

Facilitating and Learning Materials

NATIONAL CERTIFICATE LEVEL I

TRADE AREA:

CASHEW VALUE CHAIN

UNIT 2:

WEED CONTROL IN CASHEW PLANTATION



This publication has been produced with the assistance of the Ghana Skills Development Initiative (GSDI) III, a project implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in cooperation with the Council for Technical and Vocational Education and Training (COTVET) on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ), co-funded by the European Union (EU) and the Swiss State Secretariat for Economic Affairs (SECO). The contents of this publication are the sole responsibility of GIZ and COTVET and can in no way be taken to reflect the views of the stakeholders.



Content	Page
Introduction	5-6
LO 1 Demonstrate knowledge of weed control in a cashew plantation	7-10
a) Explain weed control	
b) State the importance of weed control	
c) State weed control methods	
d) State the factors to consider in weed control	
LO 2 Demonstrate skills in manual weed control in a cashew plantation	11-14
a) Explain manual weed control	
b) State the importance of manual weed control	
c) State the factors to consider in manual weed control	
d) Demonstrate the safe use of tools for manual weed control	
e) State the procedure for manual weed control	
f) Perform manual weed control in a cashew plantation	
LO 3 Demonstrate skills in mechanical weed control in a cashew plantation	15-18
a) Explain mechanical weed control	
b) State the importance of mechanical weed control	
c) State the factors to consider in manual weed control	
d) Demonstrate the safe use of equipment for mechanical weed control	
e) State the procedure for mechanical weed control	
f) Perform mechanical weed control in a cashew plantation	
LO 4 Demonstrate skills in chemical weed control in a cashew plantation	19-22
a) Explain chemical weed control	
b) State the importance of chemical control	
c) State the factors to consider in chemical weed control	
d) Demonstrate the safe use of tools, equipment and chemical for chemical weed control	
e) State the procedure for chemical weed control	
f) Perform chemical weed control in a cashew plantation	
5 References	23

Table of Learning Outcomes (LOs)

LO 1	DEMONSTRATE KNOWLEDGE WEED CONTROL IN A CASHEW PLANTATION
LO 2	DEMONSTRATE SKILLS IN MANUAL WEED CONTROL IN A CASHEW PLANTATION
LO 3	DEMONSTRATE SKILLS IN MECHANICAL WEED CONTROL IN A CASHEW PLANTATION
LO 4	DEMONSTRATE SKILLS IN CHEMICAL WEED CONTROL IN A CASHEW PLANTATION

What is a QR Code (Quick Response Code)?

A QR code (quick response code) is a type of **2D bar code** that is used to provide easy access to information through a **smartphone**.





Example of a QR code

How to scan the QR Code

- You open an app called *barcode reader* and point the phone camera at the QR code, the app works together with the phone's camera.
- The barcode scanner reads the code and takes you to either the webpage with the extra information or to a video with extra information for independent studies.

After certain information you will see a table with a QR code as well as the title of the document or video of the QR code and an icon, like the one below.

- You can either scan the QR code with your smartphone or
- Ctrl + Click on the heading which will take you to the same information.

For more information scan the QR below or follow the URL hyperlink		
	https://www.youtube.com/watch?v=Xe1o5JDwp2k	

0. INTRODUCTION AND PRELIMINARY NOTES

In the agricultural sector, one of the major pitfalls is weed control, which affects quality, productivity and crop yield. If weeding is not done or it is done incorrectly it can lead to disastrous consequences such as a decrease in the quality of the soil which would contribute towards reduced land productivity, resulting in poor crop yield and the lifestyle of the community would deteriorate. It is important to have sustainable cultivation practices that conserve the health of the land to reduce the factors that lead to poor quality and production.

In developing countries, such as Ghana, agriculture faces many pressures such as the scarceness of skilled labour, volatility of the weather patterns due to climate change, a reduction in land productivity and increased migration. This makes it difficult for the owner/farmer to cultivate for their land and even more so for the effective management of weeds.

Previously, the focus has been on the development of weed control tactics, such as the usage of herbicides and high-tech solutions, which in Ghana are rarely reasonably accessible. As such, the focus of weed control requires an alternative and more integrated management strategy.

In this unit you will learn about weed control and gain the necessary skills to build up an effective strategy for weed control management to successfully deal with weeds.

LO 1: Demonstrate knowledge of weed control in a cashew plantation

With cashew plantations it is vital to bear in mind that soil health determines the health of the plants. For the best quality of the soil and to improve the growth of cashews, weeds need to be effectively managed.

To achieve the best weed management practices, a holistic approach to the agricultural practices is needed. In this learning outcome you will learn about weed control and the various methods to deal with weeds.

PC (a) Explain Weed Control

Weed control refers to the prevention or control of the the growth and spread of invasive, fast growing and unwanted plants (known as weeds). Weeds act as competition for the mango trees as they compete for space, nutrients, water and light.

PC (b) State the Importance of Weed Control

If weeds are left uncontrolled they will steal all the light, water and nutrients from the cashew trees and take over the space resulting in poor yield of mango fruit.

Not only will they take over the cashew plantation, contaminate seeds and hamper harvesting operations, but the weeds will spread to the surrounding regions making the soil less productive. Out of control weeds can lead to insect pests, plant diseases, run-off, leaching and soil erosion.



For sustainable land cultivation for future generations and to overcome poverty is it important to effectively deal with factors that inhibit production – such as weeds.

PC (c) State Weed Control Methods

- **Manual:** These are methods involving uprooting or pulling out weeds by hand or the use of small hand tools.
- **Mechanical:** Include the use of various mechanical equipment to remove weeds.
- **Biological:** Using the natural enemies of the weeds (such as insects, animals and other plants) to reduce the weed population. For example goats are known to eat weeds
- **Chemical:** This is the use of herbicides and weedicides to kill or limit the growth and spread of weeds.

A combination of the above methods of weed control is known as **integrative weed management**.

PC (d) State the Factors to Consider in Weed Control

There are many factors to consider when deciding on the method of weed control.

- **Competition between Cashew Trees and Weeds:** Cashew trees can sometimes out compete the weeds and not much is needed in terms of weed control techniques and procedures. This depends on the type and amount of weeds as well as how the cashew trees have been spaced.



- **Time Factors:** When developing a weed control strategy, it is important to establish when planting of the trees occurred, if there were any weed control measures before planting, how long the weeds have been infesting the area and the time between the weed control measures. When mapping out a weed control schedule, it needs to be considered that some seasons will be more difficult than others and that it is better to focus on longer term weed control measures even they are not so cost effective initially.

- **Cultivation Practices:** Ordinary farming practices can help with the control of weeds. These include tilling and mowing at the correct intervals.



- **Regrowth of Weeds:** Once weeds have been effectively managed, it is not permanent as they regrow. Manual methods of removal need to be done with care as any sections left behind will accelerate weed growth.

Some herbicides work in the soil and not just on the weeds and these might act for longer term weed control as it will prevent or limit future regrowth.



- **Environmental Factors:** Climate and natural vegetation on the land varies from place to place and this means that there will be different types and growth patterns of weeds. Ghana is known to experience droughts and this makes deciding which control methods to use all the more important, as the dry climate affects the ability of the cashew trees to recover from things like an overgrowth of weeds. It is important to make note of the soil conditions and rainfall patterns when implementing a weed control strategy as these affect the amount of competition between the weeds and the cashew trees, the pace at which the weeds will regrow and how effective herbicides will be in weed control management.



Due to the limited availability of water during dry seasons and droughts, there will be high competition for water and so it is better to have more control over the weeds than to try cut costs in this area. Chemical control methods can be harmful to the surrounding plants, animals and insects and these also need to be considered.

- **Effects on the Cashew Trees:** The method of removal can also impact on the growth of the cashew trees and their yield. Some herbicides may not be safe to use as they could affect the growth and yield of the cashew trees and you need to be selective in the type of herbicide you use so it is compatible with the cashew trees. When doing manual and mechanical techniques of weed control you need to ensure that you do not harm the cashew trees in the process.



- **Other Factors to Consider:** Manual weeding can be labour intensive while herbicides and high-tech equipment might not be so readily available and so the different options need to be weighed as to what is a viable and effective weed control management system. There may be harvesting challenges, elements of personal pride or landlord requirements that will be major deciding factors on the way the weeds will be managed. There may also be certain product guarantees and respray programs that will contribute to the development of a weed control management plan.

Self-assessment

PC (a)

Define weed control

.....

.....

.....

.....

PC (b)

Why is weed control important?

.....

.....

.....

PC (c)

State the different methods of weed control.

.....

.....

.....

.....

PC (d)

What factors are there to consider in weed control?

.....

.....

.....

.....

LO 2: Demonstrate skills in manual weed control in cashew plantation

In this learning outcome, manual weed control methods will be discussed and techniques for performing the weed control measures will be taught.

PC (a) Explain Manual Weed Control

When looking at weeding, the two of the main types are mechanical weed control (discussed in the next outcome) and manual weed control. The difference between the two is simply that manual weed control consists of using hand held devices (such as hoes and sickles) or hands alone (hand weeding) whereas mechanical weed control relies more on machinery type methods of removing weeds either with the help of animals or engines.



PC (b) State the Importance of Manual Weed Control

Manual weed control is especially important during the early growth phase of the cashew plants as the cashew plants can be easily damaged through other methods. It is also used to prepare the land for planting and to navigate the cashew plantation easily.

PC (c) State the Factors to Consider in Manual Weed Control

- 1) Pull the entire root out completely to avoid regrowth
- 2) A lot of physical and labour intensive power is needed
- 3) There aren't preventative measures as you can only de-root them once they surface and seen
- 4) On a small scale it is effective but not on a larger scale
- 5) Ensure that gloves are worn to prevent being pricked by weeds such as stinging nettles
- 6) Disturbing the soil can cause more weeds to sprout, therefore needs to be done with care
- 7) Remove the weeds before they flower
- 8) The competition with the weeds varies based on the size of the tree (specifically in this case the mango tree)
- 9) Different types of weeds have different interactions with the mango tree

PC (d) Demonstrate Safe use of tools for manual weed control



The use of tools for manual weed control general help and assist making the task easier. It is important to ensure that the person doing the task is wearing gloves in order to prevent being stung or scratched by weeds such as nettle. Weeds generally have a bad odour and this way the gloves help mask the smell.

The tools include things like cutlasses and hoes. Tools used vary based on the space, soil density, area and type of weeds. Each tool provides a unique performance and helps remove stubborn weeds and definitely entails physical labour and power behind using the tools. Removing the roots with the tools helps ensures that the entire root is removed to prevent weed regrowth.

PC (e) State the procedure for manual weed control

The procedure for manual weed control is as follows:

- Personal protective gear is worn
- Correct tools are identified and selected
- Ideas to be weeded are identified
- Weeds are cut short with a cutlass or dug out with a hoe
- Area is cleaned
- Tools are cleaned and stored



PC (f) Perform Manual Weed Control in a Cashew Plantation



Situation: There has been an infestation and you need to weed the cashew plantation. You have made the necessary preparations and you are ready to weed.

Instructions

1. Select and wear the correct protective equipment.
2. Gather the appropriate tools.
3. Perform manual weed control.
4. Clean and store tools.

Performance Criteria

1. Correct protective equipment was worn.
2. Correct tools were selected.
3. Manual weed control was conducted correctly.
4. Tools are cleaned and stored.

Use the checklist to follow the stated steps in performing manual weed control. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Daily PM Activities	Rate
1. Wearing the necessary protective equipment	
2. Correctly inspect the area	
3. Correctly perform manual weed control	
4. Cleaning and storing the equipment	

SELF-ASSESSMENT

PC (a)

Define manual weed control.

.....
.....
.....

PC (b)

Why is manual weed control important?

.....
.....
.....

PC (c)

Name and explain 2 factors of manual weed control.

.....
.....
.....
.....

PC (e)

What is the procedure for manual weed control?

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

LO 3: Demonstrate skills in mechanical weed control in a cashew plantation

Mechanical measures of weed control have been effective as keeping fields weed free long before the invention of herbicides.

In this learning outcome, mechanical weed control methods will be discussed and techniques for performing the weed control measures will be taught.

PC (a) Explain Mechanical Weed Control

Mechanical weed control refers to the weed control measures that involve the use of equipment and machinery. These mechanical techniques can be used in addition to herbicides in order to control the problem. These techniques can include cultivation practices such as tilling and a few more.

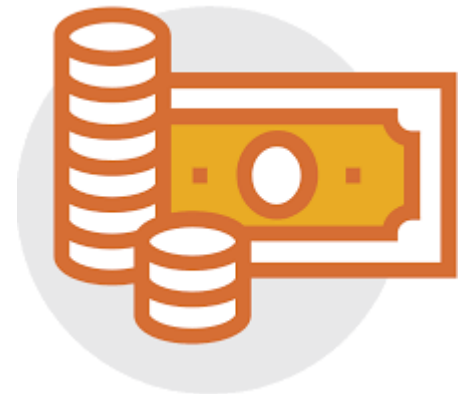
PC (b) State the Importance of Mechanical Weed Control

Mechanical weed control is important as weeds can restrict the growth of the trees and become a host for pests and diseases. Manual and chemical methods are not always able to effectively remove the weeds and so mechanical methods will need to be used. Mechanical weed control methods also include general cultivation practices that will help the growth of the cashew trees.

PC (c) State the Factors to Consider in Mechanical Weed Control

Cost and Labour:

- Mechanical weed control is more labour intensive than using chemical control. If not done at the correct time or if implemented poorly it can result in increased weed populations. Buying the machines and equipment can be expensive in the short term but it can reduce the amount of labour needed as well as act as a replacement for chemical control measures which can be harmful to the environment.



Damage to the Cashew Trees:

- The use of equipment and machinery need to be handled carefully so as not to damage the cashew trees. If the wrong devices are selected and mechanical techniques implemented, it could cause damage to the cashew trees and impact on their ability to produce cashew apples.

PC (d) Demonstrate the Safe Use of Equipment for Mechanical Weed Control

Machine and equipment maintenance:

- Tractors and Slashers are used
- The equipment and machinery require cleaning, regular servicing and to be oiled and handled properly to prevent damage and ill-use of the machinery and equipment. All of this needs to be done on a regular basis in order for the farmer to maintain the performance that is required to get the job done.



PC (e) State the Procedures for Mechanical Weed Control

- The equipment is handled with care and correctly – be mindful of equipment with blades
- A physical pre-start up test is conducted
- Ensure that the equipment is used only by means of following the instruction manual
- The power supply is checked in order to use the machinery
- Equipment warrantee and insurance is prepared and acknowledged
- A regular service plan is done in order to maintain the equipment in mint condition
- Techniques of rust prevention are made aware of
- Oiling is maintained in order to prevent rusting on equipment
- Clean out equipment after use to avoid blockage of weeds on equipment

PC (f) Perform mechanical weed control



Situation: Weeds have taken over the cashew plantation. You need to use mechanical methods of control to deal effectively with the weeds.

Instructions:

1. Prepare the equipment
2. Perform weed control in a simulated environment

Performance criteria:

1. Protective clothing is worn
2. Correct tools and equipment are selected and used
3. Safety precautions are taken
4. Weeds are effectively managed

Use the checklist to follow the stated steps in performing manual weed control. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Daily PM Activities	Rate
1. Wearing the necessary protective equipment	
2. Correctly inspect the area	
3. Correctly perform mechanical weed control	
4. Cleaning and storing the equipment	

SELF-ASSESSMENT

PC (a)

Define mechanical weed control.

.....

.....

.....

.....

.....

PC (b)

Why is mechanical weed control important?

.....

.....

.....

.....

PC (c)

What are the factors to consider in mechanical weed control?

.....

.....

.....

PC (e)

What is the procedure for mechanical weed control?

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

LO 4: Demonstrate skills in chemical weed control in a cashew plantation

PC (a) Explain Chemical Weed Control

Chemical weed control refers to the application of a chemical (herbicide) to control the germination (growth) of the weed species to weeds or soil. Simply, chemical weed control is the use of weedicide (weed killer) to control weeds.



PC (b) State the Importance of Chemical Weed Control

Chemical weed control is important as it is often the most efficient and effective method of weed control. It can be used to prevent the growth of weeds especially in cases where manual and mechanical measure fail.

PC (c) State the Factors to Consider in Chemical Weed Control

Important factors:

- Temperature
- Air / wind speed
- Soil moisture
- Soil Temperature
- Equipment

PC (d) Demonstrate the Safe Use of Equipment for Chemical Weed Control

Agricultural equipment and machinery used in chemical weed control are as follows:

- Knapsack sprayers
- Boom sprayers
- Mist blowers

Chemical control methods are hazardous and require caution when implementing them. Personal protective equipment needs to be worn at all times with using chemicals. The equipment needs to be checked, maintained and cleaned regularly, before and after use.

It is also important to perform pre-start up tests to make sure the equipment is in working condition and can be used for the implementation of chemical control.

PC (e) State the Procedure for Chemical Weed Control

- Personal protective clothing is worn
- The equipment is handled with care and correctly – be mindful of the chemicals
- A physical pre-start up test is conducted
- Ensure that the equipment is used correctly
- Clean equipment after use to avoid blockages as well as to make sure that hazardous materials will not cause harm or damage

PC (f) Perform chemical weed control.



Situation: You are responsible for weed management and manual and mechanical methods have not been enough to control the weeds. You are now required to use chemical control measures.

Instructions:

1. Wear protective clothing
2. Select the correct tools and equipment
3. Conduct chemical control
4. Clean and store tools and equipment after use

Performance criteria:

1. Protective clothing is worn
2. Correct tools and equipment are selected
3. Weed control management is conducted
4. Equipment and tools are cleaned and stored correctly

Use the checklist to follow the stated steps in chemical weed control. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Daily PM Activities	Rate
1. Wearing the necessary protective equipment	
2. Correctly identify and select the equipment and tools	
3. Correctly perform chemical weed control	
4. Cleaning and storing the equipment and tools	

Self-assessment

PC (a)

Define chemical weed control.

.....
.....
.....

PC (b)

Why is chemical control important?

.....
.....
.....
.....

PC (c)

What factors are there to consider when selecting chemical methods of weed control?

.....
.....
.....
.....
.....

PC (e)

What is the procedure for conducting chemical weed control?

.....
.....
.....
.....
.....
.....



Reflection on your learning in this unit:

Write short reflections of your learning and actions relating to the knowledge you have learnt and the practical skills you have developed.

Tips for writing your reflection / reflection journal:

You should write in your reflection journal within 24 hours of completing your practical session to record your experiences while they are fresh in your memory. Use the ‘What, So What, Now What Model’ to guide your writing. Answer the following questions:

- What happened to...? (Describe what happened when did what you did)
- So, what did I learn from that? (Give at least 2 examples)
- Now what can I do better in future? (How can I improve next time?)
 What did you learn to do?
- What difficulties did you face in this unit?
- What can I do it better in future?

How long did it take you each time you did it?

Attempt 1

.....

Attempt 2

.....

Attempt 3

.....

REFERENCES:

- <https://www.extension.purdue.edu/extmedia/ws/ws-16-w.pdf>
- <http://www.fao.org/3/y5031e/y5031e0e.htm>
- <https://www.lexiconoffood.com/video/organic-no-till-weed-management>
- <http://www.fao.org/3/y5031e/y5031e0e.htm>
- <https://www.mdpi.com/2077-0472/8/8/118/pdf>
- <https://www.lexiconoffood.com/soil/weed-control>
- http://agritech.tnau.ac.in/agriculture/agri_weedmgt.html
- <http://bulletin.ipm.illinois.edu/pastpest/articles/v982h.html>
- <http://www.ikisan.com/ap-mango-weed-management.html>
- Cloutier D.C., Leblanc M.L. (2001) Mechanical Weed Control in Agriculture. In: Vincent C., Panneton B., Fleurat-Lessard F. (eds) Physical Control Methods in Plant Protection. Springer, Berlin, Heidelberg
- <http://www.fao.org/3/y5031e/y5031e0e.htm>
- <https://www.mdpi.com/2077-0472/8/8/118/pdf>
- <http://www.fao.org/3/a-a0884e.pdf>
- <https://www.agweb.com/article/5-factors-to-consider-in-weed-management-NAA-sonja-begemann>
- <https://www.wikihow.com/Apply-Herbicides-Safely>
- <http://wienco.com/Site/>
- <http://www.reisscoogh.com/agric.php>
- <http://tomstargh.com/products/>
- <http://kenessgh.com/c/se/1331/Footwear.html>
- <https://rcoplus.com/>
- <https://ucanr.edu/repository/fileaccess.cfm?article=161108&p=IAOWAN>
- <https://www.bookstore.ksre.ksu.edu/pubs/CHEMWEEDGUIDE.pdf>
- https://www.wshc.sg/files/wshc/upload/cms/file/WSH_Guidelines_on_Safe_Use_of_Machinery.pdf
- <http://www.fao.org/3/y2767e/y2767e00.htm>