

LEARNING FACILITATING MATERIALS

NATIONAL PROFICIENCY LEVEL 2

TRADE AREA: **CASHEW PROCESSING**

UNIT 4

MANUAL CASHEW APPLE PROCESSING



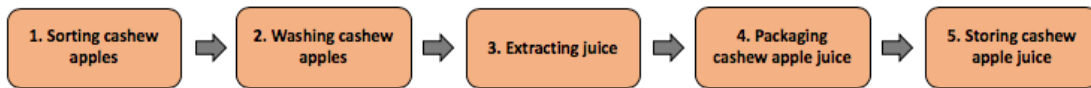
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UNIT INTRODUCTION

Welcome to Unit 4 of your learning journey in manual cashew apple processing. This guide explains the main steps in the cashew apple processing process.

The flow chart below shows the entire cashew apple processing process in 5 steps and will guide you throughout this unit:



Do you already know why it is important to follow Good Manufacturing Practices (GMP) in cashew apple processing?

If you follow the steps in the cashew apple processing process in the right sequence, you will produce high volumes of fresh cashew apple juice. 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 steps 1 to 5. The learning material covers five sub-units:

- 1) Sorting cashew apples
- 2) Washing cashew apples
- 3) Extracting juice from cashew apples
- 4) Packaging cashew apple juice
- 5) Storing cashew apple juice

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 high volumes of good quality fresh cashew apple juice for direct consumption or further processing into other delicious by-products. Sell the fresh and healthy cashew apple juice in your community or continue processing the fresh cashew apple juice into jams, cajujina and cashew candies to add more value to your product.

Even though, this learning material provides essential information on manual cashew apple processing for National Proficiency Level 2, 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



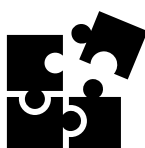
ATTENTION



PRACTICALS
HANDS ON



CROPPING
CALENDAR



SELF ASSESSMENT



WELL DONE!



TAKE A BREAK!



WATCH VIDEO

ABBREVIATIONS

Here are some commonly used abbreviations.

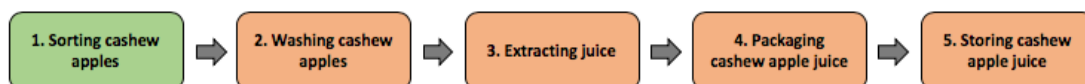
°C	Degree Celsius
g	Gram (<i>1000g = 1 kg</i>)
GMP	Good Manufacturing Practices
ml	Millilitre (<i>1000 ml = 1 Litre</i>)

1. DEMONSTRATE SKILLS FOR SORTING CASHEW APPLES

a) Explain sorting of cashew apples

Sorting of cashew apples is the process of separating high-quality and ripe cashew apples, from rotten and unripe cashew apples.

The green field indicates the step of the cashew apple processing process you are currently studying.



Source: GIZ/ComCashew – Fresh cashew apples



Sort and process cashew apples for fresh cashew apple juice making on the same day as you pick or collect the apples to avoid fermentation. Once collected, keep the cashew apples in a low temperature or refrigerated room to prevent fermentation.

b) State the importance of sorting cashew apples for processing

Sorting cashew apples is important to:

- ensure only good quality apples are selected
- avoid mixing rotten and diseased cashew apples with high-quality apples during processing
- achieve a good taste and flavor of your fresh cashew apple juice from high-quality cashew apples
- achieve a healthy and safe fresh cashew apple juice for consumption from high-quality cashew apples

c) State the criteria for sorting cashew apples for processing

Only high-quality cashew apples are used for processing into fresh cashew apple juice.

The factors to consider in selecting high-quality cashew apples are:

- Size
- Shape
- Firmness
- Defects
- Color
- Taste
- Level of ripeness

These are the features of high-quality cashew apples for fresh cashew apple juice production:

- Fresh
- Fully ripe
- Wholesome
- Intact
- Firm (no signs of wilting)
- Clean
- Spotless (no stains or perforations)
- Sweet
- Low astringency and acid taste
- Weight ranging from 100g to 140g
- Red or yellow skin color



Source: GIZ/ComCashew – Sorted high-quality cashew apples

Low quality cashew apples are/have:

- unripe
- dirty
- moldy
- contaminated
- rotten
- imperfect fruits
- a torn surface
- physical damages
- smashed parts
- rotten spots



Discard green or perished cashew apples. Remove cashew apples that present diseases, deformations, defects or injuries.



It is important to have good lighting during sorting of cashew apples.



Sort cashew apples in a cool and shaded place to avoid fermentation of the cashew apple during sorting.

d) **State the function of tools used for sorting cashew apples for processing**

The following tools are required for sorting cashew apples:

- Cashew apples can be sorted into **baskets, plastic buckets** and stainless-steel **bowls**



Source: GIZ/ComCashew – Cashew apples in basket, bucket and bowl

e) Outline the procedure for sorting cashew apples for processing

Use the checklist to follow steps 1 to 8 in sorting cashew apples. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Activities	Rating
1. Take a batch of cashew apples	
2. Pour the cashew apples on a clean surface (inspection table) for inspection in a cool and shaded place	
3. Sort the cashew apples according to <ul style="list-style-type: none"> • Size • Shape • Firmness • Defects • Color • Taste • Level of ripeness 	
4. Place high-quality cashew apples in a plastic bucket or stainless-steel bowl	
5. Discard green or perished cashew apples	
6. Remove cashew apples that present diseases, deformations, defects or injuries	
7. Send high-quality cashew apples for washing	
8. You can use the low-quality cashew apples to feed animals	

The harder you work for something, the greater you will feel after you have achieved it.

f) Sort cashew apples for processing



Practical Exercise: Sort cashew apples at the farm or at the processing site. Ensure that you follow the guidelines for sorting cashew apples carefully to avoid contamination of your fresh cashew apple juice.



Source: GIZ/ComCashew – Sorted cashew apples with raw cashew nut attached

SELF ASSESSMENT



1. Explain sorting of cashew apples.

2. State the importance of sorting cashew apples for processing.

3. State the criteria for sorting cashew apples for processing.

4. Outline the procedure for sorting cashew apples for processing.



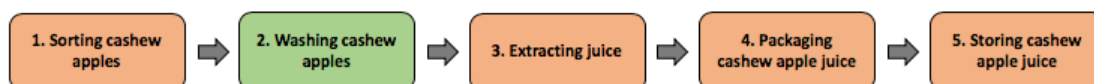
Great success, you already finished this chapter! Start where you are. Use what you have. Do what you can. Let's move on to the next.

2. DEMONSTRATE SKILLS FOR WASHING CASHEW APPLES

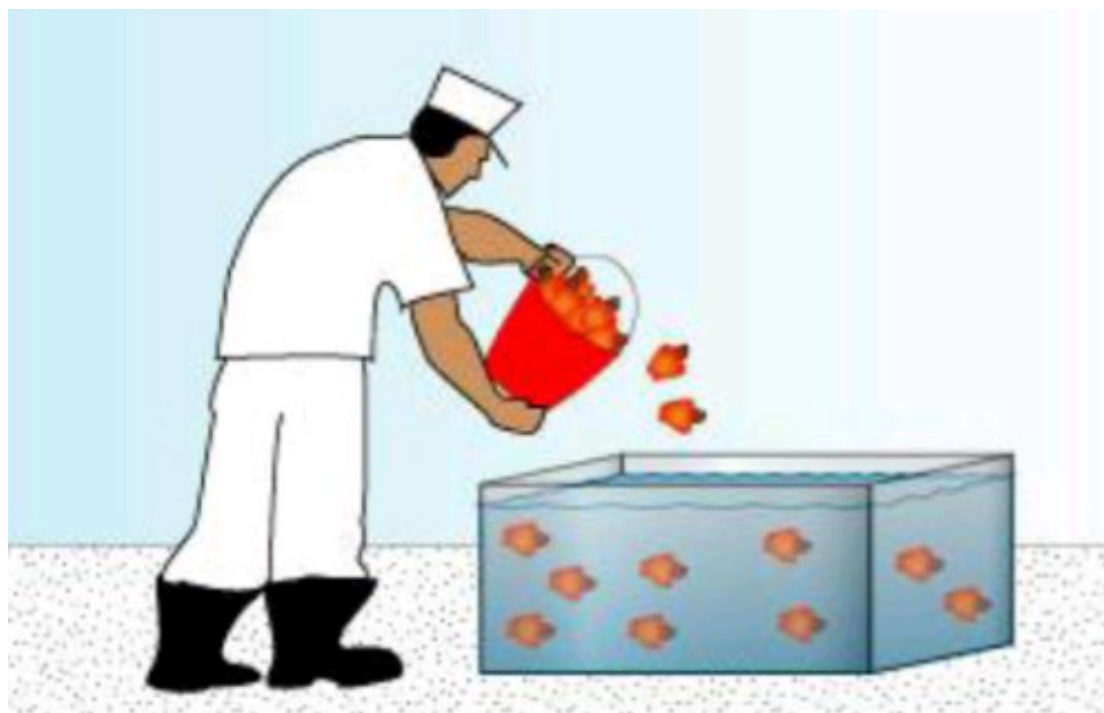
a) Explain washing of cashew apples

Washing is the process of cleaning cashew apples from impurities such as sand and dirt, or mould and bacteria with portable water.

The green field indicates the step of the cashew apple processing process you are currently studying.



For more information on washing cashew apples, watch video on *Preparing cashew apple juice* from Minute 3:11 to 4:07



Source: Paiva (2018) - *Washing of cashew apples in clean portable water*

b) State the importance of washing cashew apples for processing

Washing is important to reduce or remove impurities (foreign materials and micro-organisms) from the surface of cashew apples that can contaminate your final product – the fresh cashew apple juice.

When cashews are brought from the field, they might be contaminated because they had contact with:

- the ground after dropping
- different persons handling the cashew fruit during harvest
- different materials during storage and transportation

Washing is important to:

- eliminate dirt, sand and bacteria from the surface of cashew apples that can contaminate your fresh cashew apple juice
- avoid damage of processing equipment due to dirt and sand
- reduce the heat that cashew apples have absorbed during harvest and transportation



Source: Université d'Abomey-Calavi (2015) – Manual washing of cashew apples



Wash cashew apples in a cool and shaded place.

c) **State the uses of materials used for washing cashew apples**

The following materials are required for washing cashew apples:

- It is important to use **Clean and Cold Portable Water** to wash the cashew apples. Dirty water can contaminate the high-quality cashew apples.



Source: <https://oeconline.org/safe-drinking-water/>

- **Big Plastic Bucket** to wash the cashew apples.
 - Do not overcrowd the bucket to avoid damaging the apples during washing.



Source: <https://www.indiamart.com/proddetail/plastic-bucket-9120321612.html>

- **Disinfectant for fruits and vegetable** to clean the cashew apples from any impurities.
 - Most disinfectants include chlorine, which is appropriate for washing cashew apples.



Source: <https://twitter.com/belshawltd>

- **Mechanized washing** is another method to clean cashew apples
 - Cashew apples are poured on a processing line and washed with water pressure from a water pipe system.



Source: GIZ/ComCashew – Washing of cashew apples on mechanized processing line

d) Outline the procedure for washing cashew apples

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



Excellent



Okay



Try Again

Activities	Rating
1. Prepare a bucket with clean, cold and portable water in a cool and shaded place	
2. Add a splash of vegetable and fruit disinfectant (chlorine) to the water	
3. Take a batch of cashew apples and pour them into the plastic bucket. Do not overcrowd the bucket!	
4. Let the cashew apples float in the bucket for 15 to 20 minutes	
5. After 15 to 20 minutes, gently rub the surface of the cashew apples with your hands to clean them	
6. Remove the cashew apples from the chlorine water and put them into a bucket with clean water	
7. Rinse the cashew apples twice with clean, cold and portable water	
8. Keep the clean cashew apples in a plastic bucket to dry them. Do not dry cashew apples in hot air!	
9. Send cashew apples for juice extraction	

It does not matter how slow you go, as long as you do not stop.

e) **Wash cashew apples for processing**



Practical Exercise: Wash cashew apples in clean, cold, portable and chlorinated water before juice extraction. Use the recommended materials that are available to you.



Source: Université d'Abomey-Calavi (2015) – Rinsing of cashew apples after washing

SELF ASSESSMENT



1. State the importance of washing cashew apples for processing.

2. State the uses of materials used for washing cashew apples.

3. Outline the procedure for washing cashew apples.



Well done, you completed the second unit successfully. If you want it, you'll find a way. If you don't, you'll find an excuse.

3. DEMONSTRATE SKILLS FOR EXTRACTING JUICE

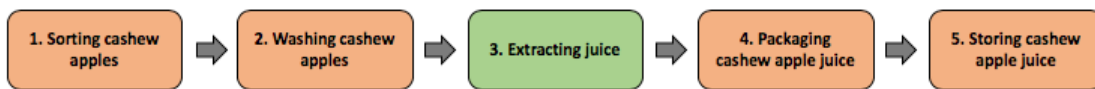
a) Explain cashew apple juice extraction

Extraction is the process of shredding or crushing cashew apples to squeeze the juice from the cashew apple. The objective of shredding and crushing is to achieve high liquid yields.



Liquid yield is the amount of juice that can be obtained from a cashew apple. A good liquid yield is around 70 %.

The green field indicates the step of the cashew apple processing process you are currently studying.



For more information on extracting cashew apple juice, watch video on *Cashew nut and fruit processing – Peace Corps* from Minute 2:57 to 3:41, and watch video on *Preparing cashew apple juice* from Minute 4:07 to 6:51.



Source: Université d'Abomey-Calavi (2015) – Filling cut cashew apples in a juice press

b) State the methods of cashew apple juice extraction

Fresh cashew apple juice can be extracted manually and mechanically.

There are two (2) different methods for cashew apple juice extraction:

1. Shredding

- Place the whole cashew apples in the funnel on top of the shredder
- Cut the tips off the cashew apples to reduce the amounts of tannin in the juice
- Wind the crank handle (manual) or press a button (mechanical) to start shredding the cashew apples
- The shredder tears the cashew apples without ripping their fibres
- Place two containers under the shredder to collect:
 - pulp
 - juice
- The extracted juice must be poured into clean containers, made of:
 - plastic
 - glass
 - aluminum
 - stainless-steel
- Sieve the fresh cashew apple juice to remove any pulp or fibre from the fresh juice after shredding and before packaging



Source: Université d'Abomey-Calavi (2015) – Filling cut cashew apples in a juice press



Process cashew apples in a cool and shaded place.

2. Crushing

- A manual expeller press is the most common method because it results in high liquid yields
- Cut the tips off the cashew apples to reduce the amounts of tannin in the juice
- Cut the remaining cashew apples into smaller pieces
- Place the cashew apple pieces in the expeller press
 - You can wrap the cashew apple pieces in a cloth and place it inside the expeller
 - The cloth functions as a pulp and fibre filter
- The expeller press crushes a batch of cashew apples by screwing a piece of metal on the cashew apples inside the press
 - The expeller press is slower than the shredder
- Sieve the fresh cashew apple juice to remove any pulp or fibre from the fresh juice after crushing and before packaging.



Source: Université d'Abomey-Calavi (2015) – Filling cut cashew apples in a juice press



For manual crushing you can also use your hands to squeeze the wholesome cashew apple. However, the processes will be less efficient, and the liquid yield will be much lower compared to using a shredder or a press.



If you prefer to use your hands, ensure that you wash and disinfect your hands thoroughly before squeezing the cashew apples with your hands.

c) **State the uses of equipment used in cashew apple juice extraction**

The following equipment is required for extracting cashew apple juice:

- **Mechanical cashew apple shredder** used for tearing cashew apples



Source: GIZ/ComCashew – Mechanical cashew apple shredder



Source: GIZ/ComCashew – Mechanical cashew apple juice processing

- **Manual expeller press** used for crushing cashew apples
 - Use medium pressure during pressing
 - Leave some juice in the drum to reduce tannin contents in the juice



Source: GIZ/ComCashew – Manual extraction with expeller press



Source: Université d'Abomey-Calavi (2015) – Freshly extracted cashew apple juice

d) Outline the procedure for cashew apple juice extraction

Use the checklist to follow steps 1 to 10 in crushing cashew apples to extract fresh cashew apple juice. Rate your own performance critically and honestly after you have completed each activity.



Excellent



Okay



Try Again

Activities	Rating
1. Cut the tips off the cashew apples to reduce the amounts of tannin in the juice	
2. Cut the remaining cashew apple into smaller pieces	
3. Place a batch of cashew apple pieces in the expeller press to facilitate pressing	
4. You can also put the cashew apple pieces in a clean white cloth and insert it inside the expeller press. The cloth functions as a filter for pulp and fibres!	
5. Place a clean container, made of plastic, glass, aluminum or stainless-steel under the outlet of the press	
6. Screw the metal tightly on top of the cashew apple pieces to squeeze as much juice as possible from the cashew apple batch	
7. Unscrew the metal and remove the crushed cashew apples from the press before adding another batch	
8. Sieve the freshly squeezed cashew apple juice to remove any pulp or fibre	
9. Send the sieved cashew apple juice to the bottling site	
10. You can use the crushed cashew apples to feed animals	

The struggle you are in today, is developing the skills you need for tomorrow.

e) Extract cashew apple juice



Practical Exercise: Use a crusher, a shredder or your hands to squeeze enough juice from a batch of cashew apples to fill 10 bottles of minimum 200ml with fresh cashew apple juice.



SELF ASSESSMENT

1. Explain cashew apple juice extraction.

2. State the methods of cashew apple juice extraction.

3. State the uses of equipment used in cashew apple juice extraction.

4. Outline the procedure for cashew apple juice extraction.



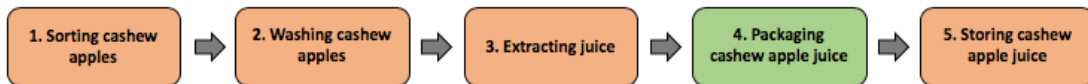
Bravo! Be proud of what you have achieved already.

4. DEMONSTRATE SKILLS FOR PACKAGING CASHEW APPLE JUICE

a) Explain packaging of cashew apple juice

Packaging cashew apple juice is the process of filling fresh cashew apple juice into bottles, drums or gallons and sealing them for storage.

The green field indicates the step of the cashew apple processing process you are currently studying.



For more information on bottling cashew apple juice, watch video on *Cashew nut and fruit processing – Peace Corps* from Minute 3:42 to 3:51, and watch video on *Preparing cashew apple juice* from Minute 6:51 to 7:44.



Source: Université d'Abomey-Calavi (2015) – Bottling freshly extracted cashew apple juice

b) State the importance of packaging

Packaging cashew apples juice is important to:

- maintain the quality and life span of fresh cashew apple juice
- enable fresh cashew apple juice sales in smaller quantities and batches
- ease branding and marketing of fresh cashew apple juice by labelling the packaging materials
- ensure safe storage of fresh cashew apple juice
- facilitate safe transportation of fresh cashew apple juice

c) State the factors to consider in packaging

Consider the following factors in packaging fresh cashew apple juice:

- Environmental cost of the packaging materials
 - Reuse glass bottles multiple times
 - Only use plastic bottles, if you can reuse them
- Cost of packaging materials
 - Calculate reusability of materials into the cost of packaging material
- Hygienic conditions of the materials
 - Wash plastic and glass bottles with soap and rinse them well
 - Sterilize glass bottles in boiling water before filling them with the fresh cashew apple juice



Source: Université d'Abomey-Calavi (2015) – Sterilizing glass bottles in boiling water before bottling



Do not sterilize plastic bottles in boiling water because they will melt in the hot water. Use disinfectant with chlorine and portable water to clean plastic bottles.

- Cashew apples are highly perishable and must be packed/bottled under cool temperature
- Transportation costs
 - The weight of plastic bottles is lower
 - The possibility of breakage of plastic bottles is lower
- Life span of the cashew apple juice
 - The taste of the cashew apple juice can be affected, if the product is transported in plastic bottles in the heat

The following information must be printed on the packaging label:

- Product name
- Amount in ml
- Production date
- Expiry date
- Full name and address of the manufacturer/ processor
- Ingredients list
- Nutritional facts
- Expressions: for example, 100 % whole juice
 - Any information on additives, in case additives were used



Source: Ceecash Juice, Asiri, Ghana – *Cajuina* (further processed fresh cashew apple juice)

d) **State the uses of materials for packaging cashew apple juice**

The following materials are required for packaging cashew apple juice:

- **Plastic Bottles with Screw Caps**



Source: Natu Company Ltd, Wenchi, Ghana – Clarified juice (further processed fresh cashew apple juice)

- **Glass Bottles with Crown Caps**



Source: Université d'Abomey-Calavi (2015) – Fresh cashew apple juice in glass bottles with crown caps

- A plastic or **Metal Funnel** to fill the fresh cashew apple juice into bottles



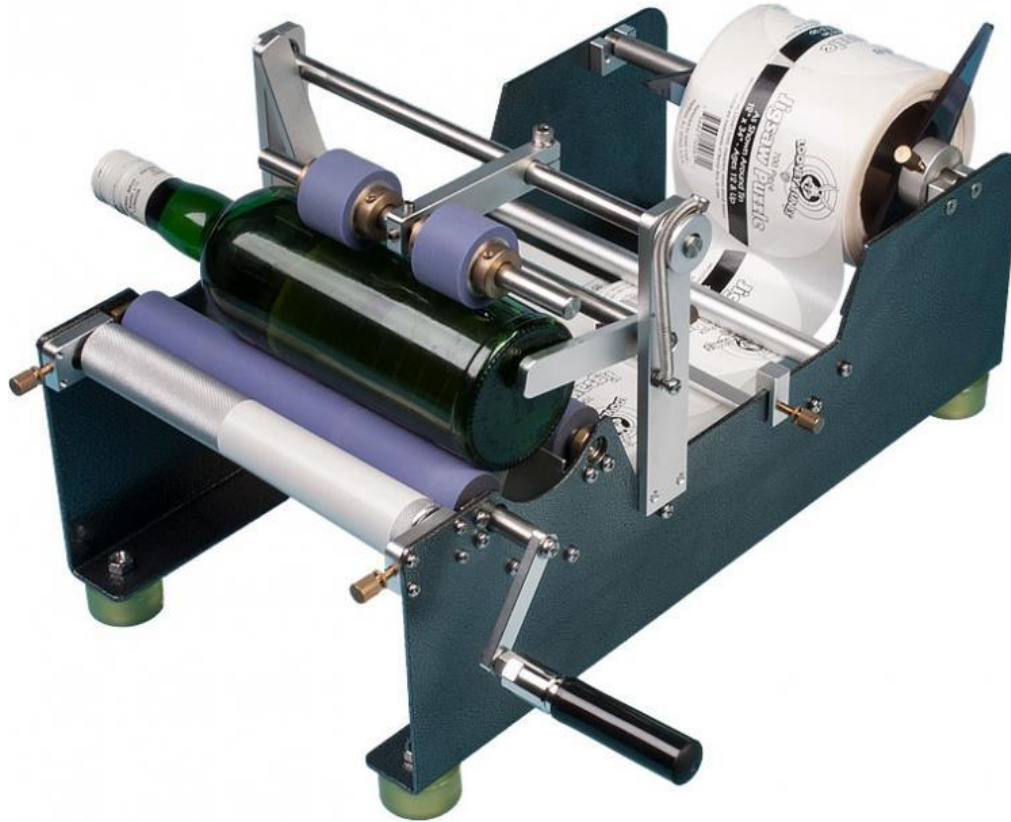
Source: <https://www.surlatable.com/product/PRO-1483452/Sur+La+Table+Stainless+Steel+Funnels>

- A manual **Crown Capper** to seal the glass bottles with crown caps



Source: Université d'Abomey-Calavi (2015) – Manual crown capper to seal bottles

- **Manual Labelling Machine and Labels** to brand your fresh cashew apple juice



Source: <https://www.fastpack.net/economical-manual-bottle-label-applicator-machine/>

e) Outline the procedure for packaging cashew apple juice

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



Excellent



Okay



Try Again

Activities	Rating
1. Place a funnel on top of a plastic or glass bottle	
2. Pour the fresh cashew apple juice in the funnel until the bottle is filled up	
3. Screw a plastic cap on the plastic bottle or fix the crown cap on a glass bottle using the crown capper	
4. Clean the outside of the bottle from any spilled fresh cashew apple juice	
5. Stick a label on the plastic bottle with product information: <ul style="list-style-type: none"> • Product name • Amount in ml • Production date • Expiry date • Full name and address of the manufacturer/processor • Ingredients list • Nutritional facts • Expressions: for example, 100 % whole juice <ul style="list-style-type: none"> ○ Any information on additives, in case additives were used 	

Great things never come from comfort zones.

f) Package cashew apple juice



Practical Exercise: Fill the freshly squeezed cashew apple juice in 10 plastic or glass bottles and seal them well. Use the materials and follow the instruction presented in this chapter.

SELF ASSESSMENT



1. State the importance of packaging.

2. State the factors to consider in packaging.

3. Outline the procedure for packaging cashew apple juice.



You are almost done. Let's tackle the last chapter with a lot of energy!

5. DEMONSTRATE SKILLS FOR STORING CASHEW APPLE JUICE

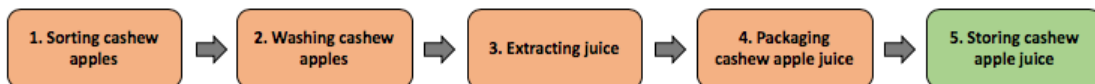
a) Explain storage of cashew apple juice

Storage is keeping the fresh cashew apple juice in a cool and safe place until consumption.

Depending on the use of the fresh cashew apple juice, you can store:

- glass and plastic bottles in crates → for direct marketing
- glass and plastic bottles on the table / or flat surface → for direct marketing
- large volumes of fresh cashew apple juice in drums → for further processing
- large volumes of fresh cashew apple juice in gallons → for further processing

The green field indicates the step of the cashew apple processing process you are currently studying.



For more information on storing cashew apple juice watch video on *Preparing cashew apple juice* from Minute 7:44 to 7:51.



Source: Université d'Abomey-Calavi (2015) – Presentation of fresh cashew juice

b) State the importance of storing cashew apple juice

Storing cashew apple juice is important to:

- enable stocktaking of products and product quantities
- maintain the quality and life span of the product until consumption or further processing



Fresh cashew apple juice must be consumed within 48 hours after bottling and stored in a cool and dry room.



Fresh cashew apple juice must be further processed into clarified juice or cajúina immediately after extraction.

c) State the factors to consider in storing

Consider the following factors in storing cashew apple juice:

- Store fresh cashew apple juice in a refrigerator



The recommended storage temperature is 5 °C. Use a household refrigerator to keep the fresh cashew apple juice. For large quantities of cashew apple juice, you need a cooling room.

- If you do not have a refrigerator or cooling room, store the fresh cashew apple juice in a dark and cool room to slow down the fermentation process of the fresh juice
- Store fresh cashew apple juice in different section, according to production date or expiry date
 - Sell products with the closest expiry date first



Source: Université d'Abomey-Calavi (2015) – Storage of fresh cashew apple juice on flat surface in a cool room

- Costs of storage
- Duration of storage



Remember! Fresh cashew apple juice is highly perishable and must be consumed within 48 hours after bottling.

d) State the uses of equipment for storing cashew apple juice

The following materials are required for storing cashew apple juice:

- Use **Crates** to store cashew apple juice bottles in smaller quantities and to ease transportation



Source: <https://www.basil.com/nl/crate-l-fietskrat-lichtblauw.html>

- Use **Gallons** to store cashew apple juice in larger quantities and to ease transportation



Source: https://www.alibaba.com/product-detail/Cashew-Juice_101287343.html

- Use **Drums** to store cashew apple juice before further processing



Source: <http://ifprc.com.pe/2018/08/11/frozen-seedless-refined-pasteurized-passion-fruit-pulp/>

e) Outline the procedure for storing cashew apple juice

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



Excellent



Okay



Try Again

Activities	Rating
1. Choose a cool, dry and safe place for storage. Keep your cashew apple juice in a cool place with recommended 5 °C	
2. Keep the cashew apple juice in a refrigerator until consumption	
3. Consume fresh cashew apple juice within 48 hours after bottling	
4. Store large quantities of fresh cashew apple juice in drums before further processing	

If you believe that you can do it, you will see opportunities. If you believe that you cannot do it, you will see obstacles.

f) Store cashew apple juice



Practical Exercise: Store cashew apple juice for less than 48 hours. Sell or distribute the fresh cashew apple juice in the community to market your product.

SELF ASSESSMENT



1. Explain storage of cashew apple juice.

2. State the importance of storing cashew apple juice.

3. State the factors to consider in storing.

4. State the uses of equipment for storing cashew apple juice.



Congratulations! You finished this entire unit.

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