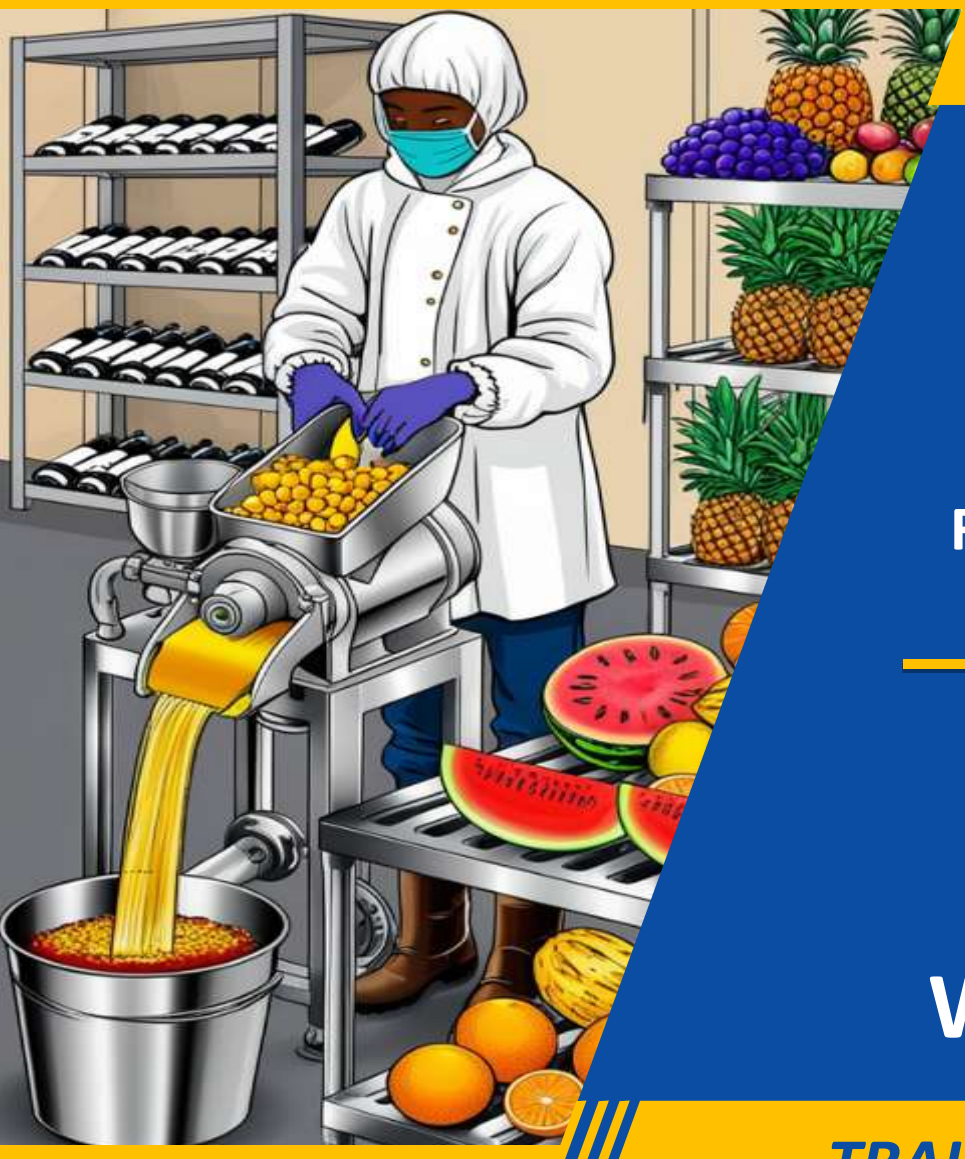
RQF LEVEL 4



FOPWM403

FOOD PROCESSING

Fruits and Vegetables Wine Making

TRAINER'S MANUAL

October, 2024

FRUITS AND VEGETABLES WINE MAKING

KOICA Korea International Cooperation Agency

TQUM TVET Quality Management Project

2024

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TABLE OF CONTENT

ACRONYMS

O_2: Oxygen

CO_2: Carbon dioxide

$C_6H_{12}O_6$: Glucose

NaOH: Sodium hydroxide

ATP: Adenosine Triphosphate

CA: Controlled atmosphere

CCPs: Critical control point

FIFO: First-in-first-out

FOP: Food processing

GAP: Good agricultural practices

GMP: Good manufacturing practices

KOH: Potassium hydroxide

KOICA: Korean International Cooperation Agency

LCD: Liquid crystal display

Ltd: Limited

pH: Potential of hydrogen

PM: Production manager

PPE: Personal protective equipment

RH: Relative Humidity

RTB: Rwanda TVET Board

TQUM: TVET Quality Management

TVET: Technical and Vocation Education and Training

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled **"Fruits and Vegetables Wine Making."** Students enrolled in this module will engage in practical activities designed to develop and enhance their competencies.

The development of this training manual followed the Competency-Based Training and Assessment (CBT/A) approach, offering ample practical opportunities that mirror real-life situations.

The trainer's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

As a trainer, you will begin by asking questions related to the activities to encourage critical thinking and guide trainees toward real-world applications in the labor market. The manual also outlines essential information such as learning hours, didactic materials, and suggested methodologies.

This manual outlines the procedures and methodologies for guiding trainees through various activities as detailed in their respective trainee manuals. The activities included in this training manual are designed to offer students opportunities for both individual and group work. Upon completing all activities, you will assist trainees in conducting a formative assessment known as the end learning outcome assessment. Ensure that students review the key reading and the points to remember section.

MODULE CODE AND TITLE: FOPWM403 FRUITS AND VEGETABLES WINE MAKING

Learning Outcome 1: Prepare The Workplace and Ingredients.
Learning Outcome 2: Process The Fruits and Vegetable into Juice.
Learning Outcome 3: Process Fruits and Vegetable Juice into Wine.
Learning Outcome 4: Store The Fruits and Vegetable Wine.

Indicative Contents

1.1 Selection of Tools and Equipment Used in Wine Making
1.2 Selection of Materials Used in Wine Making
1.3 Arrangement of Workplace
1.4 Ripening of Fruits
1.5. Preparation of Ingredients.

Key Competencies for Learning Outcome 1: Prepare the Workplace and Ingredients

Knowledge	Skills	Attitudes
• Description of tools and equipment used in fruits and vegetables wine making. • Description of Food hygiene and Safety precautions of tools and equipment • Identification of criteria for selecting raw materials for fruits and vegetables wine making. • Description of the types of Raw materials used in fruits and vegetables wine making. • Description of additional ingredients used in fruits and vegetables wine making.	• Selecting tools, equipment and materials for fruits and vegetables wine making • Adjusting tools and equipment for fruits and vegetables wine making • Cleaning the workplace for fruits and vegetables wine making • Arranging the workplace for fruits and vegetables wine making • Preparing ingredients for fruits and vegetables wine making	• Paying attention when using cleaning products as some can be harmful to life. • Being accurate while preparing ingredients • Being careful when using sharp and electric connected tools and equipment

● Description of packaging materials used for fruits and vegetables wine making. ● Description of Cleaning methods and techniques for fruits and vegetables wine making ● Explanation of arrangement criteria used for fruits and vegetables wine making		

Duration: 10 hrs

Learning outcome 1 objectives:

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

1. Describe correctly tools, materials and equipment based on the intended use.
2. Identify properly criteria for selecting materials, tools and equipment based on the intended use.
3. Select properly tools and equipment based on the intended use.
4. Adjust correctly tools and equipment based on the intended use.
5. Describe appropriately safety precautions based on tools and equipment.
6. Describe clearly cleaning methods and techniques based on their types.
7. Clean effectively the work area, tools and equipment based on product requirement.
8. Arrange properly the workplace according to the processing line.
9. Describe appropriately raw materials used in fruits and vegetables based on their types.
10. Describe appropriately additional ingredients used based on their types.
11. Prepare accurately ingredients for fruits and vegetables wine making based on protocol.

Resources

Equipment	Tools	Materials
• Pulping machine • Pasteurizer • Washing Machine • Slicing Machine • Peeling Machine • Cooling Tank • Boiling Pans • Blender	• Knives • Spoons • Refractometer • Thermometer • Jugs • Analytical Balances • Filter Cloths • Sponges • Balances • Cutting boards, • Brushes	• Fruits (banana, passion fruits, pineapple, straw berry,) • Vegetables (carrots, beet roots,) • Sugar • Water • Disinfectants • Packaging Materials • Labels • Wine yeast

• PPE • Compressor • Cooker • Juice extracting machine • Pressing machine, • Crushing machine • Vacuum cleaner • Working table • Packaging machine • Fermentation Tanks • Labelling machine • Filling machine • Ageing tank • Sealing machine	• Broom • Dustbin • Mops • Bucket • Dustbin • Brew barrels • Brew bucket • Squeegee • Graduated • Cylinder	• Buffer solution • Titrating reagent • Bentonite • Clay • Egg white • Water • Preservatives • Gas lighter • Filter cloths • Towels

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail materials, tools and equipment for fruits and vegetables wine making and make sure that they are in good working condition and verify if materials are not expired.
- Prepare teaching aids and didactic materials (manuals/guides, task sheets, photos, audio-visuals, protocols, …) for fruits and vegetables wine making.
- Make sure that both classroom and Fruits and vegetables wine making workshop are available

Indicative content 1.1: Selection of Tools and Equipment used in Fruits and Vegetables Wine Making

Duration: 2 hrs

Theoretical Activity 1.1.1: Description of tools and equipment for fruits and vegetables wine making

Notes to the trainer:

- The trainer may use small groups to describe tools and equipment used in fruits and vegetables wine making.
- The use of drawings, pictures, or videos as didactic materials for describing tools and equipment used in fruits and vegetables wine making is required.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

i. Based on your understanding, state any tools and equipment used in fruits and vegetables wine making do you know?

ii. Give the uses of tools and equipment given in (i)

iii. What could be the safety precautions of tools and equipment used for fruits and vegetables wine making.

Step 2: Ask trainees to write the findings on papers, flip chart, blackboard or white board.

Step 3: Facilitate trainees to present their findings.

Step 4: Provide the expert view and clarify ideas by using didactic materials.

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key readings 1.1.1 in trainee manual.

Points to Remember

- In Fruits and vegetables wine making, the main equipment are fermenter and juice extractor.
- Tools, material and equipment for vegetable and wine making.
- When handle sharp knives and other tools must be carefully.
- Before using tools and equipment used in wine making, you should read the instruction use and check cleanliness and functionality.

- While using tools and Equipment used in wine making you are recommended to wear PPE.

Practical Activity 1.1.2: Selecting and adjusting of tools and equipment used in fruits and vegetables wine making.

Notes to the trainer

- The trainer is supposed to demonstrate how to select and adjust tools and equipment used in wine making.
- Avail photos and videos as didactic materials,
- Avail various tools and equipment in which those for fruits and vegetables making for being selected and adjusted.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to select and adjust tools and equipment to be used in fruits and vegetables wine making.

Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)

Step 3: Demonstrate how to select and adjust tools and equipment for wine making. While demonstrating, explain the selection criteria and adjustment procedures of tools and equipment used to make wine.

Step 4: Ask trainees to select and adjust tools and equipment used in fruits and vegetables wine making. And monitor the procedures.

Step 5: Verify whether tools and equipment are well selected and adjusted and provide feedback where necessary.

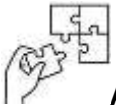
Step 6: Ask trainees to read key reading 1.1.2 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 1.1

Points to Remember

- For easy work and efficient, you are recommended to select tools and equipment accordingly.
- When adjusting tools and equipment used in fruits and vegetables making must follow manufacturer's instructions

- While adjusting tools and equipment used in fruits and vegetables making, you are recommended to adjust settings accordingly considering the specific needs of the recipe. Don't be afraid to experiment with different settings and keep a record of adjustments and their outcomes.



Application of learning 1.1:

Organize a trainees' field visit in a winery near your school and ask each trainee to select and adjust tools and equipment to be used in wine making.

Checklist

SN	Criteria	Indicator	Score	
			Yes	No
1	Tools and equipment are properly selected	1.1 Tools are selected		
		1.2 Equipment is selected		
2	Tools and equipment are properly adjusted	2.1 Tools are adjusted		
		2.2 Equipment is adjusted		
3	Reporting is properly done	3.1 Report format is considered		
		3.2 key competencies are mentioned		

Indicative content 1.2: Selection of Materials used in Fruits and Vegetables Wine Making

Duration: 2 hrs.

Practical Activity 1.2.1: Selecting cleaning agents for fruits and vegetables wine making

Notes to the trainer

- The trainer is supposed to demonstrate how to select cleaning agents used in in fruits and vegetables wine making.
- The use of videos as didactic materials for selecting cleaning agents is required fruits and vegetables wine making.
- Avail cleaning agent being selected for use.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop and select cleaning agents used in fruits and vegetables wine making.
Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)
Step 3: Demonstrate how to select cleaning agents for fruits and vegetables wine making. While demonstrating, explain the criteria of selecting cleaning agents used in fruits and vegetables wine making.
Step 4: Ask trainees to select cleaning agents to be used in fruits and vegetables wine making and monitor the procedure.
Step 5: Verify whether cleaning agents are properly selected and provide feedback where necessary.
Step 6: Ask trainees to read the key readings 1.2.1 in trainee manual.
Step 7: Ask trainees to perform the task provided in application of learning 1.2.

Points to Remember

- Cleaning agents are harmful when not used appropriately, you are recommended to follow guidelines.

Practical Activity 1.2.2: Preparing cleaning agents for fruits and vegetables wine making

Notes to the trainer

- Trainer supposed to demonstrate how to prepare cleaning agents.
- The use videos as didactic materials related to preparation of cleaning agents.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the food processing workshop and prepare cleaning agents used in fruits and vegetables wine making.

Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)

Step 3: Demonstrate how to prepare cleaning agents for fruits and vegetables wine making. While demonstrating, explain the procedure of preparing cleaning agents used in fruits and vegetables wine making.

Step 4: Ask trainees to prepare cleaning agents to be used in fruits and vegetables wine making and monitor the procedures.

Step 5: Verify whether cleaning agents are properly prepared and provide feedback where necessary.

Step 6: Ask trainees to read the key readings 1.2.2 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 1.2.

Points to Remember

- Before using cleaning product used in fruits and vegetables wine making, you should read the instruction for use and follow a recipe or formula.

Practical Activity 1.2.3: Selecting raw materials and ingredient used in wine making

Notes to the trainer

- Trainer is supposed to demonstrate how to select raw materials for wine making.
- The use of videos as didactic materials related to selection of raw materials for wine making is required.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop and select raw materials for fruits and vegetables wine making.
Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)
Step 3: Demonstrate criteria of selecting raw materials for fruits and vegetables wine making While demonstrating, explain different raw materials used for fruits and vegetables wine making.
Step 4: Ask trainees to select raw materials for fruits and vegetables wine making and monitor the procedures.
Step 5: Verify whether raw materials are well selected and provide feedback where necessary.
Step 6: Ask trainees to read the key readings 1.2.3 in trainee manual.
Step 7: Ask trainees to perform the task provided in application of learning 1.2.

Points to Remember

- When selecting raw materials used in fruits and vegetables wine you must consider the following criteria: maturities index, freshness, free from disease and contamination, color, shape, size.

Theoretical Activity 1.2.4: Description of additional ingredient used in fruits and vegetables wine making

Notes to the trainer:

- The trainer may use small groups for describing additional ingredients used in wine making.
- The use of videos as didactic materials for describing additional ingredients used for fruits and vegetables wine making.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer the following questions:

i. Basing in your understanding, state any additional ingredients used in fruits and vegetables wine making.

ii. Give the uses the additional ingredients used fruits and vegetables wine making given(i)?

Step 2: Ask trainees to write the findings on papers, flip chart, blackboard, or white board.

Step 3: Facilitate trainees to present their findings discuss on papers, flip chart, blackboard, or white board.

Step 4: Provide the expert view and clarify ideas by using didactic materials.

Step 5: Address any questions or concerns.

Step 6: Ask trainees to read the key readings 1.2.4 in trainee manual.

Points to Remember

- In fruits and vegetables wine the dominant types of yeast used is the Saccharomyces cerevisiae var ellipsoideus (CFTRI 101) (wine yeast)).
- During fermentation in fruits and vegetables wine making, the most common substrate is Sugars.

Practical Activity 1.2.5: Selecting packaging materials used for fruits and vegetables wine making

Notes to trainer:

- The trainer is supposed to demonstrate how to select packaging materials for wine making.
- For the effective delivery, it is recommended to:

✓ Avail videos as didactic materials,

✓ Avail wine packaging materials to be selected.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the food processing workshop and select packaging materials for fruits and vegetables wine making.

Step 2: Explain the task and provide clear work instruction (Task, PPE, Time allocated)

Step 3: The trainer demonstrates how to select packaging materials for fruits and vegetables wine making and explain selection criteria and procedure.

Step 4: Ask trainees to select packaging materials for fruits and vegetables wine making. While demonstrating, explain the criteria to follow.

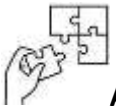
Step 5: Verify whether packaging materials are well selected and provide feedback where necessary.

Step 6: Ask trainees to read key reading 1.2.5 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 1.2

Points to Remember

- Mains functions of Packaging material are used to: enclose, protect, transport, and market goods.
- Select appropriately packaging material for wine to extend shelf life and to preserve product freshness for consumer perception.



Application of learning 1.2:

Organize a field visit in a winery near your school and ask each trainee to select wine packaging materials and additional ingredients to be used in wine making.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Packaging materials are properly selected	1.1 Cleaned and sterilised wine bottles are selected		
		1.2 Safety of packaging material is checked		
2	Additional ingredients are well selected	2.1 Yeast is selected		
		2.2 Sugar is selected		
		2.3 Sorghum is selected		
3	Reporting is properly done	3.1 Report format is considered		
		3.2 key competencies are mentioned		

Indicative content 1.3: Arrangement of Workplace

Duration: 2 hrs

Practical Activity 1.3.1: Cleaning and arranging tools, equipment and work area for fruits and vegetables wine making

Notes to the trainer

- The trainer is supposed to demonstrate how to clean and arrange tools, equipment and the work area for wine making.
- Avail cleaning materials, tools and equipment used for cleaning tools, equipment and work area for wine making.
- Avail work area, tools, and equipment to be cleaned.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in fruits and vegetables wine making workshop to clean and arrange the work area for fruits and vegetables wine making.

Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)

Step 3: Demonstrate how to clean and arrange the work area for fruits and vegetables wine making. While demonstrating, explain the procedure for cleaning and work area arrangement criteria.

Step 4: Ask trainees to clean and arrange the work area for fruits and vegetables wine making and monitor the procedures.

Step 5: Verify whether the work area is properly cleaned and arranged and provide feedback where necessary.

Step 6: Ask trainees to read the key readings 1.3.1 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 1.3.

Points to Remember

- During cleaning tools, equipment and work area dry cleaning and wet cleaning methods must be used

- Techniques of cleaning used in fruits and vegetables wine making are cleaning in place and cleaning out of place.
- When cleaning the interior surface of pipelines, vessels, filters, process equipment and associated things without dismantling it recommend to use cleaning in place(CIP) cleaning techniques
- When using cleaning out of place (COP) techniques, make sure all parts are completely submerged to ensure that adequate efficient cleaning.
- Cleaning large or bulky equipment that can be accommodated in CIP systems.

Practical Activity 1.3.2: Checking the effectiveness of cleaning the work area, tools and equipment for fruits and vegetables wine making

Notes to the trainer

- The trainer is supposed to demonstrate how to check the effectiveness of cleaning the work area, tools and equipment for wine making.
- Avail videos as didactic materials related to checking effectiveness of cleaning tools, equipment, and work area.
- Avail cleaned tools, equipment and work area to be checked.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop and check the cleaning effectiveness for work area, tools and equipment used in fruits and vegetables wine making.

Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)

Step 3: Demonstrate how to check the cleanliness of work area, tools and equipment for fruits and vegetables wine making. While demonstrating, explain the methods and procedure used in checking the cleaning effectiveness for work area, tools and equipment used in fruits and vegetables wine making.

Step 4: Ask trainees to check the cleanliness of work area, tools and equipment for fruits and vegetables wine making, and monitor the procedure.

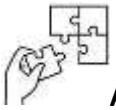
Step 5: Verify whether the cleanliness is correctly checked and provide feedback where necessary.

Step 6: Ask trainees to read the key readings 1.3.2 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 1.3.

Points to Remember

- During checking cleaning effectiveness of work area, tools and equipment for fruits and vegetables wine making you are recommended to correctly follow the procedure for selected method.



Application of learning 1.3:

Last week, the school manager finished rehabilitation activities for fruit and vegetable wine making workshop in your school. Ask trainees to clean work area, check cleaning effectiveness and arrange properly the workshop.

Checklist:

S/N	Criteria	Indicator	Yes	No
1	Cleaning techniques are effectively applied	1.1 CIP is applied		
		1. 2 COP is applied		
2	Cleaning methods are effectively applied	2.1 Dry cleaning is applied		
		2.2 Wet cleaning is applied		
3	Cleaning efficiency is properly checked	3.1 Visual inspection is done		
		3.2 ATP testing is done		
		3.3 Swab test is done		
4	Work area for bread making is appropriately arranged	4.1 Tools are arranged		
		4.2 Equipment are arranged		
		4.3 Materials are arranged		
5	Field visit report is correctly done.	5.1 Trainee identification is mentioned		
		5.2 Company identification is mentioned		
		5.3 Key competencies gained are described		
		5.4 Recommendations are mentioned		

Indicative content 1.4: Ripening of Fruits

Duration: 2 hrs

Practical Activity 1.4.1: Ripening of fruits

Notes to the trainer

- The trainer is supposed to demonstrate how to apply ripening methods of fruits for wine making.
- Avail unripe fruits being ripened.
- Avail materials, tools and equipment used for ripening fruits.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop and apply methods of ripening fruits used in fruits and vegetables wine making.

Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)

Step 3: Demonstrate how to apply the ripening methods of fruits for fruits and vegetables wine making. While demonstrating, explain the methods and procedure used in applying the ripening methods of fruits used in fruits and vegetables wine making

Step 4: Ask trainees to apply ripening methods of fruits for fruits and vegetables wine making and monitor the procedures.

Step 5: Verify whether the methods are correctly applied and provide feedback where necessary.

Step 6: Ask trainees to read key reading 1.3.4 in trainee manual

Step 7: Ask trainees to perform the task provided in application of learning 1.3

Points to Remember

- The most common way that fruits ripen and is the preferred method by many consumers is natural ripening.

- The fruits that continue to ripen after they have been harvested are called Climacteric fruits while fruits that do not continue to ripen after they have been harvested are called non-climacteric fruits.
- Indicators show that fruits are well ripen fruits are Color change, Softness increase, Sugar increase while acidity decrease and Flavor development

Application of learning 1.4: ripening of fruits

PXZ winery located in neighbouring schools ripen banana for the aim of producing juice used in wine making. In your school, ask trainees to ripen banana the same as PXZ winery.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Banana fruits are properly ripened.	Ripening methods are applied		
		Color change is seen		
		Softness is increased		
		Level of sugar is increase		
2	Reporting is properly done	Report format is considered		
		Key competences gained are mentioned.		

Indicative content 1.5: Preparation of Ingredients

Duration: 2 hrs

Practical Activity 1.5.1: Preparing ingredients used in wine making

Notes to the trainer

- The trainer is supposed to demonstrate how to prepare ingredients for wine making.
- Avail ingredients for wine making.
- Avail videos as didactic materials related to preparation of ingredients for wine making.

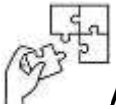
Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making processing workshop to prepare ingredients for wine making.
Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)
Step 3: Demonstrate how to prepare ingredients for wine making. While demonstrating, explain the procedure for fruit and wine making.
Step 4: Ask trainees to prepare ingredients for wine making and monitor the procedure.
Step 5: Verify whether the fruits are correctly prepared and provide feedback where necessary.
Step 6: Ask trainees to read the key readings 1.5.1 in trainee manual.
Step 7: Ask trainees to perform the task provided in application of learning 1.5.

Points to Remember

- When preparing ingredients for wine making, make sure that fruit and vegetables are properly sorted, graded, washed, peeled, sliced, and cored to ensure quantity and quality standards for wine.



Application of learning 1.5:

Organize a trainees' field visit in a winery near your school and ask each trainee to prepare fruits and vegetables for wine making.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Fruits and vegetables are accurately prepared	1.1 Fruits and vegetables are sorted and graded		
		1.2 Fruits and vegetables are weighed		
		1.3 Fruits and vegetables are washed		
		1.4 Fruits and Vegetables are well peeled		
		1.5 Fruits and vegetables are sliced		
2	Field visit report is correctly done	2.1 Trainee identification is mentioned		
		2.2 Company identification is mentioned		
		2.3 Key competencies gained are described		
		2.4 Recommendations are mentioned		

Learning out come 1 end assessment

Theoretical assessment

Question 1. Which of the following statements is **true** or **false**

a. Cleaning is process of remove soil and pesticide residues except microorganisms
   Answers: True
b. Cleaning in Place (CIP) is system of cleaning the interior surface of pipelines, vessels, filters, process equipment and associated things with dismantling.
   Answers: false
c. Factors affecting cleaning effectiveness are Temperature, Mechanical Actions, Concentration of a product and Time.
   Answers: True
d. Wet cleaning method is method of cleaning use water-based solvents while Dry cleaning method is method of cleaning by removal of soil particles from surfaces by mechanical, manual or chemical methods rather than water.

Answer: True

Question 2. Read the following statement on prepare workplace for fruits and vegetables for wine making, Choose the correct answer by encircling the corresponding letter

1. What is the primary purpose of a primary fermenter?
   A. To store finished wine
   B. To age wine
   C. To initiate the fermentation process
   D. To filter wine

Answer: C. To initiate the fermentation process

2. Which device is used to measure the specific gravity of the juice or wine during fermentation?
   A. Thermometer
   B. Hydrometer
   C. Airlock
   D. Siphon

   Answer B. Hydrometer
3. Which tool is used to transfer wine from one container to another without exposing it to air?
   A. Wine thief
   B. Siphon
   C. Racking cane
   D. Wine corker

Answer B. Siphon

4. What is the primary purpose of a wine corker?
    A. To seal wine bottles
    B. To filter wine
    C. To measure the acidity of wine
    D. To crush grapes

Answer A. To seal wine bottles

5. When adjusting equipment, the first step is to:
    A. Turn off the equipment
    B. Identify the problem
    C. Consult the manual
    D. Gather necessary tools

Answer B. Identify the problem

6. A refractometer is used to measure:
    A. pH
    B. Brix
    C. Alcohol content
    D. Temperature

    Answer: B. Brix

7. Before making adjustments to equipment, it is important to:
    A. Turn it on
    B. Ignore the manual
    C. Use any tools available
    D. Unplug it from its power source

Answer: D. Unplug it from its power source

8. Which cleaning agent is often used to remove grease from grills and blocked drains?
    A. Sodium carbonate
    B. Sodium hydroxide
    C. Acetic acid
    D. Citric acid

    Answer: B. Sodium hydroxide

9. When selecting a cleaning agent, you should consider the pH level because:
    A. Some surfaces require acidic or alkaline solutions
    B. The pH level does not affect cleaning effectiveness
    C. Only alkaline solutions are effective for cleaning
    D. Only acidic solutions are effective for cleaning

Answer: A. Some surfaces require acidic or alkaline solutions

10. What is the primary role of yeast in winemaking?
    A. To add color to the wine
    B. To initiate and conduct fermentation
    C. To provide sweetness
    D. To clarify the wine

Answer: B. To initiate and conduct fermentation

11. Which of the following is NOT a desirable characteristic of good wine yeast?
    A. Rapid initiation of fermentation
    B. Production of undesirable aromas
    C. Ability to ferment at low temperatures
    D. Effective conversion of sugar to alcohol

Answer: B. Production of undesirable aromas

12. The purpose of workplace arrangement is to:
    A. Increase production costs
    B. Reduce efficiency
    C. Create a chaotic environment
    D. Optimize efficiency and productivity

Answer: D. Optimize efficiency and productivity

13. What is the primary difference between climacteric and non-climacteric fruits?
    A. Climacteric fruits ripen after harvest, while non-climacteric fruits do not.
    B. Climacteric fruits are sweeter than non-climacteric fruits.
    C. Climacteric fruits are always larger than non-climacteric fruits.
    D. Climacteric fruits are more acidic than non-climacteric fruits.

Answer: A. Climacteric fruits ripen after harvest, while non-climacteric fruits do not.

14. The most common chemical used for ripening fruits is:
    A. Carbon dioxide
    B. Ethylene gas
    C. Oxygen
    D. Nitrogen

    Answer: B. Ethylene gas

15. To check the quality of a ripe fruit, you should:
    A. Only look at the color
    B. Only feel the texture
    C. Only smell the fruit
    D. Use a combination of visual inspection, touch, smell, and taste

Answer D. Use a combination of visual inspection, touch, smell, and taste

Practical assessment

Buryohe ltd is an industry which produce fruits and vegetables wine from fruits and vegetables in Western province of Rwanda. They need food processing assistant technician to receive material, selection of tools/equipment and adjust tools and equipment used in fruits and vegetables wine making. You are hired by the industry to select, adjust tools/equipment and to receive materials used in fruits and vegetables wine making. All tools, equipment and materials are available in the workshop.

Check list:

Criteria	Indicators	Score	
		YES	NO
1. Equipment is properly selected	Knives are selected		
	Refractometer is selected		
	Filter is selected		
	Balances are selected		
	Graduated jag is selected		
	Thermometer is selected		
	Juice extractor is selected		
	Pasteurizer is selected		
	Cooling tank is selected		
2. Tools and Equipment are correctly adjusted.	Refractometer is adjusted		
	Thermometer is adjusted		
	Pasteurizer is adjusted		
	Cooling tank is adjusted		
	Juice extractor is adjusted		
3. Work area, tools and equipment are properly cleaned.	Tools are cleaned		
	Equipment is properly cleaned		
	Work area is cleaned		
4. Ingredients are well selected	Fresh fruits and vegetables are selected		
	Sugar is selected		
	Yeast is selected		
5. Fresh fruits and vegetables are properly prepared	Fresh fruits and vegetables are sorted and graded		
	Fresh fruits and vegetables are washed		
	Fresh fruits and vegetables peeled and sliced		

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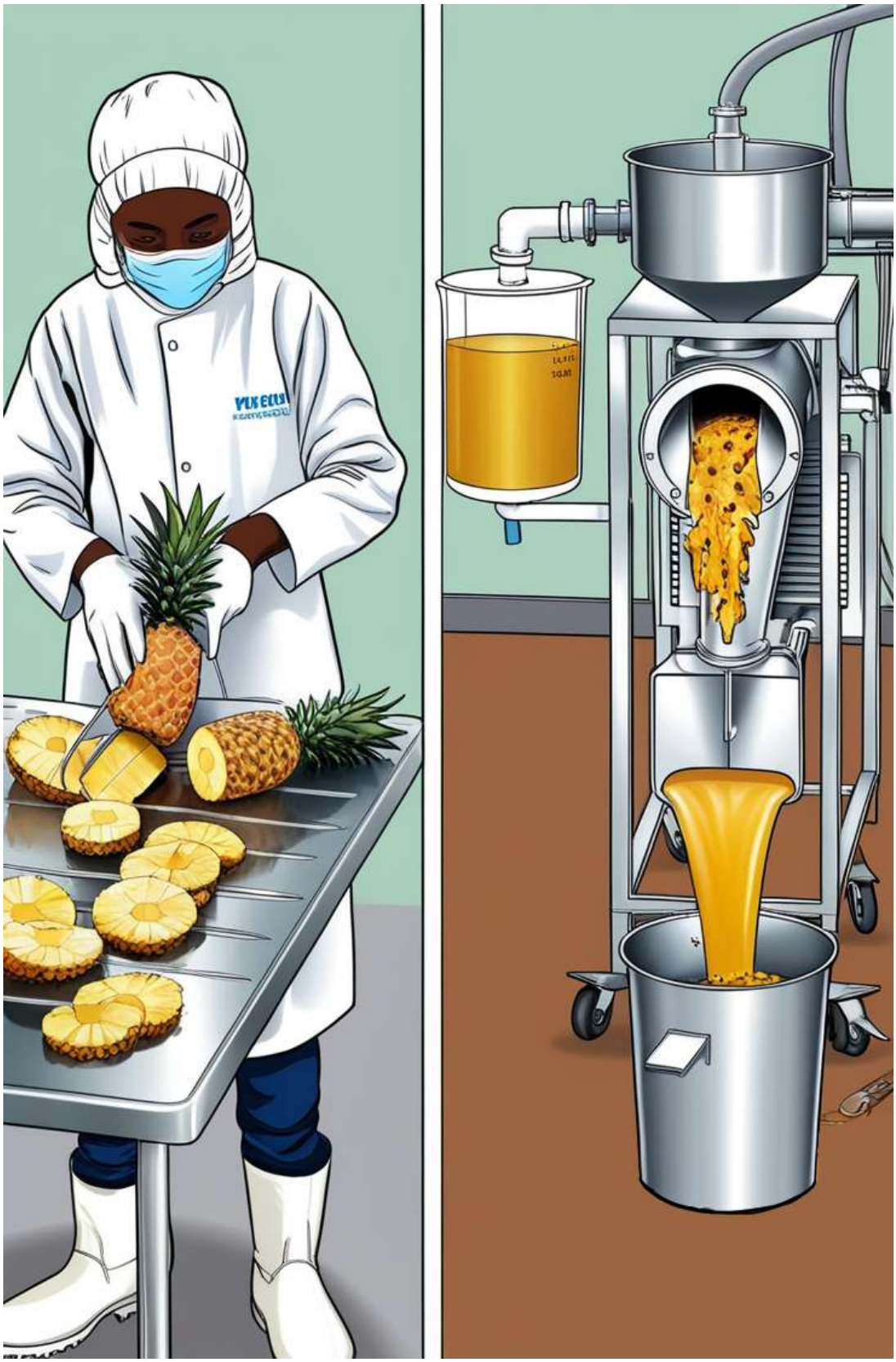


Indicative Contents
2.1 Extraction of Fruits and Vegetable Juice
2.2 Adjustment of Brix
2.3 Pasteurization of Fruits and Vegetable Juice
2.4 Cooling of Juice for Wine Making

Key Competencies for Learning Out come 2: Process Fruits and Vegetables into Juice

Knowledge	Skills	Attitudes
• Identification of method of juice extraction depending on the types of fruits • Identification of functions of wine's ingredients • Identification of mixing ratio of juice/water/sugar • Description of method of juice pasteurization • Description of cooling conditions of juice.	• Extracting juice from fruits and vegetables • Adjusting brix of juice • Pasteurize of juice • Mixing of ingredient	• Being careful when using juice extractor machine • Being respectful for pasteurisation and cooling condition

Duration: 30 hrs

Learning outcome 2 objectives:

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

1. Identify cleary juice extraction methods based on product requirement
2. Extract properly juice of fruits based on product specification.
3. Describe clearly the methods for juice pasteurization based on pasteurization condition.
4. Adjust appropriately brix of juice for wine making based on product requirement.
5. Pasteurize effectively juice used in fruits and vegetables wine making based on pasteurization conditions.
6. Describe correctly the cooling conditions based on cooling condition.
7. Monitor correctly cooling conditions of juice for wine making based on product requirement.

 **Resources**

Equipment	Tools	Materials
▪ Pulping machine Slicing Machine Pressing /Squeezing Machine Brew Vats Pasteurizers Blender Crushing Machine Juicer PPE Cooker Water Filter	Knives Tank Basins Bucket Refractometer Jugs Measuring Scale Thermometer Timer Boiling Pans Dust Bin pH-Meter Brew Vats Stainless Steel Filters	Filter cloths Fruits Vegetables Sugars Water

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail the fruits or vegetables being processed.
- Avail well organised workshop.
- Avail Photos and videos as didactic materials related to juice extraction

Indicative content 2.1: Extraction of Fruits and Vegetables Juice

Duration: 8 hrs

Practical Activity 2.1.1: Extracting and filtrating juice from fruits and vegetables

Notes to the trainer

- The trainer is supposed to demonstrate how to extract and filtrate juice from fruits and vegetables.
- Avail fruits and vegetables being extracted.
- Avail organized workshop.
- The use of videos related to extraction and filtration of juice from fruits as didactic materials is required.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to extract and filtrate juice from fruits and vegetables.

Step 2: Explain the task and provide clear work instructions (Time allocated)

Step 3: Demonstrate how to extract juice of fruits and vegetables for fruits and vegetables wine making. While demonstrating, explain the methods and procedure used in extracting and filtrating juice from fruits and vegetables.

Step 4: Ask trainees to extract and filtrate juice from fruits and vegetables and monitor the procedures.

Step 5: Verify whether the fruits and vegetables juice is properly extracted and filtrated and provide feedback where necessary.

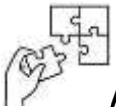
Step 6: Ask trainees to read the key readings 2.1.1 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 2.1.

Points to Remember

- During juice extraction, the main methods used for extracting juice from fruits and vegetables are mechanical and enzymatic methods.

- Screen filtration is a method of separating solid particles from a fluid (liquid or gas) using a screen or mesh.



Application of learning 2.1:

Organize a field visit in a winery near your school and ask trainees to extract and filtrate banana, pineapple and beet root juice for wine making.

Check list:

Criteria	**Indicators**	**Score**	
		YES	**NO**
1 Fruits and vegetable juice is properly extracted	1.1 Banana Juice is extracted and filtrated		
	1.2 Pineapple juice is extracted and filtrated		
	1.3 Beetroot wine is extracted and filtrated		
	1.4 Banana juice is filtered and filtrated		
2 Reporting is properly done	2.1 Report format is considered		
	2.2 Key competencies are mentioned		

Indicative content 2.2: Adjustment of Brix in Juice for Wine Making

Duration: 8 hrs

Practical Activity 2.2.1: Standardising brix of juice for fruits and vegetables wine making

Notes to the trainer

- The trainer is supposed to demonstrate how to standardize the brix of fruits and vegetables juice for wine making.
- Avail juice to be standardized.
- Avail organized workshop.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to standardize juice used in fruits and vegetables wine making.

Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)

Step 3: Demonstrate how to standardize juice for fruits and vegetables wine making. While demonstrating, explain the methods and procedure.

Step 4: Ask trainees to standardize brix of juice of fruits and vegetables for fruits and vegetables wine making and monitor the procedures.

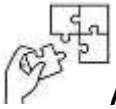
Step 5: Verify whether the fruits and vegetables juice is correctly standardised and provide feedback where necessary.

Step 6: Ask trainees to read the key readings 2.2.1 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 2.2.

Points to Remember

- During adjustment and standardized juice to know brix of juice is very important
- Brix in juice is determined by using Refractometer.
- pH of juice is determined by using pH meter.



Application of learning 2.2:

Organize a trainees' field visit in a winery nearby your school and ask each trainee to check and adjust pineapples juice for wine making.

Checklist:

SN	Criteria	Indicators	Score	
			YES	NO
1	Juice quality is checked according to the product specifications	Brix of juice is checked		
		p H of juice is checked		
2	Brix is well adjusted according to the product specifications	Initial brix is respected		
		Final brix is respected		
		Dilution factor is considered		
3	Reporting is properly done	Report format is considered		
		Key competencies are mentioned		

Indicative content 2.3: Pasteurization of Fruits and Vegetables Juice

Duration: 8 hrs.

Practical Activity 2.3.1: Pasteurizing juice for fruits and vegetables wine making

Notes to the trainer

- The trainer is supposed to demonstrate how to pasteurize juice for fruits and vegetables wine making.
- Avail videos as didactic materials related to pasteurization of fruits and vegetables juice for wine making
- Avail unpasteurized juice being pasteurized
- Avail organized workshop

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to pasteurize juice of fruits and vegetables for wine making.

Step 2: Explain the task and provide clear work instruction (Task, PPE, Time allocated)

Step 3: Demonstrate how to pasteurise fruits and vegetables juice for fruits and vegetables wine making. While demonstrating, explain the methods and procedure used in pasteurisation of juice of fruits and vegetables used in fruits and vegetables wine making

Step 4: Ask trainees to pasteurize of juice of fruits and vegetables for fruits and vegetables wine making, and monitor the procedures.

Step 5: Verify whether juice is well pasteurised and provide feedback where necessary.

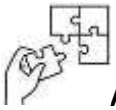
Step 6: Ask trainees to read the key readings 2.3.1 in trainee manual

Step 7: Ask trainees to perform the task provided in application of learning 2.3

Points to Remember

- During pasteurization juice must be monitor careful temperature and time

- The main Purpose of juice pasteurization is to kill harmful bacteria and other microorganisms that may be present in the juice.
- During juice pasteurization used in fruits and vegetables wine: Low temperature long time (LTLT) and High temperature short time (HTST) are recommended



Application of learning 2.3:

Organize a trainees' field visit in a winery nearby your school and ask each trainee to pasteurize juice for fruits and vegetables wine making.

Check list:

	Criteria	**Indicators**	**Score**	
			YES	**NO**
1	Fruits and vegetable juice is effectively pasteurized according to the pasteurization condition	1.1 Temperature of pasteurization is monitored		
		1.2 Time of pasteurization is respected		
		1.3 Pressure is considered		
2	Field visit report is correctly done	2.1 Trainee identification is mentioned		
		2.2 Company identification is mentioned		
		2.3 Key competencies gained are described		
		2.4 Recommendations are mentioned		

Indicative content 2.4: Cooling of juice for fruits and vegetables wine making

Duration: 6 hrs

Practical Activity 2.4.1: Cooling juice for fruits and vegetables wine making

Notes to trainer:

- The trainer is supposed to demonstrate how to cool fruits and vegetables juice for wine making.
- Avail videos as didactic materials related to cooling fruits and vegetables juice for wine making
- Avail hot juice being cooled
- Avail organized workshop

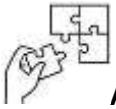
Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to cool fruits and vegetables juice for wine making.
Step 2: Explain the task and provide clear work instruction (Task, PPE, Time allocated)
Step 3: Demonstrate how to cool fruits and vegetables juice in wine industry. While demonstrating, explain the cooling steps.
Step 4: Ask trainees to cool juice used in fruits and vegetables wine making. And monitor the procedures.
Step 5: Verify whether fruits and vegetables juice are appropriately cooled and provide feedback where necessary.
Step 6: Ask trainees to read the key readings 2.4.1 in trainee manual
Step 7: Ask trainees to perform the task provided in application of learning 2.4

Points to Remember

- Cooling the juice up to optimum temperature of fermentation before fermentation, it is important because it allows the yeast activities and develop more complex flavors and aromas in the wine.



Application of learning 2.4: cooling juice for wine making

Organize a trainees' field visit in a winery nearby your school and ask each trainee to cool juice for wine making.

Checklist:

SN	Criteria	Indicators	Score	
			YES	NO
1	Fruits and vegetable juice is well cooled according to the requirement	1.1 Temperature of cooling is respected		
		1.2 Hygiene is maintained		
2	Reporting is properly done	2.2 Report format is considered		
		2.3 Key competencies are mentioned		

Learning outcome 2 end assessment

Theoretical assessment

Q1. After reading and understanding carefully below statement answer by **True** or **False**?

a) Juice extractor is equipment used in fruits and vegetables wine making.
Answer: True

b) Cheesecloth should be used as tool in fruits and vegetables wine making.
Answer: false

c) Screen filtration is a method of separating solid particles from a fluid (liquid or gas) using a screen or mesh in fruits and vegetables wine making.
Answer: True

d) Pasteurization is one of many techniques used in fermentation of juice.
Answer: false

e) Cooling the juice up to optimum temperature of fermentation before fermentation, it is important because it allows the yeast activities and develop more complex flavors and aromas in the wine.
Answer: True

Q2. Complete the following table relating to the pasteurization of fruits and vegetables juice.

Fruits and vegetables pasteurization type	**Temperature**	**Time**	**Purpose**
HTST	……	……	……
LTLT	……	……	……
UHT	……	……	……

Answer:

Nectar and squash pasteurization type	**Temperature**	**Time**	**Purpose**
HTST	around 161°F (72°C).	15-30 seconds.	to minimize heat damage to the product while effectively reducing microbial populations.
LTLT	around 145°F (63°C) to 149°F (65°C).	30 minutes or more.	LTLT pasteurization is suitable for heat-sensitive products, as it minimizes heat-induced changes in flavor, color, and texture.

UHT	around 280°F (138°C) or higher.	a very short time, usually just a few seconds.	UHT pasteurization can effectively sterilize the product, making it shelf-stable without refrigeration.

Question 3. Read the following statement on process fruits and vegetables into juice for fruits and vegetables wine making, Choose the correct answer by encircling the corresponding letter.

1. What are the two main methods of extracting juice from fruits?
    A. Mechanical and chemical
    B. Mechanical and enzymatic
    C. Chemical and physical
    D. Physical and biological

Answer: B. Mechanical and enzymatic

2. Maceration is an enzymatic extraction method that involves:
    A. Soaking fruits in a solution containing enzymes
    B. Using ultrasound waves
    C. Using microwave radiation
    D. Spinning the fruit at high speed

Answer: A. Soaking fruits in a solution containing enzymes

3. What is the difference between crushing and scooping?
    A. Crushing reduces the size of fruits, while scooping removes internal parts.
    B. Crushing is only used for apples, while scooping is used for passion fruits
    C. Crushing is a slower process than scooping
    D. There is no difference between crushing and scooping.

Answer: A. Crushing reduces the size of fruits, while scooping removes internal parts.

4. Why is measuring the pH of juice is important?
    A. To determine the sweetness
    B. To ensure safety and flavor
    C. To measure the acidity
    D. To measure the sugar content

Answer: C. To measure the acidity

5. R**efractometer is used to measure:**
    A. PH
    B. Brix
    C. Acidity
    D. Vitamin content

Answer: B. Brix

6. If the Brix of juice is too high, what can be done to adjust it?
    A. Add more sugar
    B. Add water
    C. Heat the juice
    D. Cool the juice

Answer: B. Add water

7. What is the formula for calculating the percent juice content?
    A. (Weight of juice / Weight of fruit) x 100
    B. (Weight of fruit / Weight of juice) x 100
    C. Weight of juice / Weight of fruit
    D. Weight of fruit / Weight of juice

Answer: B. (Weight of fruit / Weight of juice) x 100

8. The Pearson square is used to calculate:
    A. The pH of juice
    B. The Brix level of juice
    C. The amount of sugar and water needed to adjust Brix
    D. The percent juice content

Answer: C. The amount of sugar and water needed to adjust Brix

9. A dilution factor of 1:4 means:
    A. One-part juice and four parts water
    B. Four parts juice and one-part water
    C. One-part juice and three parts water
    D. Three parts juice and one-part water

Answer: One-part juice and four parts water

10. What is the primary purpose of juice pasteurization?
    A. To improve the flavor of juice
    B. To increase the sugar content of juice
    C. To kill harmful microorganisms in juice
    D. To change the color of juice

Answer: C. To kill harmful microorganisms in juice

11. The pasteurization process involves:
    A. Heating the juice, holding it at a specific temperature, and cooling it
    B. Adding sugar to the juice
    C. Filtering the juice and then freezing it
    D. Adding preservatives to the juice

Answer: A. Heating the juice, holding it at a specific temperature, and cooling it

12. High-temperature short-time (HTST) pasteurization typically involves:
    A. Heating the juice to 185 degrees Fahrenheit for 30 seconds
    B. Heating the juice to 120 degrees Fahrenheit for 30 minutes
    C. Freezing the juice
    D. Adding preservatives to the juice

Answer: A. Heating the juice to 185 degrees Fahrenheit for 30 seconds

13. Cooling the juice after pasteurization in wine making helps to:
    A. Promote yeast activity
    B. Inhibit the growth of harmful microorganisms
    C. Increase the shelf life of the product
    D. All of the above

    Answer: A. Promote yeast activity
14. Which of the following is a method for monitoring the temperature of the juice during winemaking?
    A. Using a thermometer
    B. Tasting the juice
    C. Visual inspection
    D. Smelling the juice

Answer: A.

Practical assessment

ISANGE Ltd which is located in Rulindo district is a company process fruits and vegetables wine they received an order from KEZA Hotel for supplying to their client's fruits and vegetables wine. This company faces a sudden problem of their employees who are in charge of extraction, adjust brix, and pasteurize juice during processing of fruits and vegetables wine. The company asks you to support it on that task.

Task1: extract, adjust, and pasteurize juice from pineapples
Task2: extract, adjust, and pasteurize juice from banana fruits
Task3: extract, adjust, and pasteurize juice from carrots

Checklist:

SN	Criteria	Indicators	Score	
			YES	NO
1	Fruits and vegetable juice is properly extracted	1.1 Extraction method is applied		
		1.2 Banana Juice is extracted		
		1.3 Pineapple juice is extracted		
		1.4 carrots juice is extracted		
		1.5 Banana juice is filtered		
2	Juice quality is checked according to the product specifications	2.1 Brix of juice is checked		
		2.2 p H of juice is checked		
3		3.1 Initial brix is respected		

	Brix is well adjusted according to the product specifications	3.2 Final brix is respected		
		3.3 Dilution factor is considered		
4	Fruits and vegetable juice is effectively pasteurized	4.1 Pasteurization temperature is respected		
		4.2 Pasteurization time is respected		
		4.3 Optimum temperature of yeast activities is respected		

Further information to the trainer

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25°C

Indicative Contents
1.1 Fermentation of Fruits and Vegetables Juice
1.2 Clarification and Stabilization of Wine
1.3 Checking Quality Parameter of Wine

Key Competencies for Learning Outcome 3: Fermentation of Fruits and Vegetable Juice

Knowledge	Skills	Attitudes
• Description of yeast used in wine making. • Description of factors affecting wine fermentation • Comparison of primary fermentation to secondary fermentation • Description of methods used in wine clarification. • Description of methods used in wine stabilization. • Description of quality parameter of wine • Description of methods of checking quality of wine • Identification of classes of wines	• Inoculating juice • Monitoring wine fermentation • Clarifying wine • Stabilizing wine. • Checking quality of wine	• Paying attention when inoculating. • Being careful when inoculating and stabilizing wine. • Having accuracy when checking quality of wine • Being committed when monitoring fermentation

Duration: 30 hrs

Learning outcome 3 objectives:

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

1. Ferment correctly fruits and Vegetable juice according to product specification.
2. Clarify and stabilize appropriately the wine according to product specification.
3. Check accurately the quality of wine based on quality parameters of wine.

Resources

Equipment	Tools	Materials
● Stainless Pump ● Stainless Steel Fermentation Tank ● Filter Machine ● Decanter ● Pasteurizer ● PPE	● Thermometer ● Refractometer ● Ph Meter ● Vinometer ● Barrel ● Air Lock ● Alcohol Meter ● Acid Test Kits ● Test Tubes ● Burette ● Bunsen Burner ● Tripod ● Conical Flask ● Jags	● Buffer Solution ● Titrating Reagent ● Wine Yeast ● Bentonite Clay ● Egg White (For Clarification) ● Gelatin ● Bottle Stopper

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail the pasteurized juice.
- Avail fermenters and make sure that they are in good working condition.
- Avail required materials are not expired
- Avail well organised workshop
- Avail videos as didactic materials related to juice fermentation

Indicative content 3.1: Fermentation of Fruits and Vegetables Juice

Duration: 10 hrs

Practical Activity 3.1.1: Inoculating juice for fruits and vegetables making

Notes to the trainer

- The trainer is supposed to demonstrate how to inoculate wine for fruits and vegetables wine making.
- For the effective delivery, it is recommended to:
  - ✓ Avail videos as didactic materials related to inoculation for wine making.
  - ✓ Avail tools and equipment related to inoculation for wine making.
  - ✓ Avail juice being inoculated.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to inoculate the juice.

Step 2: Explain the task and provide clear work instruction (Task, PPE, Time allocated)

Step 3: Demonstrate how to inoculate wine. While demonstrating, explain the procedure.

Step 4: Ask trainees to inoculate juice used in wine making and monitor the procedures.

Step 5: Verify whether juice is properly inoculated and provide feedback where necessary.

Step 6: Ask trainees to read the key readings 3.1.1 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning.

Points to Remember

- During Inoculation, you must respect temperature for growth of wine yeast typically ranges between 15°C to 30°C (59°F to 86°F)

Practical Activity 3.1.2: Fermenting fruits and vegetables juice into wine

Notes to the trainer

- The trainer is supposed to demonstrate how to ferment fruits and vegetables juice into wine.
- For the effective delivery, it is recommended to:
  - ✓ Avail videos as didactic materials related to fermentation process for wine making
  - ✓ Avail tools and equipment related to fermentation for wine making.
  - ✓ Avail juice being fermented.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to ferment fruits and vegetables juice into wine.

Step 2: Explain the task and provide clear work instruction (Time allocated)

Step 3: Demonstrate how to ferment wine. While demonstrating, explain fermentation monitoring conditions and procedures.

Step 4: Ask trainees to ferment juice and monitor the procedures.

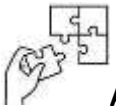
Step 5: Verify whether fermentation is adequately performed and provide feedback where necessary.

Step 6: Ask trainees to the read key readings 3.1.2. in trainee manual

Step 7: Ask trainees to perform the task provided in application of learning 3.1.2.

Points to Remember

- During fermentation you must take care of the following factors; yeast strains, PH, temperature, sugar concentration and availability of oxygen
- Main difference between primary to secondary fermentation is primary fermentation taken in presence of oxygen while secondary fermentation taken in absence of oxygen



Application of learning 3.1:

Organize leaner's field visit to the winery near school and you are requested leaners to monitor fermentation process.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Inoculation is well performed	1.1 Yeast is properly prepared		
		1.2 Inoculation conditions are respected		
2	Primary fermentation is monitored	2.1 Time and Temperature are effectively monitored		
		2.2 pH range of 4 to 4.5 is respected		
		2.3 Oxygen is allowed to enter in fermenter		
3	Secondary fermentation is monitored	3.1 Time and Temperature are effectively monitored		
		3.2 pH range of 4 to 4.5 is respected		
		3.3 Oxygen is allowed to enter in fermenter		
4	Field study report is well done	4.1 Company identification is mentioned		
		4.2 Key competencies gained are mentioned		

Indicative content 3.2: Performing Wine Clarification and Stabilization

Duration: 10 hrs

Practical Activity 3.2.1: Clarify wine.

Notes to the trainer

- The trainer is supposed to demonstrate how to clarify wine.
- For the effective delivery, it is recommended to:
  - ✓ Avail videos as didactic materials related to wine clarification.
  - ✓ Avail tools and equipment related to wine clarification.
  - ✓ Avail wine ready for clarification.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to clarify wine.
Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)
Step 3: Demonstrate how to clarify wine in wine making. While demonstrating, explain the procedures and techniques of wine clarification.
Step 4: Ask trainees to clarify the wine and monitor the procedure.
Step 5: Verify whether the wine is well clarified and provide feedback where necessary.
Step 6: Ask trainees to read the key readings 3.2.1 in trainee manual
Step 7: Ask trainees to perform the task provided in application of learning 3.1

Points to Remember

- Main purpose of wine clarification is to remove insoluble matter such as dead yeast cells, fruits skin particles, and other suspended solids from wine to improve its clarity and stability**.**

Practical Activity 3.2.2: Stabilizing wine

Notes to the trainer

- The trainer is supposed to demonstrate how to stabilize wine.
- For the effective delivery, it is recommended to:
  - ✓ Avail videos as didactic materials related to wine stabilization
  - ✓ Avail tools and equipment related to wine stabilization.
  - ✓ Avail wine ready for stabilization.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop and Stabilize wine.
Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)
Step 3: Demonstrate how to stabilize wine. While demonstrating, explain the procedures and techniques of wine stabilization.
Step 4: Ask trainees to stabilize wine, and monitor the procedures
Step 5: Verify whether wine is well stabilized and provide feedback where necessary
Step 6: Ask trainees to read the key readings 3.2.2 in trainee manual
Step 7: Ask trainees to perform the task provided in application of learning 3.2

Points to Remember

- During wine stabilization, the following methods are applied: pasteurization, add preservatives, filtration and use fining agent

Application of learning 3.2:

UBWIZA winery located in neighbouring schools clarify and stabilize wine for the aim of meeting the requirements of wine making. In your workshop, ask trainees clarify and stabilize wine the same as UBWIZA winery.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Wine clarification is well performed	1.1 Racking is well done		
		1.2 Fining agent is used		
		1.3 Method of filtration is respected		
2	Wine Stabilization is well performed	2.1 Heat stabilization is well used		
		2.2 Preservatives is used		
3	Field study report is well done	3.1 company identification is mentioned		
		3.2 key competencies gained are mentioned		

Indicative content 3.3: Checking Quality Parameter of Wine

Duration: 10 hrs

Theoretical Activity 3.3.1: Checking quality of wine

Notes to the trainer:

- The trainer is supposed to demonstrate how to check quality of wine.
- For the effective delivery, it is recommended to:

  Avail videos as didactic materials related to quality check of wine
  Avail tools and equipment related to quality check of wine
  Avail wine being checked its quality

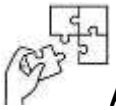
Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop and check quality of wine.
Step 2: Explain the task and provide clear work instruction (PPE, Time allocated)
Step 3: Demonstrate how to check quality of wine by applying organoleptic test and chemical test. While demonstrating, explain the methods with procedure organoleptic test and chemical test
Step 4: Ask trainees to check quality of wine and monitor the procedures.
Step 5: Verify whether quality of wine is well checked and provide feedback where necessary
Step 6: Ask trainees to read the key readings 3.3.1 in trainee manual
Step 7: Ask trainees to perform the task provided in application of learning 3.1

Points to Remember

- Main quality parameter of wine checked by organoleptic test are appearance, smell and taste
- Main quality parameter of wine checked by chemical test are acidity, sugar concentration, alcohol content.



Application of learning 4.1:

Organize leaner's field trip to the winery near school and you are requested leaners to check the quality of wine by organoleptic test and chemical test.

Check list:

3	Criteria	Indicator	Score	
			Yes	No
1	Organoleptic test is well performed	1.1 Taste is checked		
		1.2 Clarity is checked		
		1.3 Smell is checked		
2	Chemical test is well performed	2.1 Alcohol content is tested		
		2.2 Sugar content is tested		
		2.3 pH is measured		
3	Field study report is well done	3.1 Company identification is mentioned		
		3.2 Key competencies gained are mentioned		

Learning outcome 3 end assessment

Theoretical assessment

Question 01. Match the following equipment and tools in **column A** to their functions in column B and write the answers in column **C**

Column C	Column A	Column B
1…	1. pH meter	i. it is used to determine alcohol content in wine.
2…	2. Alcohol meter or vinometer	ii. it is used for determining of sugar content
3…	4. Refractometer	iii. it is used for measuring the acidity or alkalinity)in wine

Answer

1…iii

2…i

3..ii

Question 2. Read the following statement on Process Fruits and Vegetable Juice into Wine, Choose the correct answer by encircling the corresponding letter

1. What is the temperature range for yeast inoculation?
    A. 5°C to 15°C
    B. 15°C to 30°C
    C. 30°C to 45°C
    D. 45°C to 60°C

    Answer: B. 15°C to 30°C
2. What is the ideal temperature range for primary fermentation?
    A. 5°C to 15°C
    B. 15°C to 30°C
    C. 30°C to 45°C
    D. 45°C to 60°C

Answer: B. 15°C to 30°C

3. What is the primary purpose of racking wine?
    A. To increase the alcohol content.
    B. To improve the flavor profile.
    C. To remove sediment and impurities

D. To enhance the color of the wine.

Answer: C. To remove sediment and impurities

4. Which of the following is NOT a common fining agent used in winemaking?
   A. Bentonite
   B. Gelatin
   C. Isinglass
   D. Sodium metabisulfite

Answer: C. Sodium metabisulfite

5. What is the primary difference between depth filtration and surface filtration?
   A. The size of the particles they remove.
   B. The type of filter material used.
   C. The cost of the process.
   D. The impact on wine flavor.

Answer: A. The size of the particles they remove.

6. What is the primary purpose of wine stabilization?
   A. To improve the color of the wine.
   B. To increase the alcohol content.
   C. To prevent spoilage and maintain clarity.
   D. To enhance the flavor profile.

Answer: C. To prevent spoilage and maintain clarity.

7. Which of the following is NOT a common source of wine instability?
   A. Residual sugar
   B. Excess tartaric acid
   C. Excess protein
   D. Residual malic acid

Answer: B. Excess tartaric acid

8. What is the purpose of adding potassium sorbate to wine?
   A. To prevent bacterial growth
   B. To increase the sweetness
   C. To improve the color
   D. To enhance the aroma

Answer: A. To prevent bacterial growth

9. What is the primary carbon source for yeast during fermentation?
   A. Alcohol
   B. Sugar
   C. Protein

D. Water

Answer: B. Sugar

10. Which stage of fermentation produces the majority of alcohol?
A. Primary fermentation
B. Secondary fermentation
C. Both primary and secondary fermentation equally
D. Neither primary nor secondary fermentation

Answer: B. Secondary fermentation

11. What is the primary purpose of an airlock during secondary fermentation?
A. To prevent oxidation of the wine.
B. To control the temperature.
C. To prevent contamination.
D. To increase the alcohol content.

Answer: B. To prevent oxidation of the wine.

12. What happens when the yeast in wine reaches a high enough alcohol concentration?
A. It continues to ferment until all sugars are consumed.
B. It becomes inactive and fermentation stops.
C. It produces off-flavors in the wine.
D. It dies.

Answer: B. It becomes inactive and fermentation stops

Practical assessment

ABC WINERY LTD is a factory wine processing company in Kayonza district, last week they received an order of supplying pineapple wine in Kigali. The production manager ordered the winemaker to make wine for satisfying this command. Urgently, the wine maker went in mission after preparing the must for fermentation. The managing director of the company hired you as a qualified technician to make fermentation of must already prepared.All required tools, materials, and equipment are available.

Check list:

Criteria	Indicators	Score	
		YES	NO
Fruits and vegetable juice is well fermented according to the protocol	Inoculation is performed		
	Wine fermentation conditions are monitored		
Fruits and vegetable wine is properly clarified/stabilized based on the parameters	Wine clarification method is applied		
	Wine stabilization method is applied		
Fruits and vegetable wine Quality is well-checked based on quality parameters	Alcohol content is tested		
	Sugar content is tested		
	pH is measured		
	Taste is checked		
	Color is checked		
	smell is checked		

END

Further information to the trainer

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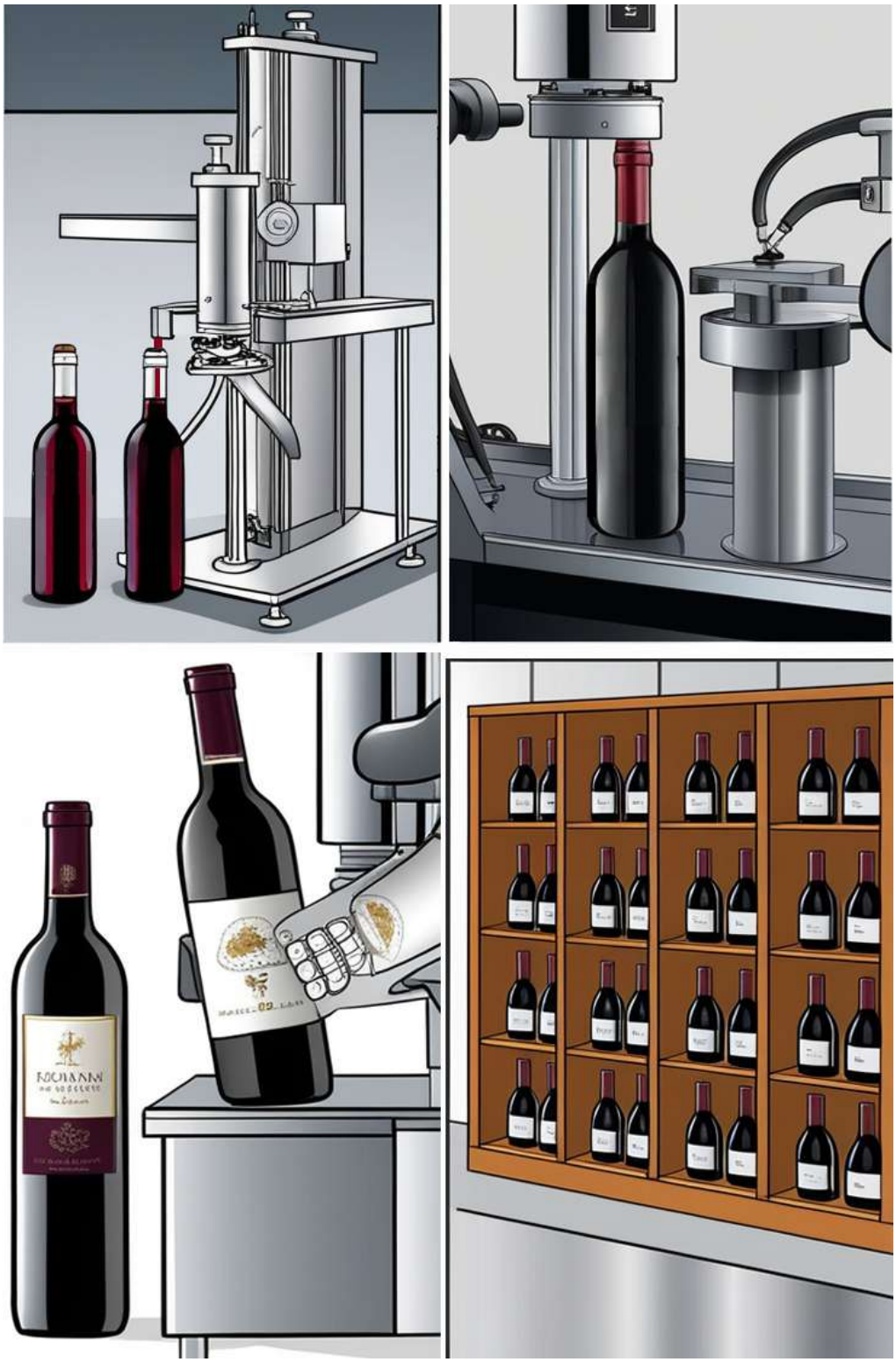


Indicative Contents
4.1 Filling Fruits and Vegetable Wine into Packaging Material
4.2 Labelling of Wine
4.3 Aging Wine

Key Competencies for Learning Outcome 4: Store Fruits and Vegetables Wine

Knowledge	Skills	Attitudes
• Description of packaging of fruits and vegetables wine • Identification of labelling information of fruits and vegetables wine • Description of the fruits and vegetables wine aging/ storage conditions	• Packaging fruits and vegetables wine • Washing and Sterilizing of the packaging materials for fruits and vegetables wine • Filling and sealing fruits and vegetables wine • Arranging the stock • storing fruits and vegetables wine • Recording temperature for fruits and vegetables wine	• Being attentive during arranging stock • Being protective when sterilizing packaging material • Being creative during labelling wine • Being careful during Filling and sealing fruits and vegetables wine

Duration: 10 hrs

Learning outcome 3 objectives:

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

1. Package fruits and vegetables wine according to their types of packaging materials.
2. label fruits and vegetables wine according to labelling requirements.
3. Monitor ageing of fruits and vegetables wine according to product specification

Resources

Equipment	Tools	Materials
● Filling machine ● Sealing Machine ● Capping Machine ● Wine Cellars ● Wine Cabinets ● Wine Rack ● Vacuum Sealer ● Working Tables ● Labelling Machine	● Barrel ● Tank	● Packaging Materials ● Corks ● Caps ● labels

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail the wine being Aged
- Avail well organized workshop
- Avail packaging materials, tools and equipment in good working conditions.
- Avail ageing room
- Avail videos as didactic materials related to wine ageing

Indicative content 4.1: Filling fruits and Vegetable Wine into Packaging Materials

Duration: 3hrs

Practical Activity 4.1.1: Packaging fruit and vegetable wine

Notes to the trainer

- The trainer is supposed to demonstrate how to package wine.
- For the effective delivery; it is recommended to:
  - ✓ Avail videos as didactic materials related to wine packaging
  - ✓ Avail tools and equipment related to wine packaging
  - ✓ Avail wine ready for packaged

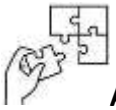
Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop and package wine.
Step 2: Explain the task and provide clear work instruction PPE, Time allocated)
Step 3: Demonstrate how to package the wine. While demonstrating, explain the procedure packaging wine.
Step 4: Ask trainees to package fruits and vegetables wine, and monitor the procedures
Step 5: Verify whether wine is well packaged and provide feedback where necessary
Step 6: Ask trainees to read the key readings 4.1.1 in trainee manual
Step 7: Ask trainees to perform the task provided in application of learning 4.1

Points to Remember

- When prepare packaging material of wine respect those methods of sterilization of packaging materials: Heat sterilization, Chemical sterilization, Low-temperature sterilization and UV radiation sterilization
- During packaging respect all safety rules precautions of packaging



Application of learning 4.1:

Organize trainees field visit to the winery near school that produce different types of wine and ask trainees to package fruits and vegetables wine.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	fruits and vegetables wine are properly filled	1.1 Packaging materials are prepared		
		1.2 Headspace is respected		
		1.3 Product quantity of is respected		
		1.4 Steps are followed		
2	Fruits and vegetables wine are properly sealed	2.1 Seals are sterilized		
		2.2 Sealing machine is used		
		2.3 Steps are followed		
3	Reporting is properly done	3.1 Report format is considered		
		3.2 Key competencies are mentioned		

Indicative content 4.2: Labelling Fruits and Vegetables Wine

Duration: 3 hrs

Practical Activity 4.2.1: Labelling fruits and vegetables wine

Notes to the trainer

- The trainer is supposed to demonstrate how to label wine.
- For the effective delivery, it is recommended to:
  - ✓ Avail videos as didactic materials related to wine labelling.
  - ✓ Avail tools and equipment related to wine labelling.
  - ✓ Avail packaged wine being labelled and labels.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to label wine.

Step 2: Explain the task and provide clear work instruction (Task, PPE, Time allocated)

Step 3: Demonstrate how to label fruits and vegetables wine. While demonstrating, explain the procedure of labelling fruits and vegetables wine.

Step 4: Ask trainees to label fruits and vegetables wine and monitor the procedures.

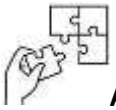
Step 5: Verify whether the wine is properly labelled and provide feedback where necessary.

Step 6: Ask trainees to read the key readings 4.2.1 in trainee manual.

Step 7: Ask trainees to perform the task provided in application of learning 4.2.

Points to Remember

- Main purpose of labelling of wine is to provide information about the wine.



Application of learning 4.2:

Urwengero Winery located in neighbouring schools label fruits and vegetables wine for the aim to provide information about the wine. In your workshop, ask trainees label fruits and vegetables wine as Urwengero Winery Ltd.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Fruits and vegetables wine are properly labelled	1.1 Product name is mentioned		
		1.2 Net quantity is mentioned		
		1.3 Shelf-life information		
		1.4 Company/produce address:		
		1.5 Lot number or batch number, Bar code		
		1.6 Instruction of use		
		1.7 Serving quantity		
2	Reporting is properly done	2.1 Report format is considered		
		2.2 Key competencies are mentioned		

Indicative content 4.3: Ageing Fruits and Vegetables Wine

Duration: 4 hrs

Practical Activity 4.3.1: Ageing fruits and vegetables wine

Notes to the trainer

- The trainer is supposed to demonstrate how to age the wine.
- For the effective delivery, it is recommended to:
  - ✓ Avail videos as didactic materials related to age of wine
  - ✓ Avail tools and equipment related to age of wine
  - ✓ Avail wine ready for ageing

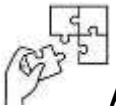
Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to go in the fruits and vegetables wine making workshop to age wine.
Step 2: Explain the task and provide clear work instructions (PPE, Time allocated)
Step 3: Demonstrate how to age wine. While demonstrating, explain the conditions, techniques, and procedure of ageing wine.
Step 4: Ask trainees to age wine and monitor the procedures.
Step 5: Verify whether wine is properly aged and provide feedback where necessary.
Step 6: Ask trainees to read the key readings 4.3.1 in trainee manual
Step 7: Ask trainees to perform the task provided in application of learning 4.3

Points to Remember

- Main chemical reaction associated to wine ageing are oxidation, polymerization, and esterification**.**
- Bottled wines are dramatically affected by the environment. During storing you are respect the following conditions: temperature between (7 - 13 °C), Dark place, Relative humidity between (60-75%) and avoid any movement
- Storing bottles horizontally, allowing constant contact of the wine with the cork, preventing the cork from drying out and letting air in



Application of learning 4.3: ageing fruits and vegetable wine

UBWIZA Winery located in neighbouring schools label fruits and vegetables wine for the aim to improving quality of wine by ageing. In your workshop, ask trainees Age wine as UBWIZA Winery Ltd.

Check list:

SN	Criteria	Indicator	Score	
			Yes	No
1	Ageing conditions are properly monitored	1.1 Time is respected		
		1.2 Temperature is respected		
		1.3 Cool and dark place is respected		
		1.4 Relative humidity is monitored		
		1.5 Avoid movement is respected		
		1.6 Avoid entering oxygen in wine is respected		
2	Reporting is properly done	2.1 Report format is considered		
		2.2 Key competencies are mentioned		

Learning outcome 4 end assessment

Theoretical assessment

Question I. Choose the correct answer among the following questions by circling the corre sponding letter

1. What is one of the main purposes of packaging wine?
   A) To enhance the alcohol content of the wine
   B) To protect the wine from contamination and spoilage
   C) To increase the weight of the wine bottle
   D) To speed up the fermentation process
   Answer: B) To protect the wine from contamination and spoilage
2. Which of the following methods is commonly used for sterilizing wine packaging material?
   A) Chemical washing with sodium hydroxide
   B) Using cold water only
   C) Drying at room temperature
   D) Boiling in hot water
   Answer: A) Chemical washing with sodium hydroxide
3. What type of packaging is described as containing the product directly?
   A) Primary packaging
   B) Secondary packaging
   C) Tertiary packaging
   D) Protective packaging
   Answer: A) Primary packaging
4. Which information is typically included on a wine label?
   A) The manufacturer's stock market price
   B) The specific health benefits of the wine
   C) The type of fruits used and the alcohol content
   D) The manufacturing date of the label
   Answer: C) The type of fruits used and the alcohol content
5. What is the ideal temperature range for aging wine?
   A) 45°F to 55°F (7°C to 13°C)
   B) 60°F to 70°F (15°C to 21°C)
   C) 70°F to 80°F (21°C to 27°C)
   D) 40°F to 50°F (4°C to 10°C)
   Answer: A) 45°F to 55°F (7°C to 13°C)
6. Which of the following is NOT a purpose of wine labelling?
   A) Differentiating brands of wine
   B) Providing information about the wine

C) Indicating the ideal drinking temperature

D) Enhancing the presentation of the wine

Answer: C) Indicating the ideal drinking temperature

7. What factor is important to maintain when storing wine to ensure its quality?

   A) Frequent movement

   B) High humidity

   C) Direct sunlight

   D) Inconsistent temperature

   Answer: B) High humidity

8. What is the effect of oxidation on wine aging?

   A) It reduces the wine's alcohol content

   B) It enhances the wine's complexity and flavors

   C) It makes the wine less aromatic

   D) It speeds up the fermentation process

   Answer: B) It enhances the wine's complexity and flavors

9. Which method of sterilization uses ultraviolet light to kill microorganisms?

   A) Chemical washing

   B) Steam sterilization

   C) UV sterilization

   D) Boiling

   Answer: C) UV sterilization

10. What happens to the color of red wine as it ages?

    A) It becomes more purple and violet

    B) It becomes golden

    C) It turns from purple and violet to orange and brick red

    D) It stays the same color throughout aging

    Answer: C) It turns from purple and violet to orange and brick red

11. What is the purpose of sterilizing packaging materials before filling fruits and vegetables wine?

    a) To reduce the shelf life

    b) To make the packaging materials easier to handle

    c) To kill and eliminate microorganisms

    d) To add flavour to the product

Answer: C) To kill and eliminate microorganisms

12. Which labelling technique involves printing all information directly on the packaging?

    a) Applied labelling

    b) Direct labelling

    c) Transparent labelling

    d) Indirect labelling

Answer: B) Direct labelling

Practical assessment

IGANZE winery LTD located in Kirehe district, last week they received an order of supplying aged wine in Kigali. As a food processing assistant technician, the manager requests you to demonstrate how wine should be Aged

All required tools, materials, and equipment are available.

Check list:

SN	Criteria	Indicators	Score	
			YES	NO
1	Fruits and vegetable wine is accurately filled in the packages according to the techniques	1.1 Packaging materials are Prepared		
		1.2 Filling with head space is respected		
		1.3 Sealing properly is done		
		1.4 Temper evidence is mentioned		
2	Fruits and Vegetable wine is well labelled according to labelling requirements	2.1 Labelling requirements are respected		
		2.2 Labelling Techniques is applied		
3	Fruits and Vegetable wine is effectively aged according to the customer's preference	3.1 Aging technique is applied		
		3.2 Aging conditions are monitored		

Further information to the trainer

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