

LEARNING FACILITATING MATERIALS

NATIONAL PROFICIENCY LEVEL 1

TRADE AREA: **CASHEW PRODUCTION**

UNIT 7

HARVEST AND POST-HARVEST HANDLINGS OF RAW CASHEW NUTS





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UNIT INTRODUCTION

Welcome to Unit 7 of your learning journey in cashew production. This guide explains the main steps of harvest and post-harvest handlings of raw cashew nuts.

Do you already know why it is important to follow Good Agricultural Practices (GAP) for harvest and post-harvest handlings?

If you follow the steps for harvest and post-harvest handlings in the right sequence, you will produce a lot of high-quality raw cashew nuts. Do not miss a step! Apply your knowledge and skills accurately to achieve a product of very high quality for your customers.



In this unit, you will learn about the main steps of harvest and post-harvest handlings of raw cashew nuts. The learning material covers five sub-units:

- 1) Collecting raw cashew nuts
- 2) Detaching raw cashew nuts from the apple
- 3) Drying raw cashew nuts
- 4) Bagging raw cashew nuts
- 5) Storing raw cashew nuts

Each sub-unit contains theoretical and practical exercises. Each module includes written materials, visuals as well as self-assessments to test your knowledge and skills.

The benefit of learning this information is to produce a lot of high-quality raw cashew nuts for 25 years. Remember that the meticulous application of harvest and post-harvest handlings affects the quality of your valuable end product - the raw cashew nut.

The better the quality of your raw cashew nut, the higher your selling price! If you produce good quality products, your customers will always buy from you.

Even though this learning material provides essential information on harvest and post-harvest handlings for National Proficiency Level 1, you should also look out for new information, innovations and technological advances during your practical work that expand your knowledge and skills.

Are you ready to start your cashew learning journey? Let's start!

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ICONS



LEARNING
OBJECTIVES



ATTENTION



PRACTICALS
HANDS ON



CROPPING
CALENDAR



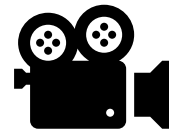
SELF ASSESSMENT



WELL DONE!



TAKE A BREAK!



WATCH VIDEO

ABBREVIATIONS

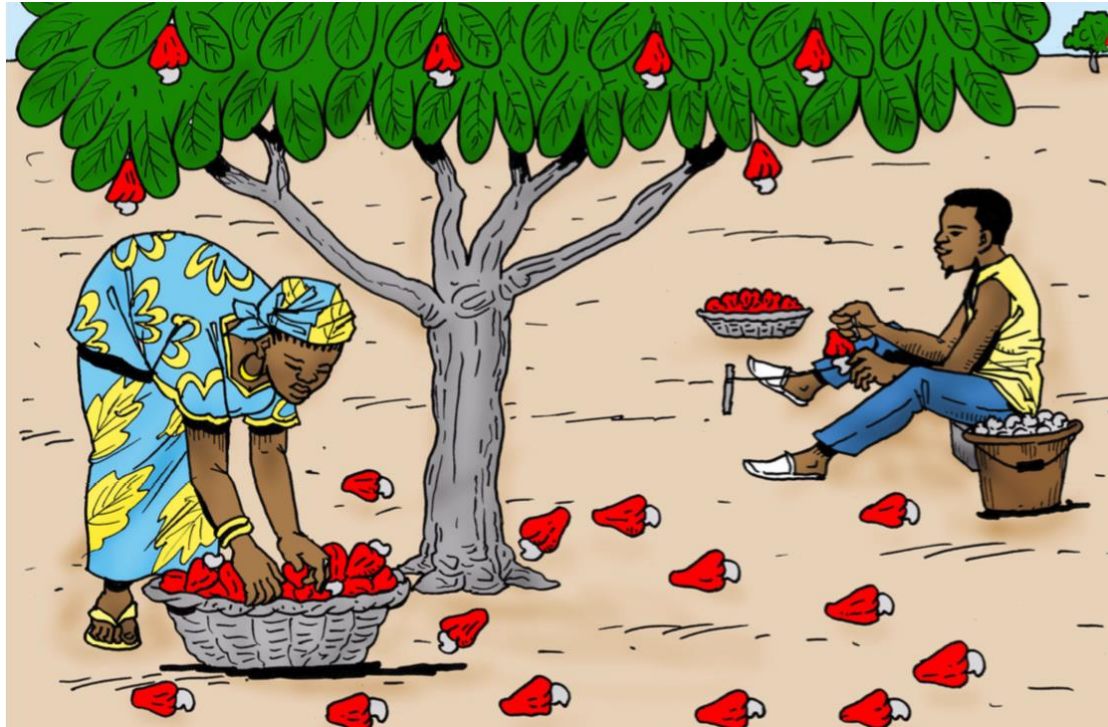
Here are some commonly used abbreviations.

cm	Centimeter (<i>1 cm = 10 millimeter</i>)
CNSL	Cashew Nut Shell Liquid
GAP	Good Agricultural Practices
HPH	Harvest and Post-Harvest Handlings
kg	Kilogram
m	Meter (<i>1 m =100 cm</i>)
m²	Square Meter
RCN	Raw Cashew Nuts

1. DEMONSTRATE SKILLS FOR COLLECTING RAW CASHEW NUTS

a) Explain the collection of raw cashew nuts

The collection of raw cashew nuts consists of picking the dropped and thus mature cashew fruits from the ground, and gathering them in a basket or bowl.



Source: GIZ/ComCashew – Collecting cashew fruits during harvest season



The collection of raw cashew nut takes place during the harvest season from January to May.

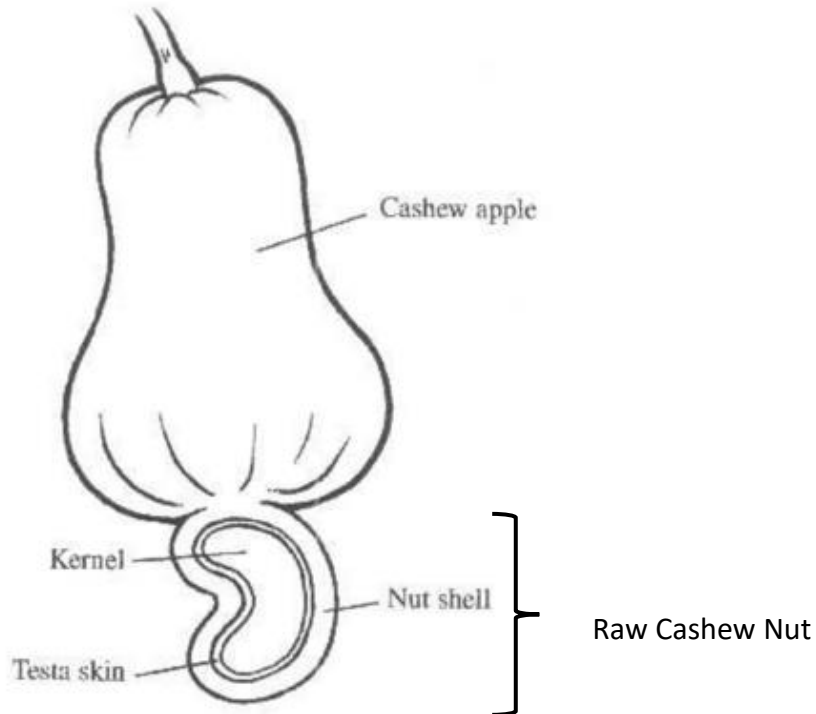
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For more information on collecting raw cashew nuts, watch video on *Cashew harvest and Post-harvest Training* from Minute 4:10 to 5:06

The cashew fruit consist of two main parts:

1. Cashew apple
2. Cashew nut



Source:

http://www.tzdp.org.tz/fileadmin/_migrated/content_uploads/Cashew_Value_Chain_Diagnostics.pdf

The cashew apple is shaped like a pear and has a yellow, orange or red color. Attached to the bottom of the cashew apple is the raw cashew nut.

The raw cashew nut has a kidney shape and consists of three parts:

1. Cashew nut shell (and liquid)
2. Testa skin surrounding the kernel
3. Kernel

The cashew tree normally bears cashew fruits 3 to 5 years after planting.

Improved cashew varieties might already bear cashew fruits after 1 or 2 years. Remove the flowers at this early stage to allow proper tree growth.



Source: GIZ/ComCashew - Mature cashew tree

In Ghana, mature cashew trees start flowering in late November and December. The cashew fruit grows in 90 - 100 days after flowering. The ripe fruits start dropping in late January.

b) State the factors to consider in collecting raw cashew nuts

During cashew harvest, allow the cashew fruits to drop on the ground before you pick them up.

Collect cashew fruits at least every 1 to 2 days in the south of Ghana. In hotter areas, for example in the northern part of Ghana, collect cashew fruits daily.

The best time to collect cashew fruits is in the morning. If you leave the cashew fruits uncollected, you allow the sun or insects to spoil the cashew apples, which lowers the quality of the cashew apple and therefore the raw cashew nuts.

It is recommended to keep record of the productive cashew trees and also mark the trees that do not produce well.



Source: GIZ/ComCashew - Collection of cashew fruits



Only collect the cashew fruits that dropped on the ground.



Weed the area under the cashew trees before harvesting starts. After weeding, it is easier to spot the cashew fruits for collection.



Strong winds during harvest can drop immature cashew fruits to the ground. Do not collect these immature cashew fruits.

Immature cashew fruits



Mature cashew fruit



Source: GIZ/ComCashew - Cashew fruits on cashew tree



Never plug cashew fruits by hand from the tree or by using a rod. Do not climb the tree and shake branches to drop the fruits. The cashew fruits that are still hanging on the tree are not yet fully mature and are of lesser quality.

c) Outline the procedures for collecting raw cashew nuts

Use the checklist to follow steps 1 to 6 in collecting raw cashew nuts. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Activities	Rating
1. Weed under the cashew tree before the harvest season	
2. Allow cashew fruits to drop (do not plug them from the tree)	
3. Collect the cashew fruits every 1-2 days, preferably in the early morning and do not collect immature fruits	
4. Keep record of trees that produce well	
5. Mark trees that do not produce well	
6. Use a basket or bowl to keep the collected fruits before detaching	

It is ok, if you are not excellent in everything. You can always try again.

d) Collect raw cashew nuts



Practical Exercise: Go to the farm for your apprenticeship and collect a bowl / basket of cashew fruits early in the morning.



Source: GIZ/ComCashew - Collection of cashew fruits



SELF ASSESSMENT

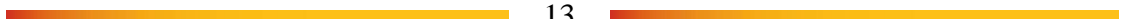
1. State two (2) reasons for weeding before harvest.

1. Explain the process of raw cashew nut collection.

2. State the reason for collecting cashew nuts instead of plugging from the tree.



Well done! You have completed the first set of questions. This is very encouraging. Let's move on to proceed on your cashew learning journey.



2. DEMONSTRATE SKILLS FOR DETACHING NUTS FROM CASHEW APPLES

a) Explain nut detachment in cashew apple harvesting

The best way to detach the cashew nut from the cashew apple is by using a nylon thread that is fixed to two short wooden sticks.



Source: GIZ/ComCashew - Detaching cashew nut from cashew apple

This is how you detach the raw cashew nut from the apple:

- Hold one of the short wooden sticks down in front of you, using your left foot
- Pick one cashew fruit at a time
- Hold the nut with your left hand
- Holding the other wooden stick in your right hand, wind the string around the base of the nut once, where the nut is attached to the apple
- Pull the string tightly and detach the raw cashew nut from the apple
- Let the apple drop into a separate basket
- Put the neatly detached nut in another basket



For more information on detaching raw cashew nut from the cashew apple, watch video on *Cashew harvest and Post-harvest Training* from Minute 4:10 to 5:06

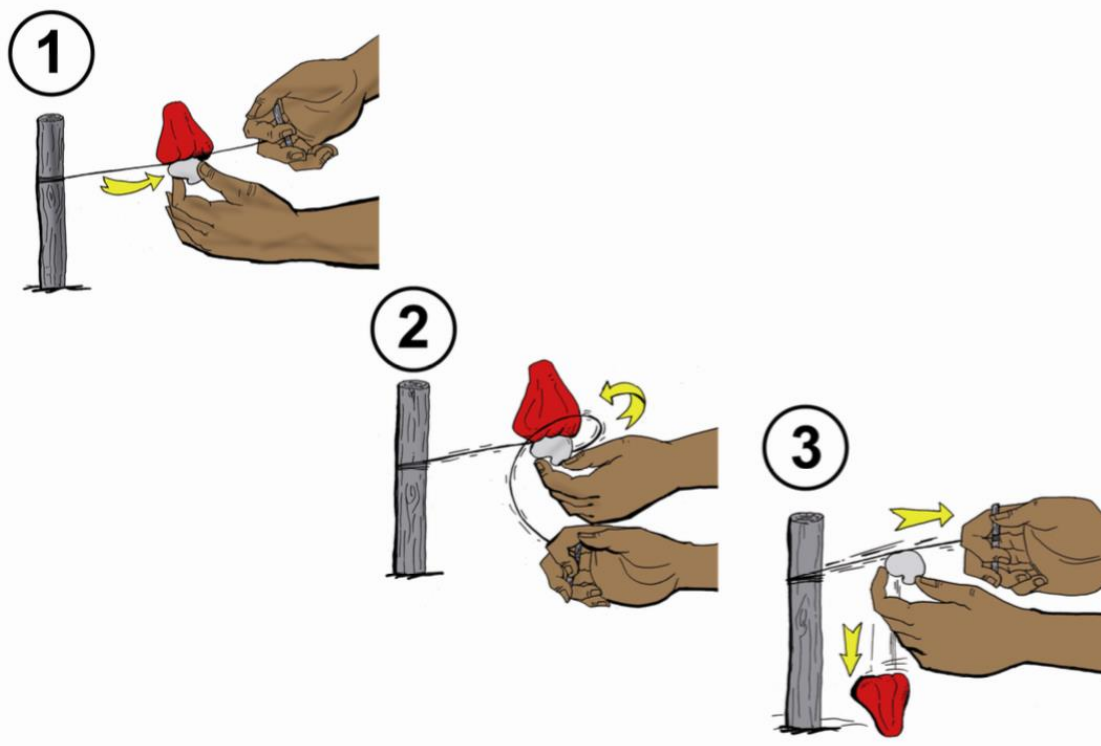


Source: GIZ/ComCashew – Detaching cashew nut from cashew apple with foot on the wood



Ensure that no flesh/pulp is attached to the raw cashew nut after separation. The flesh/pulp from the cashew apple will spoil the kernel in the raw cashew nut.

You can also put a wooden stick in the ground in front of you. Use your left hand to hold the nut and your right hand to wind the nylon thread tightly around the base of the nut. Pull the string tightly to detach the raw cashew nut from the apple.



Source: GIZ/ComCashew – Detaching cashew nut from cashew apple

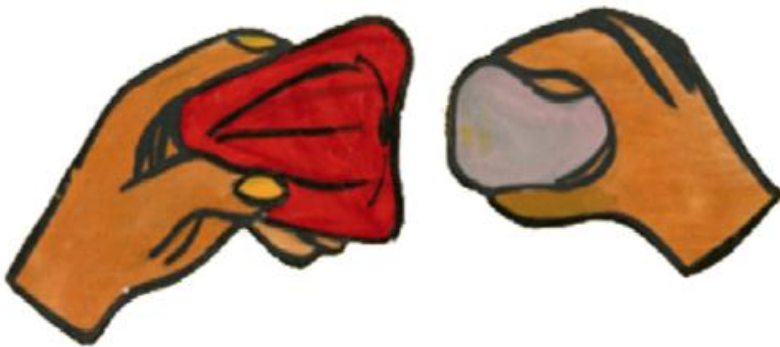


The detachment of raw cashew nuts from the apple takes place from January to May, immediately after the cashew fruits have been collected.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec

b) State the importance of nut detachment in cashew nut harvesting

Detach the raw cashew nut neatly from the cashew apple, as to not affect the kernel quality.



Source: GIZ/ComCashew – Neatly detached cashew nut from apple

The quality of the kernel is affected when:

- the raw cashew nut remains attached to the apple for too long after dropping to the ground
- the apple starts fermenting and the raw cashew nut is still attached
- the raw cashew nut is not neatly detached from apple

Remember! The higher the quality of your product, the better your selling price!



Source: GIZ/ComCashew - Neatly detached cashew nuts during drying

c) State the tools used in nut detachment

The following tools are required for nut detachment:

- The best way to detach the cashew nut from the cashew apple is by using a **Nylon Thread** that is fixed to two short wooden sticks.
 - The length of the nylon cord (0.5 - 1 m) depends on the sitting or standing position and the height of the person doing the separation.
 - Pay attention to the position of your hands and fingers while you separate the nut.
 - Clean the nylon thread, before and after usage and store it safely, out of reach of children.



Source: <https://merrilywequiltalong.com/aurifil-invisible-nylon-thread-1094yd-clear>

- You can also use a sharp **Knife** to detach the cashew nut from the apple.
 - Pay attention to your hands and fingers while you cut between the apple and the nut.
 - Clean the knife, before and after usage and store it safely out of reach of children. Caution! Handle knife safely to reduce risk of injuries.



Source: <https://www.knivesandtools.de/de/pt/-kizer-bush-1034a2-brown-g10-survivalmesser-justin-gingrich-design.htm>



If you use a knife for the separation, ensure that the nut is neatly detached from the apple. The nut must be clean and without any flesh / pulp.

d) **State the factors to consider during nut detachment**

It is important that the raw cashew nut is neatly detached from the cashew apple immediately after collection to obtain a high-quality kernel during processing of the raw cashew nut. Ensure that the raw cashew nut is neatly detached from the apple and that no flesh/pulp is left on the nut after separation.



Source: GIZ/ComCashew - Women detaching cashew nuts from cashew apple on farm



It is recommended to use the nylon thread for detaching the raw cashew nut from the cashew apple. After some practice, using the nylon thread is much faster and cleaner than using a knife.

e) Outline the procedures used to detach nuts

Use the checklist to follow steps 1 to 9 in detaching raw cashew nuts from cashew apples. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Activities	Rate
1. Prepare your nylon thread or knife	
2. Pick a cashew fruit	
3. Wind the string around the base of the raw cashew nut once	
4. Hold the raw cashew nut	
5. Pull the string tightly and detach the raw cashew nut from the cashew apple	
6. Carefully drop the cashew apple into a basket	
7. Ensure that the raw cashew nut is neatly detached, without any flesh/pulp left on the nut	
8. Put the neatly detached raw cashew nut into another basket	
9. Remove and discard immature, diseased, shrivelled and damaged nuts	

Remember, the learning journey never ends.

f) Detach cashew nuts



Practical Exercise: Go to the farm for your apprenticeship and detach raw cashew nuts from the apple, using a nylon thread.



Source: GIZ/ComCashew - Woman detaching cashew nuts from cashew apples on farm



SELF ASSESSMENT

1. Outline the process of detaching raw cashew nuts from cashew apples.

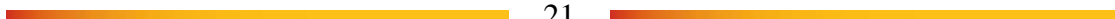
2. State how to safely use the tools in detaching cashew nuts from cashew apples.

3. Describe the features of a neatly separated cashew nut.

4. State the advantage of using the nylon thread technique.



*Congratulations! You have completed the second set of questions.
Let's move on to the next chapter.*



3. DEMONSTRATE SKILLS FOR DRYING RAW CASHEW NUTS

a) Explain raw cashew nut drying

After detaching, raw cashew nuts are air-dried on:

- Concrete floors
- Drying mats made of bamboo and palm leaves
- Tarpaulins



Raw cashew nuts are air-dried in the shade or the sun for 3-4 days.

Sunny areas like the Northern parts of Ghana will require drying under shade. More humid areas like the Southern parts will require drying in the sun to avoid humidification of the cashew nuts.

The moisture content of raw cashew nuts at harvest is dependent on:

- Climatic conditions
- Moisture content of the soil on which the nuts have fallen
- Weed growth density under the tree
- Time between cashew fruit fall to the ground and collection

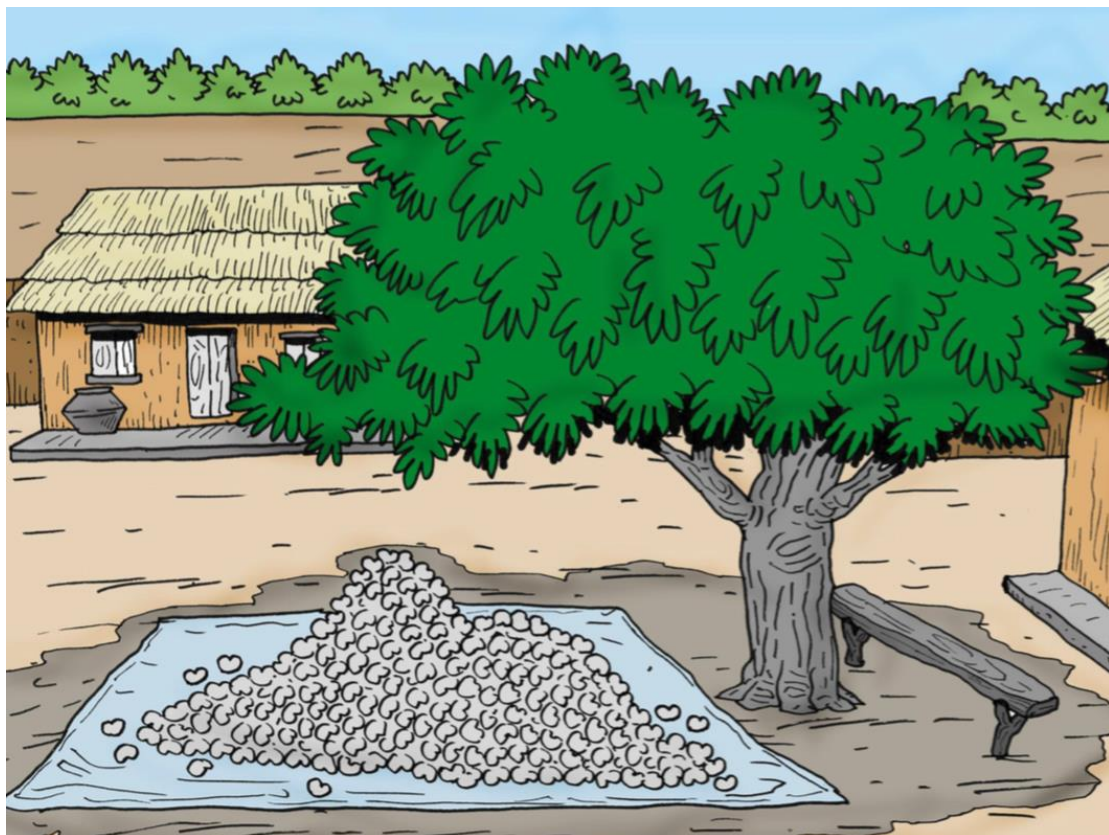


Source: GIZ/ComCashew – Drying of RCN under the sun

The drying areas should be smooth and slightly sloping to allow rainwater to run off. The nuts should be frequently raked and turned to ensure that they are dried uniformly.

In the evenings, the nuts should be heaped together and covered. Heap the nuts while they are still warm. They will continue to dry under the cover of a tarpaulin or under palm leaves. In the morning, check the moisture content of the raw cashew nuts. Assess their need for either further drying or readiness for bagging. If further drying is required, spread the nuts evenly in the morning to continue the drying process.

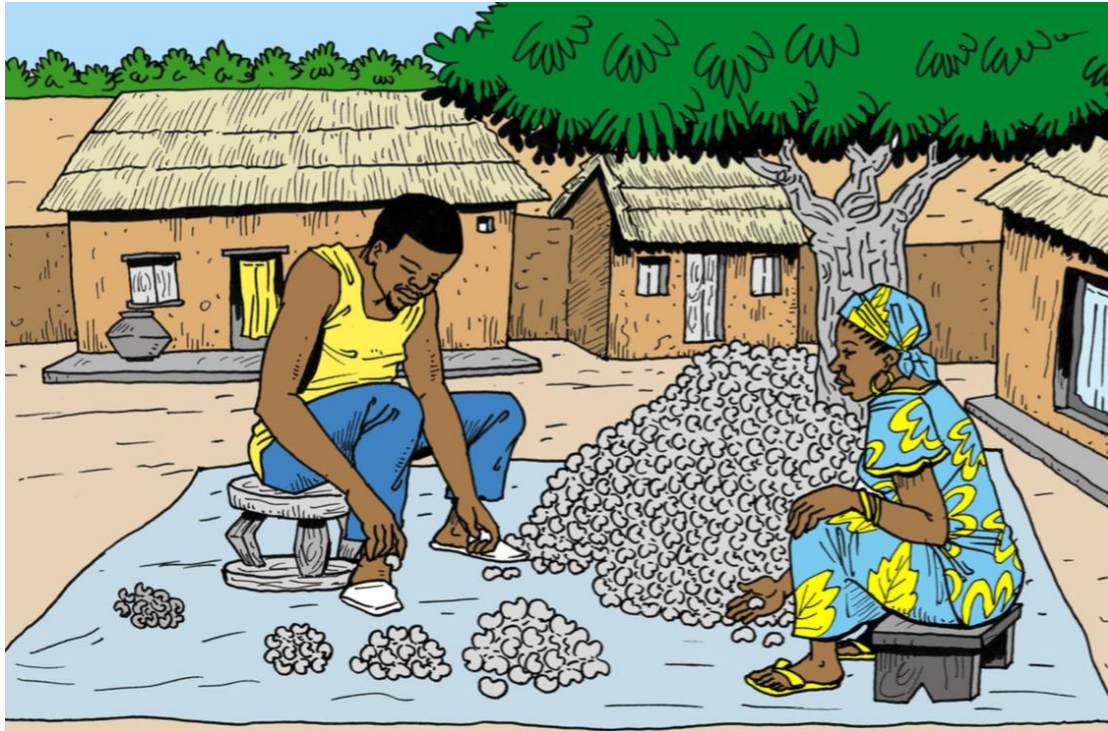
As soon as the nuts are dry, they should be stored and protected from rain.



Source: GIZ/ComCashew – Drying of raw cashew nuts in the shade on tarpaulin



Before bagging, remove any foreign matter and discard immature, diseased, shriveled and damaged nuts.



Source: GIZ/ComCashew – Removing foreign matter from dried raw cashew nuts



Drying takes place from January to May, immediately after separating the raw cashew nut from the cashew apple.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
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For more information on drying raw cashew nuts, watch video on *Cashew harvest and Post-harvest Training* from Minute 7:26 to 11:11

b) State the importance of drying raw cashew nuts

Raw cashew nuts are air-dried in the shade or under sunlight for two reasons:

- To reduce the moisture content
- To mature the seed (kernel) that is inside the nut

The high moisture content may cause deterioration of the kernel due to:

- mould
- bacterial attack
- enzyme action

Drying the raw cashew nuts immediately after harvesting is essential in preserving their quality after harvest.



Source: GIZ/ComCashew – Drying of RCN on tarpaulin under the sunlight



Make sure that you do not neglect this process to attain high-quality products.

c) Describe the use of equipment for drying

The drying floors are always outside, on specially laid **concrete floors**, **drying mats made of bamboo** or **palm leaves** (1m height, 1.5 m² drying space) or **tarpaulins**. The drying floors are set up in an area with shade or under sunlight.

The following tools and materials are required for drying:

- **Tarpaulin**



Source: https://www.msquaredphotog.com/index.php?main_page=product_info&products_id=2620

Use **Rakes** or **Plastic Containers** to turn the raw cashew nuts every two hours to ensure uniform drying. Dried nuts make a rattling sound while turning.

- **Rake**



Source: <https://www.krafttool.com/GG871>

- **Plastic Container**



Source: <https://www.about-tea.de/authentic-big-bin-container-storage-box-yellow-plastic-1210074-EN>

You can also check the moisture level of raw cashew nuts by taking different samples in your hand and shaking them. Dried nuts make a rattling sound while shaking.



Source: GIZ/ComCashew – Checking moisture content of RCN manually during drying

d) Explain factors to consider in drying raw cashew nuts

When pouring the raw cashew nuts under the sunlight or on a shaded drying ground, it is important that the raw cashew nut layer is not thicker than 10 cm to ensure proper drying. This is approximately 60 kg of nuts per square meter (m²).



The raw cashew nuts are fully dried when the moisture content of the nut is 10 % and below.



Pick some raw cashew nuts in your hand and shake them. If the nuts are well-dried, they will produce a rattling sound. The raw cashew nuts are then ready for bagging.

The color of well-dried raw cashew nuts is light brown for the dry season crop and dark brown for the rainy season crop.

Do not dry:

- indoors
- on metallic surfaces
- under the scorching sun

When drying raw cashew nuts indoors, the quality of the raw cashew nuts will deteriorate because the raw cashew nut cannot release the moisture properly, which can result in infestation of the entire drying batch.

When drying raw cashew nuts in the heat, the quality of the raw cashew nuts will deteriorate because the cashew nut shell liquid (CNSL) – that is in the shell of the raw cashew nut – can enter the kernel.

e) Outline the procedure for drying raw cashew nuts

Use the checklist to follow steps 1 to 9 in drying raw cashew nuts. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Activities	Rate
1. Find a dry, even and shaded or lightly sunny ground on the farm or in the community	
2. Spread tarpaulin on the ground or erect drying mats made of bamboo and palm leaves	
3. Pour undried raw cashew nuts on the drying ground evenly (60 kg/m ² and not thicker than 10 cm)	
4. Turn raw cashew nuts frequently (every 2 hours) to ensure uniform drying	
5. Heap nuts together in the evenings and cover them with a tarpaulin or palm leaves to protect from rain, animals and thieves	
6. Uncover and spread the nuts in the morning to continue drying	
7. Test moisture content after 3 days	
8. Raw cashew nuts are ready for bagging when the moisture content in the nut is 10 % and below. They make a rattling sound when shaking them	
9. Remove any foreign matter and discard immature, diseased, shriveled and damaged nuts	

Failure is your opportunity to begin again more intelligently.

f) **Dry raw cashew nuts**



Practical Exercise: Go to the farm for your apprenticeship and dry raw cashew nuts.



Source: GIZ/ComCashew – Farmers drying RCN



SELF ASSESSMENT

1. Outline the process of drying raw cashew nuts.

2. State the tools used in drying raw cashew nuts.

3. Describe quality features of well-dried raw cashew nuts.



You are making great progress! You have completed another set of questions. Take a break or go ahead and start with the next chapter.



4. DEMONSTRATE SKILLS FOR BAGGING RAW CASHEW NUTS

a) Explain bagging

Bagging is filling dried raw cashew nuts into bags. Fill raw cashew nuts only in jute bags to allow adequate ventilation of the nuts and to prevent build-up of moisture during storage, which can result in infestation of the raw cashew nuts.



Source: GIZ/ComCashew – Bagging of RCN at the farm



Bagging takes place from January to May, approximately 4 to 5 days after drying.

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
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b) State the importance of bagging

Raw cashew nuts must be bagged appropriately for safe storage and transportation.

Buyers demand a reliable supply of high-quality raw cashew nuts in 80 kg jute bags. Using 80 kg bags facilitates marketing of your product.

Knowing the weight of your product also helps in negotiating for a better price. Therefore, it is important to weigh the product while filling.

A reliable and uniform supply of high-quality raw cashew nuts to buyers can be an advantage for your business and can result in receiving premium prices from buyers.

c) State the factors to consider in bagging

Ensure that the raw cashew nuts are fully dried. The moisture content of the raw cashew nuts should be 10 % and below.

Ensure the raw cashew nuts are cooled down after drying. Leave the filled bags open for 24 hours before stitching/closing the jute bags for storage to reduce the risk of humidification of the raw cashew nuts during storage.

d) **State the tools and materials used in bagging**

The following tools and materials are required for bagging:

- **Jute bags** are most appropriate for storing raw cashew nuts. Jute bags allow air to flow through. You can use former cocoa jute bags to store raw cashew nuts.



Source: <https://www.tvv-verpackungen.de/Jute-Saecke-H320>



Do not use plastic or fertilizer sacks or containers like boxes, buckets, etc. for storage. They store the moisture and infest the raw cashew nuts.



Source: GIZ/ComCashew – Weighing of RCN

- Use **Manual Weighing Scales** to ensure that each jute bag is filled with exactly 80 kg of raw cashew nuts.



Source: <https://www.awmlimited.co.uk/va.html>

- Use a thick needle and **nylon thread** to tightly stitch the jute bags before storage.



Source: <https://merrilywequitalong.com/aurifil-invisible-nylon-thread-1094yd-clear>

e) Outline the procedure for bagging

Use the checklist to follow steps 1 to 5 in bagging raw cashew nuts. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Activities	Rate
1. Place jute bag on weighing scale	
2. Pour well-dried raw cashew nuts into jute sacks	
3. Fill jute sack with well-dried raw cashew nuts up to 80 kg	
4. Leave the bags open for 24 hours for cool down of the raw cashew nuts after drying	
5. Stitch jute sacks tightly to avoid spillage	

Education not only teaches us facts, but also teaches us how to think and learn on our own.

f) **Bag raw cashew nuts in jute sacks**



Practical Exercise: Go to the farm for your apprenticeship and bag raw cashew nuts in 80 kg jute bags.



Source: GIZ/ComCashew – Weighing of RCN during bagging



SELF ASSESSMENT

1. Outline the process of bagging raw cashew nuts.

2. State three (3) factors to consider during bagging.

3. Describe the tools and materials required for appropriate bagging.

4. Describe the process for appropriate bagging.



Great success, you are almost done! Let's tackle the last chapter.

5. DEMONSTRATE SKILLS FOR STORING RAW CASHEW NUTS

a) Explain storage of raw cashew nuts

Storage of raw cashew nuts involves the systematic stacking of 80 kg jute bags, filled with raw cashew nuts on pallets in a ventilated warehouse.

Storage requirements depend on weather conditions. Raw cashew nuts are usually produced in climates with a long dry season. Thus, simple buildings with concrete floors and walls, and roofs of corrugated metal provide adequate storage.



Source: GIZ/ComCashew – Placing jute bags on wooden pallets for storage



Remember! Raw cashew nuts must be dried at a moisture content of 10 % or below, packed and sealed in jute bags for storage.



An appropriate storage system for raw cashew nuts is important to store raw cashew nuts for 12 months or more.

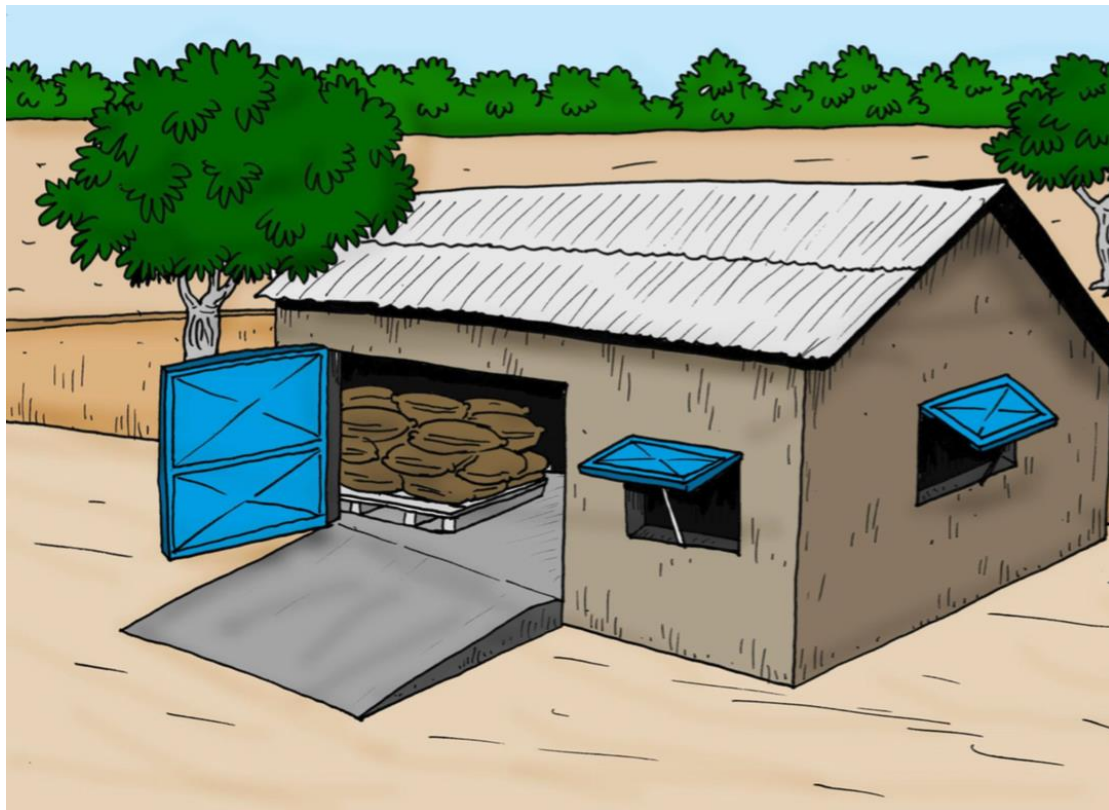
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b) State the factors to consider in storing raw cashew nuts

There are ten (10) factors to consider in setting up a safe storage structure and system for storing raw cashew nuts:

1. A waterproof, dry floor
2. A firm and secure metal roof
3. Openings in the wall must be protected in order to prevent water from entering the room
4. A clearance of 1.5 m between the packed jute bags, the roof and the walls of the storage
5. Allow air to circulate freely
6. The store should be easily inspected
7. Allow stacks to be moved around, if large quantities are to be stored
8. Allow sufficient space for individuals to walk around and check the condition of the stack
9. Place stacks on raised wooden platforms / pallets to prevent moisture from the floor from entering the nuts
10. Label the different stacks of products according to sourcing origin and initial date of storage

Always store raw cashew nuts in a dry and ventilated warehouse.



Source: GIZ/ComCashew – Warehouse for proper storage of raw cashew nuts in a community

Do not store raw cashew nuts:

- outside without protection from rain
- in a hot room

Infestation can also occur at various stages of handling raw cashew nuts, especially during inappropriate storage. Infestation can go undetected until the damage has progressed to the point of heavy product loss.



Sell the raw cashew nuts within the same year of harvest to prevent quality loss. Nuts kept until the following season are of much lower quality. You might run the risk of not being able to sell your raw cashew nuts at all.



Source: GIZ/ComCashew – Storage of RCN in warehouse



For more information on storing raw cashew nuts, watch video on *Cashew harvest and Post-harvest Training* from Minute 11:12 to 12:50

c) **State the tools and materials used for storing raw cashew nuts**

The following tools and materials are required for storage:

- Use **wooden pallets** to raise jute bags off the floor to prevent moisture from the floor from entering the nuts. Arrange pallets with sufficient space from the walls, roof and other stacks to ensure ventilation.



Source: <https://www.universalpallets.com/product/4-way-entry-standard-size-conversion-pallet/>

- Use **Wooden Sign Boards** to label each stack according to sourcing origin and initial date of storage.



Source: <https://www.indiamart.com/proddetail/wooden-sign-board-14857621348.html>

d) Outline the procedure for storing raw cashew nuts

Use the checklist to follow steps 1 to 4 in storing raw cashew nuts. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Activities	Rate
1. Place wooden pallets on the floor	
2. Arrange pallets with 1.5 m clearance to the walls of the storage and a 1 m gap between the stacks	
3. Place jute bags on the pallets	
4. Stack jute bags not higher than 4-meters to ensure stability	

Our greatest weakness is giving up. The most certain way to succeed is always to try one more time.

e) **Store raw cashew nuts**



Practical Exercise: Go to your apprenticeship venue and store raw cashew nuts in a ventilated warehouse.



Source: GIZ/ComCashew – Storage of RCN



SELF ASSESSMENT

1. Outline the factors to consider for setting up a safe storage/warehouse.

2. Outline the process of safe storage.

3. State the reasons for the importance of safe storage.



Congratulations! Well done! You have completed this unit successfully.

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