	**Pick off and remove mud and debris from the tools**
Grease	**Wheelbarrow wheels to make sure they are well lubricated**
Water	**For the first wash. More thoroughly clean off mud and debris.**
Whetstones	**Rub against the edge of the hoe and other sharp edges to make sure they stay sharp**
Putty knives	**Remove more embedded grime and dirt from the tools**
Hose with nozzle	**Stronger flow of water to blast off harder to get to dirt and mud**
Old towel	**Rub on grease**
Working gloves	**Worn to protect hands from disinfectant and so they don't get injured while cleaning**
Bucket	**Measure cleaning solution for cleaning**
Penetrating oil	**For all metal tools to prevent rust**
Boiled linseed oil	**For any wooden handles to prevent drying out and cracking**

2. Among the different cleaning disinfectants, which disinfectants might be useful in this case?

Possible Answers: Hydrogen peroxide as it is accessible in rural areas and it won't harm the equipment.

Learning Outcome 2.2: Identification of cleaning techniques

Objectives: By the end of the learning outcome, trainees will be able to:

a. Choose appropriate cleaning techniques of farm tools and equipment
b. Demonstrate cleaning techniques of farm tools and equipment
c. Apply different criteria to consider when selecting cleaning techniques

Time Required: 5 hours

Learning Methodology: Scenarios, real life applications, group discussion

Materials Needed:

- Dirty tools and equipment
- Cleaning materials

Preparation:

- ❑ Bring in enough dirty tools and cleaning materials for the trainees to practice hands-on cleaning
- ❑ If you cannot bring in enough dirty tools, prepare a site visit to a farm where the trainees can clean different farm tools

Cross Cutting Issues:

- ✓ **Standardization culture:** Emphasize the need to follow certain procedures while cleaning tools and equipment.
- ✓ **Environment and sustainability:** Make sure the trainees understand the importance of using environmentally friendly cleaning products.

Prerequisites:

- Understanding of the materials that make up tools

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify cleaning techniques of farm tools and equipment	**1.** Choose appropriate cleaning techniques of farm tools and equipment	**1.** Forward thinking
2. Describe cleaning techniques of farm tools and equipment	**2.** Demonstrate cleaning techniques of farm tools and equipment	**2.** Detail oriented
3. Identify the criteria to consider when selecting cleaning techniques	**3.** Discover the criteria to consider when selecting cleaning techniques	**3.** Respectful

Steps:

Getting Started: What do we know and where are we going?

Topic 2.2 Task 1:

1. Ask the trainees to consider the different types of tools such as garden, hand, and power tools. Next, prompt them with the following questions:
   a. How might you clean each of these differently?

   b. What are some techniques you would use to clean these different types of tools?

   c. What different types of techniques are there for cleaning machinery?

2. Show the trainees real, completely filthy tools and equipment. Ask the trainees to name different types of substances one might need to remove from tools and equipment.

3. Read the Key Competencies table as a large group.

Problem Solving Activity

Topic 2.2 Task 2:

1. Provide the following situation to the trainees. The text is in their trainee manuals. Separate them into small groups and have them answer the questions that follow. Once

the trainees have answered the questions themselves, have some of them volunteer their answers and discuss their responses as a large group.

By the end of the garden season, some farmers simply put out garden tools, such as hoes, shovels, trowels, and pruning shears, away for the season without even looking at them. The next season, when we are in a hurry to get started with yard and garden work, we find them dull and crusted with soil, which makes pruning and digging more difficult.

Ask trainees to conduct the following tasks:

a. Ask trainees to discuss when do they need to clean tools and equipment at the home.

b. Ask the trainees what techniques they would use to clean farm tools and equipment.

2. Read the **2.3 Key Facts** together as a large group. Address any of the trainee's questions or concerns. Encourage them to contribute their own cleaning methods whenever possible.

Guided Practice Activity

Topic 2.2 Task 3:

1. Ask trainees to select the most appropriate cleaning techniques for the following tools and equipment.

Answers are provided in the table.

Types of Tools/Equipment	Cleaning Techniques
Caked on soil from shovel and pickaxes, hoes, and spades	Scraping using brushes and sticks, soaking to loosen the soil if necessary, putty knife to get embedded dirt, old towels to dry off the tools and rags to wipe on linseed and penetrating oil so that the equipment do not degrade.
Rust spots on pruning shears or a saw	Sanding paper/sanding blocks to clear off the rust. Then spray the tools with penetrating oil to prevent further rust.

Soil residue on wooden handles	Use old towels to wipe off the residue and a stick or stiff brush to pick off the hardened pieces. Use water to wash the handle off then recover the wood with boiled linseed oil to preserve the wood.
Mud and grit from the blades	Putty knives to remove the mud from the blades. Old towel and water to wipe the blades down. Steel wools to smooth out any pits. Then whetstones to file the edges and keep them sharp. Finally, add penetrating oil to preserve the metal.

Application Activity

Topic 2.2 Task 4:

1. Ask the trainees to either find two different dirty farm tools and equipment or bring in dirty farm tools and equipment to the training centre. Using the table provided to them, guide the trainees as they write out the steps detailing how they would clean the tools and equipment. Afterwards, assist the trainees to use the cleaning materials available to them and clean the tools and equipment.

Points to Remember

- Clean your tools and equipment after every use.
- Be careful as you wipe the blades as they are very sharp.
- Be sure to properly dry your tools before storing them.

Formative Assessment

1. Among the following tools and equipment, which ones need oiling?

Answers:

a. Wheelbarrow
b. Spade
c. Shovel
d. Saw
e. Pruning shears

2. What technique would you choose to properly remove rust from tools? Why?
   Possible Answer: Use a stick or brush to remove large chunks of rust then sandpaper or a file to remove the rest. Afterwards polish off the rust with some steel wool. These techniques will ensure there is no leftover rust that can further degrade the metal on the tools.

3. _____ is a process that will reduce the spread of disease and ensure there is no lingering bacteria remains the tools.
   a. **Disinfectant**
   b. Cleaning
   c. Washing
   d. Rinsing

ⓘ Further Information for the Trainer

1. https://kaivac.com/a_419-Maintaining-Cleaning-Equipment-for-the-Most-Effective-Work
2. https://www.finegardening.com/article/clean-sharp-tools-work-better
3. https://www.houzz.com/magazine/how-and-why-you-should-clean-your-garden-tools-stsetivw-vs~52375647
4. https://www.stltoday.com/lifestyles/home-and-garden/why-you-should-clean-your-garden-tools/article_2fa89d4c-32af-11e7-a027-6f5358a57c93.html
5. https://www.extension.iastate.edu/smallfarms/clean-and-maintain-garden-tools

Learning Outcome 2.3: Clean tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Demonstrate the objectives of cleaning farm tools and equipment

b. Illustrate tools and equipment cleaning procedures

c. Employ the cleaning tools and equipment procedures

Time Required: 5 hours

Learning Methodology: Demonstration, field practices exercises, group discussions, scenarios

Materials Needed:

- Dirty farm tools and equipment, cleaning materials
- Chalk/marker, chalk/whiteboard, materials to write on in front of class

Preparation:

- ❑ Research some large farms for the trainees to visit
- ❑ Organize the dirty tools and equipment and their respective cleaning materials for trainees to work in groups

Cross Cutting Issues:

- ✓ **Financial education:** Ensure the trainees understand the importance of cleaning tools and equipment so that their tools last longer and they do not have to buy new ones as frequently
- ✓ **Gender:** Gender does not play a role in cleaning tools and equipment. Take this lesson as an opportunity to explain to the trainees that both boys and girls need to clean.

Prerequisites:

- Knowledge of different cleaning materials
- Knowledge of different cleaning techniques

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify the objectives of cleaning farm tools and equipment	**1.** Demonstrate the objectives of cleaning farm tools and equipment	**1.** Problem solver
2. State the cleaning tools and equipment procedures	**2.** Illustrate tools and equipment cleaning procedures	**2.** Detail-oriented
3. Describe the cleaning tools and equipment procedures	**3.** Employ the cleaning tools and equipment procedures	**3.** Methodical

Steps:

Getting Started: What do we know and where are we going?

Topic 2.3 Task 1:

1. Tell trainees to find a partner.

2. Each pair receives a tool or equipment requiring cleaning.

3. The cooperative pairs are instructed to work together to decide what the problem is and what they need to do to clean properly. The trainees will clean the tools and equipment.

4. After the trainees clean the tool(s) or equipment, have them present to the large group and explain the cleaning materials and techniques they used to clean the tool or equipment.

Problem Solving Activity

Topic 2.3 Task 2:

1. Write the following scenario in the front of the class.

Steve has spent all day preparing his garden for planting. He removed lots of rocks and weeds for the soil where he plans on planning many new plants. To do so, he used a

pickaxe with a wooden handle to break up the dirt. He wore gloves to remove the rocks and put them in a wheelbarrow to transport them elsewhere where he would not be gardening.

2. As a large group, work together with the trainees to write the steps Steve would take to clean each of the tools including the gloves, wheelbarrow, and pickaxe.

3. Have trainees turn to **2.4 Key Facts**, read them together and answer any questions about cleaning operations.

Guided Practice Activity

Topic 2.3 Task 3:

1. At the school training centre or as a field exercise, find some tools and equipment that need to be cleaned. Divide the trainees into groups and provide them with different dirty tools and equipment.

2. Using the basic steps to cleaning tools and equipment from **2.4 Key Facts** above, tell trainees to attempt to follow the steps and clean their given tools and equipment.

Application Activity

Topic 2.3 Task 4:

1. Do some research in the community and identify a large farm that has many tools and equipment. If possible, identify multiple large farms then divide the trainees into groups and have them visit a large farm.

2. Instruct the trainees to ask the farmer or the workers how they clean the tools and equipment at the farm.

3. If possible, make sure the trainees ask the farmer to assist in cleaning the tools and equipment with the farmer or workers at the farm.

4. Debrief the activity back at the training centre as a large group. If the trainees visited different farms, have them share their experiences with a peer focusing on the different methods the larger farm used to clean their tools and equipment. Write the different

methods on the board and use them to update the key facts, especially if new, more effective methods of cleaning farm tools and equipment were learned.

Points to Remember

- Always observe manufactures instructions for cleaning tools and equipment.
- Never attempt to clean equipment while it is plugged in or operational. You will risk serious injury.
- Remember to use safety equipment (gloves and goggles) to protect from splashing chemicals in your eyes.
- You must clean the tools and equipment properly before you disinfect them.
- Before using any disinfectant, read the label and follow the instructions and precautions

Formative Assessment

Answers:

1. Among the following steps, which *is not included* in the cleaning tools and equipment process
   a. Pre-wash
   b. Put tool in proper place
   c. Rinse
   d. Disinfection
   e. Drying

2. Detergents are chemicals used in cleaning to:
   a. Remove dirt
   b. Break down debris and grease
   c. Disinfect tools and equipment
   d. Remove the disinfectant
   e. Remove all moisture

3. What tool did you learn about cleaning in the large farm? Write out the steps to clean the tool you cleaned or learned about cleaning.

   Possible Answer: Responses will depend on the experience of the trainee.

Self -Reflection

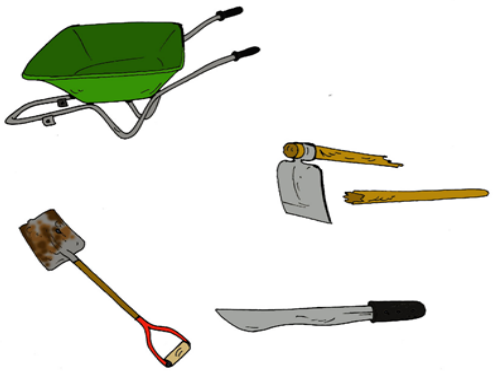
1. Ask trainees to re-take the self- assessment at the beginning of the **Unit 2**. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve.

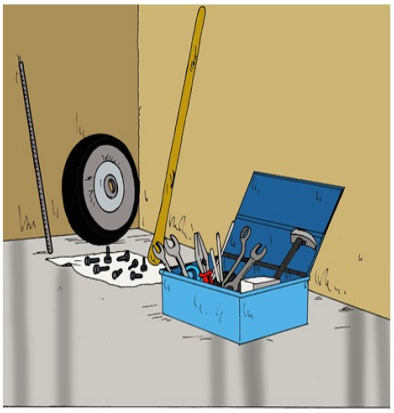
2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

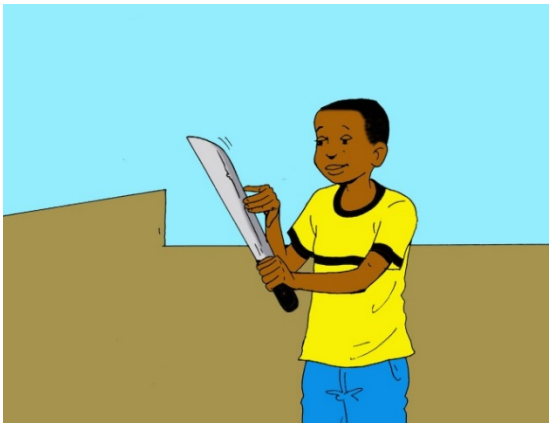
Further Information for the Trainer

1. https://kaivac.com/a_419-Maintaining-Cleaning-Equipment-for-the-Most-Effective-Work
2. https://www.finegardening.com/article/clean-sharp-tools-work-better
3. https://www.houzz.com/magazine/how-and-why-you-should-clean-your-garden-tools-stsetivw-vs~52375647
4. https://www.stltoday.com/lifestyles/home-and-garden/why-you-should-clean-your-garden-tools/article_2fa89d4c-32af-11e7-a027-6f5358a57c93.html
5. https://www.extension.iastate.edu/smallfarms/clean-and-maintain-garden-tools

Learning Unit 3: Repair tools and equipment







Learning Outcomes

By the end of the Learning Unit, trainees will be able to:

3.1 Select spare parts based on damaged

3.2 Identify repairing techniques of tools and equipment

3.3 Repair tools and equipment

3.4 Test repaired tools and equipment

Learning Unit 3 Self-Assessment

1. Ask trainees to look at the illustration unit 3 and discuss what they observe. What topics do they think this unit will include based on the illustration? After some brainstorming, share the main topics.

2. Ask trainees to fill out the self- assessment at the beginning of the **Unit 3** in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the **Unit 3** and for them to see what they know or do not know at the beginning. At the end of the **Unit 3**, they will do a self- reflection, which includes re-taking the self - assessment and identifying their strengths, areas that need improvement and actions to take. The self-assessment is not a test!

Learning Outcome 3.1: Select spare parts based on damaged parts

Objectives: By the end of the learning outcome, trainees will be able to:

a. Identify damaged parts on farming tools and equipment

b. Choose appropriate spare parts for repairing according to damaged parts

Time Required: 4 hours

Learning Methodology: Small group discussion, practical activities, brainstorming, scenarios, and demonstration

Materials Needed:

- Damaged tools and equipment, spare parts for damaged tools and equipment, pictures of more damaged tools and equipment, tools for making repairs to damaged tools and equipment, materials for writing in front of class, materials to write on in front of class

Preparation:

- ❑ Make sure that the provided area for practical activities is available for a duration of the entire activity and have enough space.
- ❑ Place damaged tools and equipment into groups.
- ❑ Collect spare parts for damaged tools and equipment.
- ❑ If possible, contact school farm tools and equipment repairing technicians to explain how to identify damaged parts.

Cross Cutting Issues:

- ✓ **Financial education:** emphasize the importance of looking at damages or malfunctions of tools from a financial angle. It may be cheaper to replace the part, fix the part, or buy a new tool. This sort of analysis should be performed when repairing a tool.
- ✓ **Inclusivity:** sometimes spare parts will be relative to the needs of the person. It can be important to switch out parts to meet one's needs.

Prerequisites:

- ▸ Knowledge of different parts constituting farm tools and equipment
- ▸ Knowledge of spare parts to farm tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify damaged parts of tools and equipment	**1.** Assess an issue with farming tools and equipment then evaluate the damage	**1.** Attention to detail
2. Explain the causes of malfunctions the farm tools and equipment spare parts	**2.** Discover malfunctions and damage in a farm tool or piece of equipment	**2.** Methodical
3. Identify appropriate spare parts of tools, equipment	**3.** Choose appropriate spare parts according to damaged parts	**3.** Patient

Steps:

Getting Started: What do we know and where are we going?

Topic 3.1 Task 1:

1. Place the trainees in pairs.

2. Ask the trainees to share experiences where they have broken a farm tool or piece of equipment. Ask trainees to answer the following questions:

a. What happened? How did the tool break?

b. How did you repair the tool? How did you find the spare part?

c. What would you have done differently?

3. Read the Key Competencies table as a large group.

Problem Solving Activity

Topic 3.1 Task 2:

1. Divide the trainees into pairs.

2. Tell the trainees to fill out the chart below with different tools and the different ways they might become damaged or defective.

Tool or Equipment	Way Tool or Equipment Might Become Damaged or Defective

3. In the front of the class, create a very large table on the board/flipchart like the one above but with many more rows. Have the trainees write in their tools if it is not already written down.

4. Read **3.1 Key Facts** together as a large group.

Guided Practice Activity:

Topic 3.1 Task 3:

1. Provide the trainees with the following scenario/role play. Ask trainees to form groups.

   You are an agricultural worker responsible for overseeing association of coffee farmers in the Karongi region. You receive a donation of pruning shears to distribute, in the order of 10 shears per association. These shears must be used to prune the coffee plants each year.

2. Tell trainees to answer the following questions in their groups:
   a. What kinds of damage do you risk encountering next year? Why?
      Possible Answers: Shears becoming blunt, handles becoming split or cracked, tool blade is cracked, loose or bent blade.

   b. What spare parts are needed to repair the shears?
      Possible Answers: Screws, handles, blades

   c. What needs to be considered when choosing spare parts to repair the shears?
      Possible Answer: Whether they are repairable or consumable.

3. Afterward, have one trainee from each group present their responses. After all groups have presented, have a large group discussion so that you reach a consensus on what needs to be done for the shears.

Application Activity

Topic 3.1 Task 4:

1. Bring together a large assortment of tools and equipment. For each tool and equipment, have the trainees answer the following questions regarding the tools and equipment.
   a. Which parts of tools or equipment are damaged?
   b. Identify the main causes of these tools or equipment damages.
   c. Suggest appropriate spare parts need to remedy them.
   d. Explain the factors to consider when suggesting these spare parts.
   e. Explain the process of finding and replacing these spare parts.

Topic 3.1 Task 5:

1. In small groups, instruct the trainees to identify the spare parts frequently used for repairing the following tools and equipment.
   Possible Answers:
   a. Hand operated sprayer pump: Battery, pipe, spray bottles/holders, sprayer filter, backpack, nozzle items
   b. Wheelbarrow: Tires, handles, axles, trays/barrows
   c. Manure fork: Fork head, handle
   d. Rakes: Rake head, handle
   e. Hoes: Blade, handle

2. Ask trainees to share and discuss their answers. Then verify them using the key above.

Topic 3.1 Task 6:

1. Provide trainees with the following scenario. Have them answer the questions following the scenario. Go around the room and make sure the trainees are on the right track.

   Suppose that your sector leases small farm tools and equipment to till 5 hectares of deep terraces at your school.

a. What kinds of wear and tear do you risk encountering during the use of these tools and equipment for terraces tillage?
Possible Answers: Blunted blades, loose screws and bolts, split or cracked handles, cracked or bent blades

b. Order the spare parts of tools and equipment that tools and equipment should have and that the school must buy according to the types of their damage. Write your answers in the following table:

Tools/equipment	Spare parts name	Total number	Type of damage	Number of damaged tools/equipment

Points to Remember

- Always read descriptions of all parts of tools and equipment.
- Review the owner's manual and manufacturer manual when choosing parts.
- Consistently make note of the conditions of the different tools and equipment.

Formative Assessment

1. What factors might one consider when searching for spare parts?

Possible Answer: The parts that are damaged, the available spare parts, the cost of the spare parts, one's own technical capabilities for repairing the farm tool or piece of equipment.

2. List a common issue you might find with the following tools and the appropriate spare part.

Possible Answers:

Tool or equipment	Issue	Spare Part
Pruning shears	*Lost screw*	*Screw*
Hoe	*Broken head*	*Hoe head*
Shovel	*Broken handle*	*Shovel handle*
Wheelbarrow	*Broken wheel*	*Wheelbarrow wheel*

Further Information for the Trainer

1. www.fcbco.com/blog/spare-parts inventory
2. www.grindex.com/en-us/toolbox/spare -parts

Learning Outcome 3.2: Identify repairing techniques of equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Apply basic repairing operations based on damaged parts of tools and equipment

b. Describe the basic repairing techniques of equipment

c. Select appropriate repairing techniques of equipment

Time Required: 4 hours

Learning Methodology: Brainstorming, demonstration, group discussion, scenarios and practical exercises

Materials Needed:

- Broken tools and equipment, spare parts or materials necessary to repair the tools and equipment, materials to write on in front of class, writing materials for writing in front of class,

Preparation:

- ❑ Make sure that the provided area for practical activities is available for the duration of the entire activities and organized.
- ❑ Make sure that are the teaching materials are properly selected and arranged according to the tasks and activities to carry out.
- ❑ Find a farm with tools and equipment that need repairing for trainees that do not have any tools or equipment.

Cross Cutting Issues:

- ✓ **Financial education:** Emphasize the financial benefits of learning to repair one's own tools and equipment.
- ✓ **Gender:** Explain that girls and boys are both equally capable of repairing tools and equipment.

Prerequisites:

- Understanding of different parts of tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify basic repairing operations of tools and equipment	**1.** Apply basic repairing operations of tools and equipment	**1.** Attention detail
2. Describe repairing techniques of tools and equipment	**2.** Demonstrate repairing techniques of tools and equipment	**2.** Willing to seek clarification
3. Select appropriate repairing techniques of tools and equipment	**3.** Choose appropriate repairing techniques of tools and equipment	**3.** Respectful

Steps:

Getting Started: What do we know and where are we going?

Topic 3.2 Task 1:

1. Tell the trainees to consider some past experiences where they have had to get rid of broken tools or equipment. Place them into small groups to share experiences regarding the following questions:

   a. What caused you to get rid of the tool or equipment rather than repairing it?

   b. What were the main issues with the tool or equipment?

   c. What could you have done to keep the tool or equipment in better shape to extend its life? Could any parts have been repaired sooner?

   d. Why do you think it is important to repair tools and equipment?

2. Read Key Competencies table together.

Problem Solving Activity

Topic 3.2 Task 2:

1. Place the trainees in pairs.

2. Instruct the trainees to carefully look at the tools and equipment pictured in their manuals. Once they have done so, have them fill out the table describing the tools, the way they are damaged, and the way to repair/replace the damaged part.

3. Write the table in front of the class and have the trainees contribute their responses.

4. Read **3.2 Key Facts** together as a large group.

Guided Practice Activity

Topic 3.2 Task 3:

1. If possible, find tools with the issues listed in the scenarios below. Have the trainees assess each of the scenarios or the actual damaged tools then propose a technique for repairing them.
   Answers:
   a. Sprayer nozzle drips and is due to a loose handle
      Repairing technique: **Clean the nozzle and screw in loose screws/replace the screws**

   b. Machete blade is too dull
      Repairing technique: **Sharpen the blade**

   c. Pruning shears are so rusty they are hard to close when cutting
      Repairing technique: **Lubricate using oil**

   d. Shovel head keeps sliding off due to loosely tightened screws
      Repairing technique: **Screw in loose screws or replace them altogether**

Application Activity

Topic 3.2 Task 4:

1. Ask trainees to make a list of farm tools and equipment found at the school or their home. Tell trainees to check whether the tools function and then suggest the type of repairing techniques that should be performed for each tools and equipment. Tell them to write their answers into the following table:

Tools/equipment	Types of damage	Repairing technique

Points to Remember

- If the tools are seriously damaged, have them repaired by a qualified person.
- Always check manufacturer's instructions.
- Be creative when repairing tools. Sometimes the tools can be fixed using other, non-traditional parts.

Formative Assessment

1. Among the following agricultural tools and equipment, which ones need oiling? Choose all that apply.
   a. Wheelbarrow
   b. Spades
   c. Shovels
   d. Saws
   e. Hoes
   f. Pruning shears

2. The main lubricants used include:
   Choose one answer.
   a. Oils/greases
   b. Water

c. Detergents
d. Chemicals

3. Basic repairing operations of tools and equipment may include:
Choose all that apply.
a. Sharpening
b. Handle fixing
c. Rust removal
d. Lubrication
e. Painting
f. Storing

4. Screwing consists of **screwing in loose screws or replacing screws.**

5. True: Repair means responding to the breakdown of equipment and undertaking work to correct the problem in order to return the equipment to a working condition.

ⓘ Further Information for the Trainer

1. https://lifehacker.com/how-to-take-care-of-your-tools-1543310658
2. https://www.hobbyfarms.com/7-steps-to-repair-wooden-handled-tools-2/

Learning Outcome 3.3: Repair tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Demonstrate tools and equipment repairing techniques
b. Perform repairing tools and equipment techniques
c. Apply tools and equipment repairing safety

Time Required: 3 hours

Learning Methodology: Demonstration, field practices, group discussion, scenarios, hands-on practice

Materials Needed:

- Farm tools and equipment: spare parts, poorly maintained farm tools, rusty hoe, sand, motor oil, broken rake, hammer, pliers, machete, millstone, nuts and screws, wheelbarrow, pump sprayer, handles for spades and hoes, pruning shears, saws, rusty tools
- Flipchart/board, markers, paper, pens

Preparation:

- ❑ Prepare rusty and broken equipment that require repairs and maintenance
- ❑ For all tools requiring repair and maintenance, prepare the tools that will fix the problems

Cross Cutting Issues:

- ✓ **Standardization culture:** Tell the trainees to consider maintaining high standards for tools while repairing farm tools and equipment.
- ✓ **Financial education:** Evaluate the different methods of repairing and maintaining the tools by their costs.

Prerequisites:

- Understanding of the parts of farm tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Define tools and equipment repairing	**1.** Demonstrate tools and equipment repairing techniques	**1.** Work independently
2. Apply tools and equipment repairing techniques	**2.** Perform tools and equipment repairing	**2.** Decisive
3. Recognize tools and equipment repairing safety	**3.** Apply safety for repairing tools and equipment	**3.** Self -control

Steps:

Getting Started: What do we know and where are we going?

Topic 3.3 Task 1:

1. Have the trainees make a list of concerns they have about repairing tools and equipment. Try to understand the farming activities your trainees want to perform and the different tools they may need to replace or repair. Gather these specific needs in the front of the class so you can be sure to continue providing training that addresses their needs.

2. For review, have the trainees define the different tools or materials they would need to repair the different tools or equipment they mentioned.

Problem Solving Activity

Topic 3.3 Task 2:

1. Provide the trainees with the following scenario then have them answer the questions that follow. If possible, bring in different tools and different lubricants. Ask the trainees to match the lubricant with the tool or piece of equipment.

Scenario: Suppose that you are going to lubricate the school power tiller and pruning shears.

a. What type of lubricant would you choose? Why?

b. How would you apply the lubricant to these tools?

Topic 3.3 Task 3:

1. Place the trainees in groups of three and have them consider the following scenario. If possible, bring an actual power tool that has issues, it does not have to be a power tiller.

   Scenario: Now suppose the battery of the power tiller dies.

   a. **How would you replace the battery?**
   b. **Where would you find out which battery was in the machine?**
   c. **What** steps would you take to replace the battery?

2. Read **3.3 Key Facts** together as a large group.

Guided Practice Activity

Topic 3.3 Task 3:

Depending on the resources available at the training facility, have the trainees perform the following tasks. If there are other tools and equipment to repair, guide the trainees to repair those other tools and equipment.

1. Remove the rust from rusty hoes. To do this, first rub the hoes with a brush and then dip the tools in a container of sand soaked with motor oil.

2. Straighten the teeth of rakes using a hammer or pliers. To do this, push the teeth against an anvil and straighten with a 200 g - 500 g hammer, depending on the size of the rake.

3. Sharpen machetes with a millstone.

4. Replace loosen nuts and screws from wheelbarrow and pump sprayer.

Application Activity

Topic 3.3 Task 4:

Depending on the resources available at the training facility, have the trainees perform the following tasks. If there are other tools and equipment to repair, have the trainees repair

those other tools and equipment. If these tools do not exist, have the trainees create a plan as to how they would perform the following tasks.

1. You have 10 pieces of eucalyptus cuttings, at least 40 mm in diameter and each 1,80m long (dry, straight, and smooth). Ask trainees to fit properly handles to the five spades and five forks newly purchased by the school.

2. You have 10 rusty spades and hoes. Ask trainers to remove the rust from these tools.

3. Tell trainees to use a metal file or millstones to lightly sharpen the edges of tools like pruning shears, panga and saws. Again, they don't want to grind away too much of the metal, just use it to smooth out nicks, remove burrs, and give a nice clean edge. Using a clean rag, apply lubricating oil to both the wooden handle and the metal blade for shovel, spades, and panga.

Points to Remember

- Wear appropriate clothes and personnel protective equipment to prevent bodily harm.
- Refer to the manufacturer's instructions and/or service manual.
- Work with the lubricant and other tools you can find locally.

Formative Assessment

1. What daily and periodic maintenance practices should you advise the farmers to carry out to keep their tools and equipment in good condition?

   Possible Answers*:* Lubricate tools, remove rust, consistently clean the tools, continuously repair tools, properly store tools

2. If you are given a rusty spade, how could you remove the rust and ensure rust does not corrode the tools in the future?

   Possible Answers: Use oil and a wire brush to rub the rust off. Wipe them down with a clean rag then reapply a coat of oil to prevent the rust from coming back.

Learning Outcome 3.4: Test repair tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Demonstrate tools and equipment functioning
b. Prepare tools and equipment repaired for testing
c. Operate testing of tools and equipment repaired

Time Required: 4 hours

Learning Methodology: Demonstration, field practice, and group discussion

Materials Needed:

- Broken tools and equipment and their spare parts and means to repair them, materials to write with in front of the class

Preparation:

- ❑ Find a technician that is willing to have trainees come for observation
- ❑ Prepare all the broken tools for reparations
- ❑ Prepare some tools that look repaired but are not and, if not tested, will break again

Cross Cutting Issues:

- ✓ **Inclusivity:** provide the trainees with different techniques to use for tools that are not easily tested or repaired depending on physical capability
- ✓ **Financial education:** emphasize the need to test tools and equipment to ensure that you will not need to see the technician more than once and pay each time
- ✓ **Gender:** explain how girls can also become technicians and test and repair tools

Prerequisites:

- Understanding of basic tool and equipment repair

Key Competencies:

Knowledge	Skills	Attitudes
1. Recognize tools and equipment functioning	**1.** Demonstrate tools and equipment functioning	**1.** Willing to seek clarification
2. Arrange tools and equipment repaired for testing	**2.** Prepare tools and equipment repaired for testing	**2.** Persistent
3. Describe testing procedures of tools and equipment repaired	**3.** Operate testing of tools and equipment repaired	**3.** Accurate

Steps:

Getting Started: What do we know and where are we going?

Topic 3.4 Task 1:

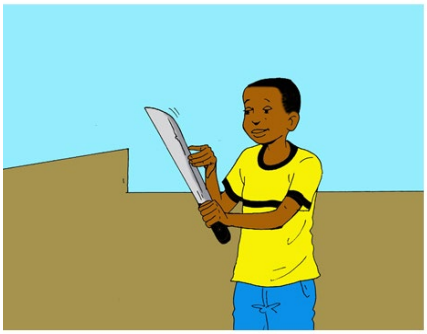
1. Divide the trainees into pairs.

2. Ask the trainees to consider the following questions:
   - **a.** How do we determine whether a farm tool is damaged or defective?
   - **b.** How do we determine whether a farm tool needs to be repaired?
   - **c.** What might happen if we do not test tools before using them?
   - **d.** Have you or anybody you know experienced negative consequences from not testing farm tools before using them?

3. Discuss the trainees' responses as a class.

Problem Solving Activity

Topic 3.4 Task 2:



1. Tell the trainees to carefully observe the picture above and answers the following questions:
   a. Which part of the tools are the farmers testing?
   b. Which activity do you think follows testing the tools?
   c. Why is important to test tools and equipment before use? Consider the case when the tools are recently repaired.
   d. Is there a better way to test if the head on a hoe is secure?
   e. Is there a better way to test if a machete is sharp?

2. Read **3.4 Key Facts** together as a large group.

Guided Practice Activity

Topic 3.4 Task 3:

1. Read the following scenario:

   Suppose that you are tasked to test the working condition of tools and equipment like shovels, trowels, spades, garden fork, hoes, wheelbarrow, pump sprayer and power tiller after repairing.

2. Tell trainees to discuss the questions with a partner:
   a. What issues will you look for in each of the tools?
   b. How would you test each of the tools?

Topic 3.4 Task 4:

1. Write/read the following scenario to trainee:

Donata is a farmer growing horticulture crops in Rubengera sector, Karongi district. After growing season, she notices that some of tools and equipment aren't functioning properly. The tools have issues such as broken handles, misshapen blades, and loose components. Donata pays a technician to repair her farm tools and equipment. Once the technician has finished repairing the tools and equipment, she needs to test them to make sure they are in good shape.

2. In small groups, tell trainees to advise Donata on the following points:
   a. Parts to be tested
   b. What to look for to make sure the tool is in good working condition
   c. How to report the issues to the technician

Possible Answers:
   a. Handles, blades, and attachable parts (forks, etc.)
   b. Handles are sturdy, blades are sharp and in the correct shape, parts are tightly attached
   c. Document the issues in writing or pictures/videos to demonstrate the problem to the technician

Application Activity

Topic 3.4 Task 5:

1. Take the trainees to visit a tool repair technician. Instruct the trainees to ask the technician the following questions then share the responses with their peers.
   a. What tools does the technician commonly repair? Add other tools you think will be relevant to your future farming work.

Name and location of technician:

Tool	Potential issues	Where to find spare parts	How to test the repairs

Points to Remember

- To avoid repairs, try to keep tools in good condition.
- Testing repairs will save lots of money in the long run by avoiding repeat repairs.
- Wear safety glasses or goggles and well-fitting gloves appropriate to avoid hazards when doing various testing tasks.

Formative Assessment

1. Explain the benefits of testing repaired tools and equipment.

Possible Answers: Save money and ensure a job well done if repaired by a technician, avoid injury that can result from an improperly performing tool, maintain tool so that it does not result in further, more serious damage

2. List techniques for testing the following tools:

a. Shovel handle secured onto shovel:
Answer: Try to dig some ground, shake the shovel, perform vigorous shovelling

b. Panga blade sharpness:
Answer: can attempt to cut something. Lightly touch the blade.

c. Screws on pruning shears:
Answer: try out the shears by cutting something that is difficult to cut

d. Wheelbarrow wheel securely fastened:
Answer: roll the wheelbarrow with some rocks or heavy cargo, spin the wheel, shake the wheelbarrow

Self -Reflection

1. Ask trainees to re-take the self- assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve.

2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Further Information for the Trainer

1. https://www.intouch-quality.com/blog/hand-tools-inspection-procedures
2. AWS Lambda with Python: A Complete Getting Started Guide, June 22, 2019
3. Install Ruby on Ubuntu: Everything You Need to Get Going, June 8, 2019
4. Mary Ann Lundteigen Marvin Rausand, testing and maintenance,2012

Learning Unit 4: Adjust and calibrate tools and equipment

Learning Outcomes

By the end of the Learning Unit, trainees will be able to:

4.1 Check tools and equipment for functioning

4.2 Calibrate tools and equipment

4.3 Adjust tools and equipment

Learning Unit 4 Self-Assessment

1. Ask trainees to look at the illustration above and discuss what they observe. What topics do they think this unit will include based on the illustration? After some brainstorming, share the main topics.

2. Ask trainees to fill out the self- assessment at the beginning of the **Unit 4** in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the **Unit 4** and for them to see what they know or do not know at the beginning. At the end of the unit, they will do a self- reflection, which includes re-taking the self -assessment and identifying their strengths, areas that need improvement and actions to take. The self-assessment is not a test!

Learning Outcome 4.1: Check tools and equipment for functioning

Objectives: By the end of the learning outcome, trainees will be able to:

a. Explain the need for checking procedures for tools and equipment functioning

b. Perform checking procedures to evaluate tools and equipment functioning

c. Apply the user instructions manual to checking tools and equipment

Time Required: 5 hours

Learning Methodology: Small group discussion, practical activity, scenarios, brainstorming, demonstration

Materials Needed:

- Tools, materials and equipment that can be tested and their tools for testing them: hoe, hook, spade, fork, shovel, rake, manure fork, rake-marker, machete, saws, axe, pick, sprayer, watering can, wheelbarrow, steel tape, measuring tape

Preparation:

- ❑ Make sure that the Personal reference tools include troubleshooting guides, manufacturer manuals, quick reference guides are available
- ❑ Contact farm tools and equipment repairing technicians and ask them to demonstrate
- ❑ Make sure that the teaching materials are properly selected and arranged according to the tasks to carry out and the number of trainees.
- ❑ Checklist of tools and equipment for functioning

Cross Cutting Issues:

- ✓ **Standardization culture:** Emphasize the necessity to keep tools and equipment up to well performing standards.
- ✓ **Environment and sustainability:** Emphasize the importance that few materials are wasted when checking tools and equipment for functioning.

Prerequisites:

- Basic understanding of the functionality of farming tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe checking procedures for tools and equipment functioning	**1.** Perform tools and equipment checking procedures for functioning	**1.** Forward thinking
2. Explain why it is important to check for tools and equipment functioning	**2.** Apply checking procedures of tools and equipment for functioning	**2.** Methodical
3. Describe the contents of a user instructions manual	**3.** Follow and apply tools and equipment user instructions	**3.** Self-confidence

Steps:

Getting Started: What do we know and where are we going?

Topic 4.1 Task 1:

1. Place the trainees into pairs and tell them to respond to the following questions:
   - **a.** Have you ever received a user instructions manual with farm tools or equipment?
   - **b.** Have you ever read a user instructions manual?
   - **c.** What did you use the user instructions manual to do?
   - **d.** Were there any instructions in the manual that helped you check if the tools were functioning properly?

2. Tell trainees that if they have never seen a user instructions manual, they should ask their peers or members of the community if they have an example they can borrow to observe.

3. Read the Key Competencies table as a large group.

Problem Solving Activity

Topic 4.1 Task 2:

1. Present the trainees with different examples of user instructions manual for any farm tool or equipment. Let trainees read briefly through the different manuals and identify the different parts of the manual. Ask trainees to answer the following questions in small groups and then in the larger group.
   a. Is there a section that describes how to check if the tools or equipment are functioning properly?
   b. What sections might be useful in maintaining the farm tool or equipment?
   c. Can all the parts be replaced in your community? Can the parts be replaced in Rwanda? Explain.
   d. Could you repair or replace the parts, or do you need a technician?
   e. Share your findings with a peer.

2. Read **4.1 Key Facts** as a large group and address any confusion the trainees face.

Guided Practice Activity:

Topic 4.1 Task 3:

1. Present the trainees with an assortment of farm tools and equipment, possibly some of the different equipment at the training centre. Have the trainees evaluate the tools and equipment based on the following:
   a. Identify how often different work tools and equipment should be checked to make sure they are working correctly.
      i. What might one do in a weekly check?
      Answer: One might note the presence of bolts, screws, and guarding, as well as the function of safety devices.

      ii. What might one do in a monthly check?
      Answer: More extensive examinations

   b. Demonstrate the correct procedures to follow when checking tools and equipment for functioning. Check the tools and equipment to see if they are functioning properly.

c. Which measures will help operators to prevent further damage to their tools and equipment in the case of malfunction?

Answer: Checking/inspecting tools regularly, using the instruction manual, advice from technicians, and one's own experience and context for using the tools.

2. Debrief the trainees' findings as a large group.

Application Activity

Topic 4.1 Task 4:

1. Separate the trainees into small groups and tell them to look closely at the two main wheelbarrows found at the training centre. They need to observe the operating parts of these equipment. Ask the following questions:
   a. What are the operating parts of the first wheelbarrow? Are the parts fixed or are they moving parts? Is this wheelbarrow good equipment? Why?
   b. Repeat questions for the second wheelbarrow.
   c. Can these wheelbarrows be leased to the work in the field? Why?
   d. For what types of adjustment operations would you recommend this kind of farm equipment?
   e. Consult the user instructions manual for any uncertainties you have.

2. Ask groups to share and compare their experiences with the rest of the class.

Points to Remember

- It is important to keep track of the age of tools and equipment so you know when you may need to test or check it for potential repairs.
- Always keep and safely guard the use instructions manual.

Formative Assessment

1. Identify two reasons why tools and equipment should be checked for correct functioning.
Answers: To avoid injury; to ensure tools are performing well enough to do the necessary work on the farm

2. What must you take account of when checking tools and equipment?
   Answers: User instructions manual, advice from technicians and others that use these tools, your own experience of the tools and equipment, its use, the factors of the workplace and the people using the work tools and equipment

3. Who should perform checking procedures for work tools and equipment?
   Answer*:* The owner of the tools and equipment or a professional technician

4. How often should one check tools and equipment?
   Answer: Frequency on checking depends on the tool or equipment, as much as every use or as little as twice a year.

Further Information for the Trainer

1. For a complete listing of publications, videotapes, and further information on concrete safety for contractors, contact the American Society for Concrete Construction (ASCC) at 1.800.877.2753, or 38800 Country Club Drive, Farmington Hills, MI 48331-3411.
2. Two useful publications are the *ASCC Safety Manual*, an extensive safety guide for concrete contractors, and the *ASCC Employee Safety Handbook*.

Learning Outcome 4.2: Calibrate tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Describe tools and equipment calibration processes

b. Perform tools and equipment calibration processes

Time Required: 5 hours

Learning Methodology: Inference from images, practical demonstration, hands on application, group discussion

Materials Needed:

- Tools, materials and equipment that can be calibrated (especially a spirit level and a sprayer), calibration instructions and calibration tools and equipment

Preparation:

- ❑ Make sure that the personal reference tools include troubleshooting guides, manufacturer manuals, quick reference guides are available
- ❑ Configure the tools and equipment so that they are not properly calibrated

Cross Cutting Issues:

- ✓ **Financial education:** Explain how a properly calibrated tool or piece of equipment functions more efficiently and saves money and time
- ✓ **Standardization culture:** Emphasise the importance of maintaining a standard of functionality for different tools and equipment

Prerequisites:

- ▸ Understanding of farm tools and equipment and their proper usage

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe tools and equipment calibration instructions	**1.** Evaluate calibration of tools and equipment	**1.** Respectful
2. Describe tools and equipment calibration process	**2.** Demonstrate calibration process of tools and equipment	**2.** Forward thinking
3. Relate calibration processes to one another	**3.** Perform tools and equipment calibration	**3.** Willing to try

Steps:

Getting Started: What do we know and where are we going?

Topic 4.2 Task 1:

1. Put the trainees in pairs to answer the following questions:

a. The verb '*to calibrate'* means to assess how accurate an instrument is and then to make the appropriate adjustments to create the desired, accurate output. Have you ever calibrated a tool or piece of equipment?

b. What did the calibration you performed consist of?

c. If you have not calibrated a farm tool or equipment, perhaps you calibrated something for cooking to make sure the measurements were more accurate. Try to make a list of examples then share them with a peer.

2. Discuss the trainees' responses as a large group then go over the Key Competencies table together.

Problem Solving Activity

Topic 4.2 Task 2:

1. Instruct the trainees to refer to their trainee manuals and, using the image, respond to the following questions in small groups.
   a. What is happening in this picture?
      Possible Answer: Two people are working together to spray crops on a farm.

   b. What tools do you notice in this picture?
      Answer: Face masks, sprayer, stopwatch

   c. What tools or equipment are being calibrated?
      Answer: Sprayer

   d. When do instruments, tools and equipment need to be calibrated?
      Answers may vary. Allow trainees to discuss their ideas. The correct answers will be revealed later in this learning outcome/topic.

   e. How can you calibrate tools and equipment?
      Answers may vary. Allow trainees to discuss their ideas. The correct answers will be revealed later in this learning outcome/topic.

f. How do you think they are working to calibrate the sprayer?
Answers may vary. Allow trainees to discuss their ideas. The correct answers will be revealed later in this learning outcome/topic.

g. What other tools and equipment need to be calibrated before use?
Answers may vary. Allow trainees to discuss their ideas. The correct answers will be revealed later in this learning outcome/topic.

2. Discuss the trainees' responses as a large group.

3. Read **4.2 Key Facts** together as a large group.

Guided Practice Activity

Topic 4.2 Task 3:

1. Show the trainees a tool that requires calibration, such as a sprayer.

2. Find a user instructions manual for a tool that requires calibration. Using a user instructions manual, read through the calibration process as a large group then instruct the trainees to:
a. Write down the steps in a more simplified form.

b. Explain the steps to calibrate the tool to a peer.

Application Activity

Topic 4.2 Task 4:

1. Instruct trainees to go into the community and ask different farmers how they calibrate a spirit level.

2. After trainees have interviewed 2-3 farmers, ask them to share their findings with the rest of the class.

3. Then, using the instructions below, explain how to calibrate a spirit level using the steps below. Have trainees compare the information they gathered in the community with the steps provided in **4.3 Key Facts**. Tell them to discuss:

a. How are the processes similar?
b. How are they different?
c. Which method do you think is best for user safety?

4. Assist trainees as they take turns calibrating a spirit level in class.

Topic 4.2 Task 5:

1. Direct trainees to read the importance of calibrating sprayers in their manuals.

The use of too little pesticide may result in ineffective pest control, too much pesticide wastes money, may damage the crop and increases the potential risk of contaminating ground water and environment. The primary goal with calibration is to determine the actual rate of application of pesticide in gallons per unit of area, then to adjust if the difference between the actual rate and the intended rate is greater or less than 5% of the intended rate.

2. Explain how to calibrate a sprayer using the following instructions and tips using **4.3 Key Facts**.

3. Ask trainees to perform the calibration of a spraying pump available at the school until they get more uniform application of pesticides and fertilizers.

Points to Remember

- It is the responsibility of the user to verify the calibration of the instrument before each use.
- The user is responsible for the proper use and care of the tools and equipment.
- Consult operator's or user instructions manual for calibration instructions.

Formative Assessment

1. What does it mean to calibrate a tool or piece of equipment?
Answer: To calibrate means to assess an instruments accuracy then make appropriate adjustments to create the desired, accurate output or measurement.

2. What are some examples of tools or equipment that require calibration before use?

Answer: Spirit level, sprayer, and a balance

3. Where might you find information on how to calibrate a tool or piece of equipment?
   Answer: The user instructions manual

Further Information for the Trainer

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2. Youden, W. J. Experimentation and Measurement. (1984)
3. Skoog, DA. Holler, FJ. Crouch, SR. Principles of Instrumental Analysis, 6th Ed. (2007)
4. Brown, Philip J. Measurement, Regression, and Calibration. Oxford statistical science series, 12. Oxford [England]: Clarendon Press (1993)
5. NZS 10012.1-2003 Quality assurance requirements for measuring equipment
6. Part 1 Metrological confirmation system for measuring equipment
7. Standards Association of Australia (SAA) HB18.25 – 1991 Guide 25 General Requirements for the Competence of Calibration and Testing Laboratories
8. ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories.
9. SAA HB86.1:1996 - The Selection Care Calibration and Checking of Measuring Instruments in Industry
10. AS IEC 60300.1-2004 Quality management and quality assurance Standards Guide to dependability program management
11. Establishing Calibration Intervals for Fluke Products - application note by Fluke Calibration
12. Calibration Intervals, A Manufacturer's Perspective - application note by Fluke Calibration
13. Guidelines for the determination of calibration intervals of measuring instruments – publication by ILAC

Learning Outcome 4.3: Adjust tools and equipment

Objectives: By the end of the learning outcome, trainees will be able to:

a. Evaluate adjustment criteria for farm tools and equipment
b. Describe different types of tools and equipment adjustment
c. Perform tools and equipment adjustment

Time Required: 5 hours

Learning Methodology: Demonstration, real world applications, small group discussion, hands on practice

Materials Needed:

- Tools, materials and equipment that can be adjusted: hoe, hook, spade, fork, shovel, rake, manure fork, rake-marker, machete, saws, axe, pick, sprayer, watering can, Wheelbarrow, steel tape, measuring tape, vice, angle template
- Materials to write on in front of the large group

Preparation:

- ❑ Prepare tools for adjustment and ensure you know the proper techniques for adjusting these tools and equipment
- ❑ Set up tools in a way that they need to be adjusted

Cross Cutting Issues:

- ✓ **Inclusivity:** Adjust the tools and equipment to meet the various needs of different individuals.
- ✓ **Financial education:** Emphasize the benefits of adjusting tools to ones needs rather than purchasing new ones.

Prerequisites:

- Basic understanding of the function and parts of different tools and equipment

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify tools and equipment adjustment criteria	**1.** Evaluate adjustment criteria for farm tools and equipment	**1.** Critical thinking
2. Describe tools and equipment adjustment types	**2.** Demonstrate tools and equipment adjustment types	**2.** Discerning
3. Explain tools and equipment adjustment process	**3.** Perform tools and equipment adjustment	**3.** Confident

 **Steps:**

 **Getting Started: What do we know and where are we going?**

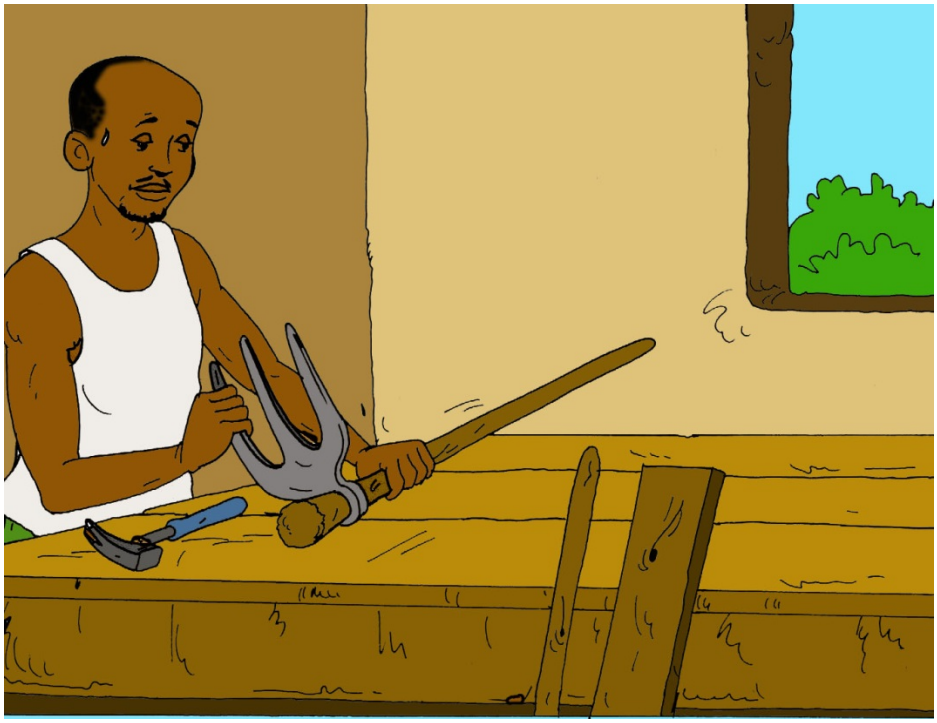
 **Topic 4.3 Task 1:**

1. Put the trainees in pairs to answer the following questions:
   - **a.** What do you do when a farming tool or piece of equipment isn't working well for the task you are performing? Consider a case where the tool is right for the job but isn't working quite right.
   - **b.** Have you ever had to adjust a tool so that it worked more effectively?
   - **c.** Have you ever had to adjust the amount of fuel or oil so that a machine ran more smoothly?
   - **d.** Have you ever sharpened a tool?
   - **e.** Have you ever tightened a loose handle or screw?
   - **f.** Consider all these tasks and think of any other adjustments you have made to a tool.

2. Have a discussion where the trainees share their responses with the large group.

3. As a large group, read the Key Competencies table.

Problem Solving Activity



Topic 4.3 Task 2:

1. Instruct the trainees to carefully observe the picture above then answer the following questions:
   a. What is happening in this picture?
      Answer: A worker is adjusting a three-pronged fork hoe.

   b. What is the man doing to the three-pronged fork hoe?
      Answer: Adjusting the fork head.

   c. Why might he be adjusting this tool?
      Possible Answers: To loosen or tighten it on the handle.

   d. Are there any other adjustments he might make to this tool so that it works more effectively?
      Answers may vary.

2. As a large group, read **4.4 Key Facts.**

Guided Practice Activity

Topic 4.3 Task 3:

1. Tell the trainees to make a list using the table in their manuals of different tools that might require adjustments prior to being used. Write the table in the front of the class to gather the trainees' responses.

2. Instruct them to list the potential adjustments you might make to these tools.

Tool	Way in which the tool may need to be adjusted	Minor or Major adjustment

Application Activity

Topic 4.3 Task 4:

1. Explain to the trainees that most garden hoes are adjustable. Getting the angles right will make the tool a joy to use, instead of an exhausting backbreaker. Tell trainees to answer the following questions for adjusting a garden hoe using **4.5 Key Facts** for guidance.
   - **a.** Why should you adjust your hoe?
   - **b.** What types of garden hoes are adjustable?
   - **c.** How can you adjust a garden hoe?

2. Instruct the trainees to follow the directions in their manuals and adjust a hoe.

3. Tell the trainees to practice adjusting different tools, such as the hoes at their homes.

4. Debrief during the next training session and gather tips that helped the trainees adjust their tools and equipment effectively.

Points to Remember

- Following standard operating procedure and manufactures specification before, during and after adjustment.

- Always consult the owner of a tool before adjusting it for your own use.

Formative Assessment

1. What is tool adjustment?
   Answer*:* Adjustment means the process of bringing the various part of a tool/equipment into a more effective and efficient relationship with another part of a tool/equipment.

2. List at least four examples of tool and equipment minor adjustments.
   Possible Answers: Depth and spacing, fixing of screw, sharpening, handle fixing, nozzle diameter/capacity

Self -Reflection

1. Ask trainee's to re-take the self- assessment at the beginning of the **Unit 4**. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve.

2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Further Information for the Trainer

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2. https://www.wsps.ca/Information-Resources/Topics/Machines,-Tools-Equipment.aspx
3. https://www.amleo.com/images/art/WB6-Instructions-2017.pdf
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Learning Unit 5: Maintain farm facilities

Learning Outcomes
By the end of the Learning Unit, trainees will be able to:
5.1 Identify damaged farm facilities
5.2 Identify materials and spare parts for repairing damaged farm facilities
5.3 Keep maintenance of farm facilities

Learning Unit 5 Self-Assessment

1. Ask trainees to look at the illustration **Unit 5** and discuss what they observe. What topics do they think this unit will include based on the illustration? After some brainstorming, share the main topics.

2. Ask trainees to fill out the self- assessment at the beginning of the **Unit 5** in their Trainee Manuals. Explain that the purpose of the self-assessment is to become familiar with the topics in the **Unit 5** and for them to see what they know or do not know at the beginning. At the end of the **Unit 5**, they will do a self- reflection, which includes re-taking the self -assessment and identifying their strengths, areas that need improvement and actions to take. The self-assessment is not a test!

Learning Outcome 5.1: Identify damaged farm facilities

Objectives: By the end of the learning outcome, trainees will be able to:

a. Describe different damages to farming facilities
b. Document different aspects of farming facilities
c. Discover the causes of farm facilities damage

Time Required: 5 hours

Learning Methodology: Small group discussion, practical investigation and observation, presentation, and community visits and investigation

Materials Needed:

- Farm facilities (farm and livestock)
- Notebook, pen, materials to write on in front of class

Preparation:

- ❑ Ensure that the farming facilities have visible and notable damage
- ❑ Contact different farmers with farming facilities that are both well maintained and others that are not well maintained

Cross Cutting Issues:

- ✓ **Environment and sustainability:** Explain how taking care of one's farming facilities is better for the environment in the long run as we do not waste resources making new facilities
- ✓ **Financial education:** Explain the benefits of identifying farming facilities early and making repairs before damages become irreparable

Prerequisites:

- ▸ Basic understanding of farming facilities and their components

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify farm facilities	**1.** Document different aspects of farm facilities	**1.** Detail-oriented
2. List the causes of farm facilities damages	**2.** Analyse the causes of farm facilities damage	**2.** Reflective
3. Identify damaged farm facilities	**3.** Evaluate damages in actual farm facilities	**3.** Observant

Steps:

Getting Started: What do we know and where are we going?

Topic 5.1 Task 1:

1. Put the trainees into pairs to reflect on the following questions:
   - **a.** What is a farming facility?
   - **b.** Have you ever seen a damaged farm facility?
   - **c.** What type of facility was it?
   - **d.** What part of the facility was damaged?
   - **e.** What caused the damage?
   - **f.** Could the damage have been prevented?
   - **g.** Was the facility worth repairing?

2. Discuss the trainees' findings as a large group.

3. As a large group, read the Key Competencies table.

Problem Solving Activity

Topic 5.1 Task 2:

1. Put the trainees in small groups and tell them to consider their own or their family's farm facilities and answer the following questions:
   - **a.** What is a farm facility? What are the critical roles of farm facilities or structures in agriculture?

b. Do you have facilities use for farming operations at home? If yes, list some common facilities found at home.

c. List the types of problems that might occur and what the possible causes could be. What would be the effect would be if the problem remains unresolved?

2. Have a discussion in the large group where trainees share their findings from the small group.

3. Read **5.1 Key Facts** as a large group.

Guided Practice Activity:

Topic 5.1 Task 3:

1. Instruct the trainees to do the following:

Fill in the table regarding the farm facilities you think you will use in your farming activities. Include facilities that were not mentioned in **5.1 Key Facts**. Once you have filled out the table, compare your findings with a peer that has similar interests to you.

Name of facility	Purpose of the facility	Potential damage to this facility

Application Activity

Topic 5.1 Task 4:

1. This activity can be conducted either during class time or as a take-home activity outside of class.

2. Provide the trainees with the following instructions:

Visit a farm facility and ask the farmer different questions regarding past damage he/she has experienced at his/her farm. Use the following form to guide the conversation. However, if the farmer begins to tell you a story or you get more information, gather it as well so that you can share the information with the large group upon your return.

3. Debrief the trainee's responses and compare their results as a large group.

Name of farmer:	**Type of farm:**	
Existing or past facilities	**Ever damaged?**	**If damaged, cause of damage**

Points to Remember

- All farm facilities will be damaged eventually, however, continuous, proper maintenance can preserve the facilities for much longer periods of time.
- Identifying and making note of damaged facilities is the first step to repairing them.
- Repair damaged facilities as quickly as possible to preserve the facilities before it is too late, and you must destroy the entire facility.

Formative Assessment

1. Choose the options that *would not* be included as farm facilities:

a. Building to house farm workers
b. Livestock
c. Tools and equipment
d. Crops
e. Church

2. Identify five different farm facilities.
Possible Answers: Barn, silo, shed, housing for farmers, fence

3. Complete the following table related to the types of damages that could occur at farm facilities

Components	**Potential type of damage**
Roof	**Holes**
Wall	**Chipped pain, crumbling**

Timber frame for building	**Cracked, rotting wood**
Foundation of building	**Cracking in half, uneven**

ⓘ Further Information for the Trainer

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2. https://www.legit.ng/1130522-types-farm-structures-uses.html
3. Cyr, D.L. & Johnson, S.B.. 2001. Storage Building Safety. University of Maine Cooperative Extension Service Fact Sheet. National Agricultural Safety Database. Accessed 1/21/01
4. Freeman, S.A., Kelley, K.W., Maier, D.E. & Field, W.E.. 1996. Review of Entrapments in Bulk Agricultural Materials Commercial Grain Facilities. Presentation at the 1996 International Meeting of the American Society of Agricultural Engineers. Paper No. 965029. ASAE, 2950 Niles Road, St. Joseph, MI 49085-9659 USA

Learning Outcome 5.2: Identify materials and spare parts for repairing farm facilities

Objectives: By the end of the learning outcome, trainees will be able to:

a. Select materials and spare parts for repairing farm facilities
b. Prepare materials for repairing farm facilities
c. Demonstrate repairing techniques for farm facilities

Time Required: 5 hours

Learning Methodology: Group discussion, demonstration, practical exercises, take-home, in the field observation

Materials Needed:

- Repairing materials and spare parts: Cement, bricks, plastics, hammer, metals, trowels, water levels, woods, nails, sheets, paints, sands
- Flipchart/board, markers, paper, pens

Preparation:

- ❑ Picture or photos showing damaged facilities
- ❑ Spare parts specifications
- ❑ Spare parts selection instructions
- ❑ Broken farm facilities pieces and the materials to fix them

Cross Cutting Issues:

- ✓ **Financial education:** emphasize the importance of maintaining farm facilities to avoid repairs
- ✓ **Gender:** explain how any gender can perform reparations to farm facilities

Prerequisites:

- ▸ Selection and use of construction materials

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify materials and spare parts for repairing farm facilities	**1.** Select materials and spare parts for repairing farm facilities	**1.** Respectful
2. Describe materials for repairing farm facilities	**2.** Prepare materials for repairing farm facilities	**2.** Methodical
3. Identify repairing techniques for farm facilities	**3.** Demonstrate repairing techniques for farm facilities	**3.** Crafty

Steps:

Getting Started: What do we know and where are we going?

Topic 5.2 Task 1:

1. Instruct the trainees to do the following in pairs: Reflect on the different damages that can occur with farm facilities from the previous topic. Share some of your experiences around possible materials and spare parts used for repairing farm facilities. When you are sharing experiences, be sure to answer the following questions:
   - **a.** What farm facilities have you repaired?
   - **b.** What part of the facility required reparations?
   - **c.** Did you repair the facility? Who repaired the facility?
   - **d.** How did the repairer know how to repair the facility?
   - **e.** What materials/parts were used to repair the facility?

2. As a large group, read the Key Competencies table.

Problem Solving Activity

Topic 5.2 Task 2:

1. Tell trainees to read the following scenario:

Nadine moved to Kigali for a job and left her farm to be cared for by some farmhands. She has many cows and returns once or twice a year to check on the farm and make

sure everything is running smoothly. One day she receives a call from one of her farmhands telling her that her barn has been severely damaged by heavy rain and wind. She takes a trip out to the farm to find that the metal roofing is bent, the wooden frame for the roof is cracked, paint is chipped off, and one of the poles holding up the gate is falling over.

2. Separate trainees into small groups and tell them to answer the following questions about the scenario. Answers may vary—allow the trainees to brainstorm creatively. The correct answers will be revealed in **5.2 Key Facts**.
   a. What materials does Nadine need to fix the barn?
   b. What techniques can her farmhands use to repair the barn?

3. Read **5.2 Key Facts** together as a large group.

Guided Practice Activity

Topic 5.2 Task 3:

1. Explain to the trainees how different types damage can occur in farming facilities and different materials are used to repair them.

2. Draw out the table below in front of the class.

3. Instruct the trainees: Using the table below, write out different damages that may occur for farming facilities, and indicate the type of material that would be used to repair it as well as the potential technique.

4. Once they have completed the table, tell trainees to compare their findings with their peers and give each other advice regarding the materials and techniques each of them have indicated.

Damage to farming facility	List of materials necessary for the repair	Technique for repairing the damage
Example: Hole in sheet metal for roof	*Replacement metal a little larger than the hole, adhesive sealant to glue on the metal, saw to cut the metal, steel wool to clean off the metal, putty knife to apply adhesive*	*Clean off the roof near the hole as well as the metal that will be used to patch the hole, using the putty knife apply lots of adhesive sealant so the metal will stick, hold the metal onto*

		the roof and make sure it dries on

Application Activity

Topic 5.2 Task 4:

1. Read the following to trainees:

Divine's pig shelter is having problems as a result of excessive moisture getting into the wood's joints leading to rot and ultimately structural failure of the components.

2. Tell trainees to name the materials and spare parts needed to repair the pig shelter.

Possible Answer: Divine may choose to rebuild her pig shelter using brick, or another more moisture-resistant material. If this option is not feasible, Divine may replace the rotted wood with new wood and minimise exposure to moisture by fixing any leaks or cracks in the roof, doors, windows, or walls. She should also ensure proper drainage and ventilation to prevent excessive moisture in the wood and paint the wooden posts so that they last longer.

Topic 5.2 Task 5:

1. Tell trainees to go into the community and identify a damaged farming facility. The trainees will fill in the following table with a list of repairs for the facility. Then, debrief the trainees' findings as a large group.

Damage to farming facility	**List of materials necessary for the repair**	**Technique for repairing the damage**

Points to Remember

- When you cannot do a repair yourself, be sure to ask multiple other repairmen to make sure you get the best price.
- Make repairs as soon as you can to avoid further damages.
- Leaving damaged farming facilities is dangerous. If the facility collapses, it may harm a person or your animals.

Formative Assessment

1. What materials are necessary to fix a broken roof where:

a. The wood frame is cracked

Answer: Wooden timber, nails, ladder, hammer, potentially an adhesive as well as metal bars to hold the hood

b. There is a hole in the tin roof

Answer: Tin, adhesive, saw, ladder, and potentially a hammer and nails

2. If there is a hole in a concrete floor in part of the barn:

a. What materials will you need for the concrete?

Answer: Cement, water, sand and gravel

b. How can you fix the concrete?

Answer: Gather the materials then fill the hole with concrete, afterwards, level it off and ensure nobody touches it until it is completely dry.

ⓘ Further Information for the Trainer

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Learning Outcome 5.3: Maintain farm facilities

Objectives: By the end of the learning outcome, trainees will be able to:

a. Demonstrate basic maintenance of the farm facilities
b. Monitor farm facilities
c. Prepare a maintenance schedule for farm facilities

Time Required: 5 hours

Learning Methodology: Demonstration, hands on practice, field observation, one on one and group discussion

Materials Needed:

- Access to any and all farm facilities, such as warehouses, shelters, stocks, hangar, soil laboratory, green house, tanks, barns, and fences
- Materials to write a maintenance schedule

Preparation:

- ❑ Identify some farm facilities for the trainees to visit.
- ❑ Find some sample farm facility monitoring and maintenance documents.
- ❑ Tell the trainees to be prepared to walk around and observe different farming facilities.

Cross Cutting Issues:

- ✓ **Standardization culture:** Maintain farm facilities at a certain standard.
- ✓ **Inclusivity:** Try to include different facilities for a wide assortment of farming activities.
- ✓ **Gender:** Ensure that boys and girls understand they are equally capable of maintaining farm facilities.

Prerequisites:

- Understanding of materials and activities included in farming maintenance

Key Competencies:

Knowledge	Skills	Attitudes
1. Identify basic maintenance for farm facilities	**1.** Demonstrate basic maintenance of the farm facilities	**1.** Forward thinking
2. Recognize basic maintenance procedures of farm facilities	**2.** Execute farm facilities maintenance procedures	**2.** Problem solver
3. Describe a schedule of maintenance for farm facilities	**3.** Prepare schedule of maintenance for farm facilities	**3.** Adaptive

Steps:

Getting Started: What do we know and where are we going?

Topic 5.3 Task 1:

1. Put the trainees in pairs to consider the following questions and answer them based on either your experiences or the experiences of people they know:
   - **a.** What do you find people have done to keep well-maintained farm facilities?
   - **b.** What do you find people have done where their farm facilities were damaged and falling apart?
   - **c.** What techniques have you seen people use to monitor their farm facilities? How often do they perform routine monitoring of their facilities?
   - **d.** How have you seen people clean their farm facilities? Have they used chemicals? What other materials have you seen people use in cleaning the facilities?
   - **e.** What techniques have you noticed people use in painting the farm facilities?

2. Facilitate a group discussion where trainees share their observations and experiences.

3. As a large group, read the Key Competencies table.

Problem Solving Activity

Topic 5.3 Task 2:

1. Tell the trainees to fill in each of the following tables regarding the different methods they would employ to monitoring and maintaining farm facilities.

Monitoring Farm Facilities

Be sure to include both the external and internal structure.

Monitoring activity	Desired output or objective of the activity	Frequency of performing the activity
Example: Checking the timber beams and frames holding the structure of the barn	*Ensure no cracks, rot, or other degradation occurs in the wood. Replace the wooden/timber beams before the barn suffers further damages*	*Once every two weeks*

Maintaining Farm Facilities

Be sure to include different aspects of cleaning the facilities.

Maintaining activity	Desired output or objective of the activity	Frequency of performing the activity
Example: Consistently repairing the fence	*Keeping the animals in and out of a closed area. A consistently repaired fence is much less vulnerable to larger damages and even, redoing the entire fence.*	*Once a month*

2. Read **5.3 Key Facts** together as a large group.

Guided Practice Activity

Topic 5.3 Task 3:

1. Ask the trainees to explain how they would carry out the following tasks in small groups:

a. Suppose that you want to keep an old barn from falling apart. The entire facility is covered in dirt and cow dung and nothing is organized. The paint is falling off the walls. The timber frame is cracked and rotting. The tin roof has many holes such that when it rains the animals get wet. To restore the barn, identify the main steps to repair then maintain the facility.

b. Establish schedule of monitoring the barn so that it stays in good condition.

2. Have the groups share and compare their ideas with the rest of the class.

Application Activity

Topic 5.3 Task 4:

1. Instruct the trainees to do the following:

Using either your farm, your family's farm, or the farm of a member of your community, make a list of the different farming facilities. Using the table below for each of the facilities, mention the different aspects of the facility, including the internal and external structure. Create a schedule to monitor each of the farming facilities using your own

judgement. If the farmer already has routine monitoring and maintenance plans, take note of these, as well.

Facility:		
Maintenance activity	**Desired output or objective of the activity**	**Monitoring activity and frequency of monitoring**
Facility:		
Maintenance activity	**Desired output or objective of the activity**	**Monitoring activity and frequency of monitoring**
Facility:		
Maintenance activity	**Desired output or objective of the activity**	**Monitoring activity and frequency of monitoring**

Points to Remember

- Continuous care for a monitoring of facilities can prevent unexpected damages and degradation which will save more money and contribute to the well-functioning and improvement of the farm.
- Always wear suitable protective clothing and gear when monitoring and maintaining facilities.
- When monitoring and maintaining facilities at heights, make sure ladders are propped at a safe angle and secured on firm ground.

Formative Assessment

1. What are two different ways of maintaining a farm facility?

Possible Answers:

- Regular cleaning
- Repair broken or worn out parts e.g. leaking roofs, broken doors, broken fences cracking walls, loose, or chipped paint coatings
- Proper storage and organization of the tools and supplies
- Logging and record keeping regarding the state of the farm including the supplies, tools, and condition of all aspects of the farm

2. What does it mean to monitor a farming facility? How can you determine how often to monitor different aspects of the facility?

Answer: Consistently check and verify whether the different aspects of the fam facility are in good condition and functioning well. Depending on the farming facility and the different aspects of the farming facility, you will know how often monitor the farming facilities.

3. Why is it important to maintain a farm facility rather than simply wait for everything to need to be repaired?

Answer: The price of maintaining a farming facility is cheaper than reconstructing a new facility because the old one has degraded. Maintaining a farming facility is better for the health of the workers, animals, crops and all aspects of the farm. When people view the farm, they will think your business is more serious and your products are of higher quality.

Self -Reflection

1. Ask trainees to re-take the self- assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve.

2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

Further Information for the Trainer

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6. Preserving Old Barns: Preventing the loss of a valuable resource (2001/2017) by John Porter and Francis Gilman. Visit www.musterfieldfarm.com/preserving-old-barns to order.
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Summative Assessment

Write the following situation on the board and have the trainees play the part of the technician.

There is a cooperative of agro-pastoralists, based in the Bushoki sector of Rulindo district. They have a field of two hectares where they grow Irish potatoes and beans in rotation. The cooperative sells them in order to pay their children's school fees and overcome increasing financial difficulties. The soil of this field is mostly sandy loam. The rainy season is often irregular meaning if the farmers fail to cultivate and seed in the week following the onset of the rains, they do not expect a satisfactory harvest. Therefore, they must begin work very soon after the first rains appear then rake the soil surface in order to seed Irish potatoes and beans as early as possible. However, currently, agricultural hand tools and equipment are very rare and consequently too expensive. It is practically impossible to buy enough tools and equipment in time to work these two hectares of land in less than one week. Thankfully, the cooperative maintains a storage warehouse containing tools, equipment, supplies and materials. The issue is that they are not sure that tools and equipment will be able to perform the various functions for growing their specific crops.

To resolve their issue, the cooperative members decided to call upon a technician to make inventory of existing tools and equipment, as well as select and repair their farm tools and equipment.

As the technician, perform the following:

- ❑ Inventory existing cooperative farm tools and equipment for sowing Irish potatoes and beans crops
- ❑ Select and test cooperative farm tools and equipment for sowing Irish potatoes and beans crops
- ❑ Repair the cooperative's farm tools and equipment for sowing Irish potatoes and beans crops
- ❑ Establish a system for maintaining cooperative farm tools, equipment and facilities

Resources

- **Tools**
  - ✓ Hoe
  - ✓ Pick
  - ✓ Spade
  - ✓ Pots
  - ✓ Secateurs
  - ✓ Brushes
  - ✓ Saw
  - ✓ Panga
  - ✓ Watering can
  - ✓ Measuring tape
  - ✓ Collection bags
  - ✓ Hose
  - ✓ Shovel
  - ✓ Forked hoe
  - ✓ Spring balance
  - ✓ Pegs
  - ✓ Baskets
  - ✓ Putty knives

- **Equipment**
  - ✓ Wheelbarrow
  - ✓ Sprayer
  - ✓ Personal protective equipment

- **Materials**
  - ✓ Seeds of Irish potatoes and beans
  - ✓ Mineral fertilizers
  - ✓ Organic fertilizers
  - ✓ Soap
  - ✓ Household oil

Assessment Criterion

Checklist	Score	
	Yes	No
Indicator 1: Tools and equipment are properly inventoried		
✓ Tools and equipment specifications		
Indicator 2: Tools and equipment are well selected		
✓ Land preparation tools and equipment		
✓ Planting tools and equipment		
✓ Crop maintenance tools and equipment		
✓ Harvesting and product handling tools		
Indicator 3: Materials for cleaning tools and equipment are well selected		
✓ Cleaning materials		
Indicator 4: Cleaning techniques are well identified		
✓ Adjustments		
✓ Fixation		
✓ Oiling		
Indicator 5: Tools and equipment are properly cleaned		
✓ Mentions proper cleaning methods		
Indicator 6: Repairing techniques of tools and equipment are well identified		
✓ Explains and performs basic repairing operations		
Indicator 7: Tools and equipment repaired are well tested		
✓ Basic knowledge of tools and equipment functioning		
✓ Checking oil and fuel		
Indicator 8: Maintenance of facilities are properly performed		
✓ Regular monitoring system for agriculture facilities and tools is set up		
✓ Ensures facilities and tools will not become damaged in the future		

Observation

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