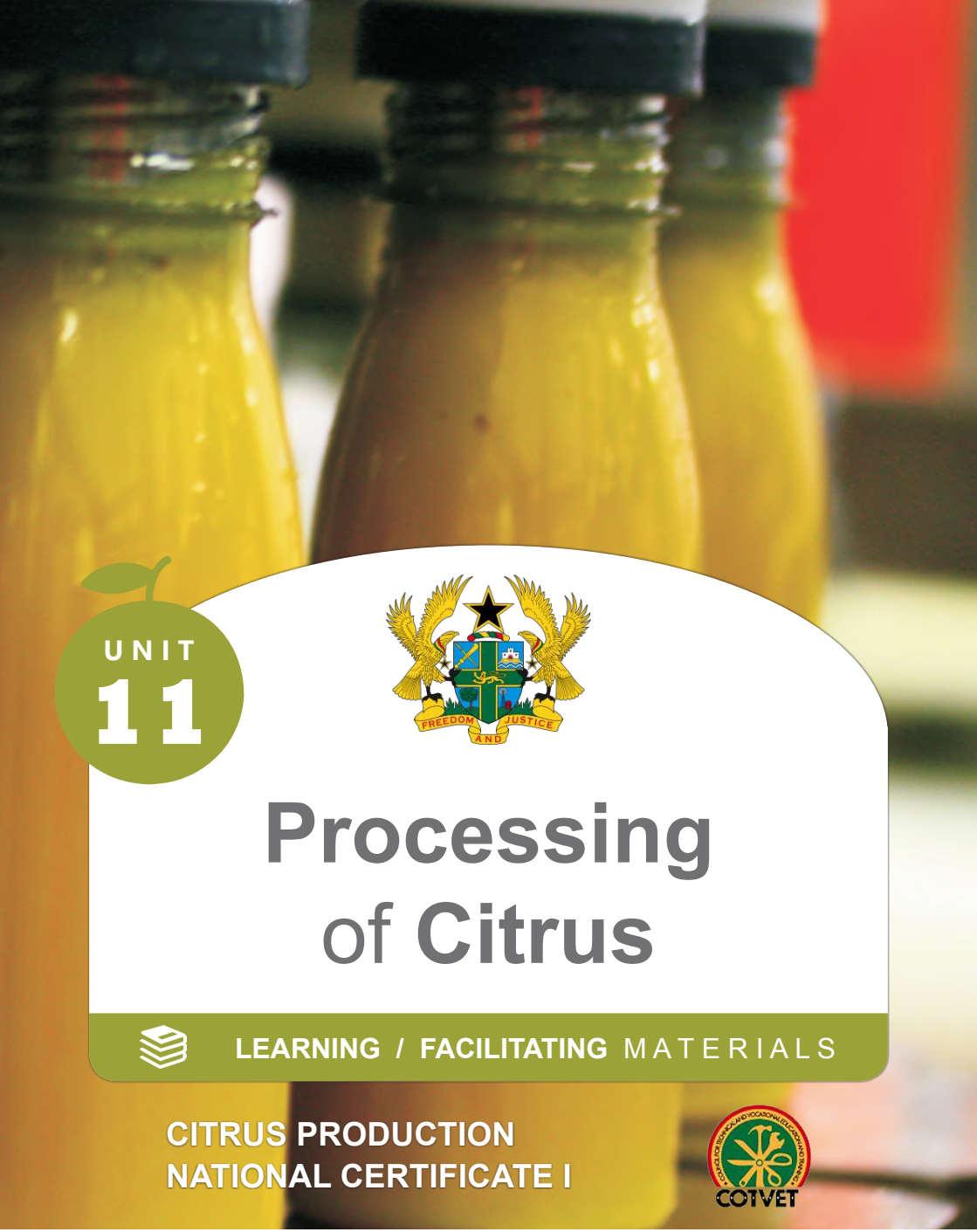

UNIT
11

Processing of Citrus

LEARNING / FACILITATING MATERIALS

CITRUS PRODUCTION NATIONAL CERTIFICATE I

COTVET

CAADP

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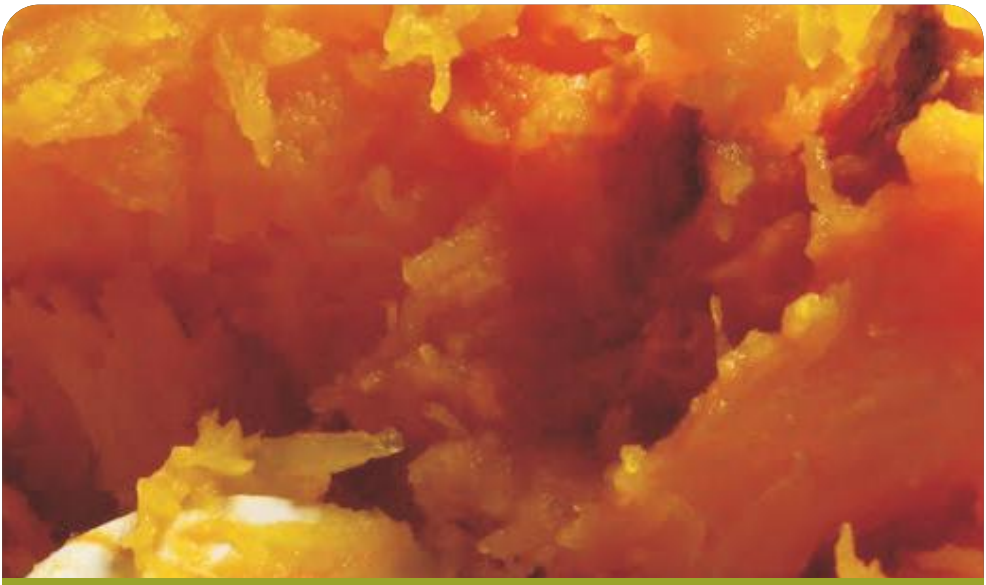

Introduction

Welcome to the start of your career in the processing of citrus fruits.

A career in processing of citrus has never been as popular as it is now; competition is strong and the standards are getting high. So you must aim higher, particularly if you see citrus industry as opportunity to build up your lifelong career.
Many career options are also available within the processing of citrus.
This unit will look at the understanding of value addition, packaging, storage and by products. While training, you should make an effort on improving your personal habits, skill and

knowledge to get along well with the working industry. All these aspects are essential to achieving success in the world of work.

Congratulations for making the decision to study the processing of citrus. You have taken the first step towards a very interesting and satisfying career.

This learning material covers the Learning Outcomes for Processing of Citrus requirements for the Certificate I Programme.

Table of **Contents**

LEARNING OUTCOME **1**

Demonstrate understanding of value addition

In this LO you will learn about the appropriate tools and equipment for citrus processing, cutting fresh fruits for sale, making concentrate and non-concentrate juice and jam from citrus fruits and apply food safety measures.

Value added products are raw agricultural products that have been modified or enhanced to have a higher market value and/or a longer shelf life. Value addition aims at enhancing the product before it is offered to the customer. Added value allows firms to market their products more successfully, emphasizing strength of brand as opposed to a commodity. They can charge higher prices, achieve a higher unit selling price and be competitive.

PC (a) Appropriate tools and equipment for citrus processing

The Citrus juicer is the commonly used appliance for extracting juice from citrus fruits. In separating the pulp, juicers concentrate on the nutrients naturally present in fruits which allows the body to more easily absorb the nutrients than digesting the solid produce. Citrus Stripper, Knife and Zester are used for peeling citrus fruit zest.

MANUAL

Citrus stripper

knife

Citrus zester

Fruits Juicers

Fruits Juicers

PC (b) Pack whole fruits for sale.

Many citrus fruits, such as oranges, tangerines, grapefruits, are generally eaten fresh. They are typically peeled and can be easily split into segments.

Examples of pack whole fruit

PC (c) Cut fresh fruits for sale

The pictures below shows examples of cut and peeled citrus fruits

Cut and peeled citrus fruits

PC (d) Make concentrate and non-concentrate juice

Concentrate juice:

The method of freezing described below is used to make a concentrated juice. The method is based on the fact that juice can be extracted from ice.

1. Juice your fruit by any method- a hand juicer, by hand, into a freezer-safe container.
2. Freeze it. This might take a while.
3. Set up a container that can hold all of the juice with a narrow funnel on top. Upend frozen juice on top of it.
4. Let sit at room temperature while the juice drips out.
5. When the ice is sufficiently clear/white, you're done! Throw out the ice and keep the concentrated juice.
6. Repeat freezing as necessary.

Making non-concentrated juice:

i. Prepare your fruits by washing them to remove any parts that might be tough or bitter and remove the pith.
ii. Prepare your juicer by cleaning it thoroughly.
iii. Slice your fruits into the appropriate-sized chunks, depending on how you will be juicing.
iv. Process the raw fruits until you have the quantity you desire.
v. Add spices, flavourings, and especially sugars sparingly.
vi. The juice is ready; you can chill the juices, or drink them fresh.

PC (e) Jam from fruits

I. Wash and peel fruit.
ii. Cut peel in thin strips into a saucepan.
iii. Add cold water and simmer, covered, until tender (about 30 minutes).
iv. Drain and remove seeds and membrane from peeled fruit.
v. Cut fruit into small pieces.
vi. Combine peel and fruit in saucepan, add boiling water and sugar.
vii. Boil rapidly over high heat, stirring frequently, until the temperature measures about 2°C above the boiling point of water (100°C at sea level), about 20 minutes.
viii. Remove from heat and skim.
ix. Pour hot jams into hot, sterile jars, leaving 10mm headspace.
x. Wipe rims of jars with a dampened clean paper towel; adjust two-piece metal canning lids.

Note: When peeling citrus fruits for jam, be sure to include some of the white membrane found just under the skin. This is where most of the pectin is located.)

Citrus Jam

PC (f) Food safety measures

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer.

Industry to market practices

Food safety considerations include the origins of food including the practices relating to food labelling, food hygiene, food additives and pesticide residues, as well as policies on biotechnology and food and guidelines for the management of governmental import and export inspection and certification systems for foods.

Market to consumer practices

The usual thought is that food ought to be safe in the market and the concern is safe delivery and preparation of the food for the consumer.

The five key principles of food hygiene, according to WHO are:

1. Prevent contaminating food with pathogens spreading from people, pets, and pests.
2. Separate raw and cooked foods to prevent contaminating the cooked foods.
3. Cook foods for the appropriate length of time and at the appropriate temperature to kill pathogens.
4. Store food at the proper temperature.
5. Use safe water and sterilized materials.

Self-assessment

PC (a), (b) & (c)

1. Using the appropriate tools, perform the following activities i. Pack whole fruits for sale

   ii. Cut fresh fruits for sale

PC (d)

1. Prepare a concentrate and non-concentrate juice using the appropriate tools and equipment. Apply the necessary safety measures.

PC (e)

1. Prepare a citrus jam well packed in appropriate container and sealed. Apply the necessary safety measures.

LEARNING OUTCOME **2**

Demonstrate knowledge of packaging

In this LO, you will learn about materials for packaging, the importance of packaging, appropriate tools and equipment for packaging, appropriate method for packaging fruits and making appropriate labels for citrus products.

Packaging is the technology of enclosing or protecting products for distribution, storage, sale, and use. Packaging also refers to the process of design, evaluation, and preparing goods for transport, warehousing, sale, and end use. Packaging contains, protects, preserves, transports, informs, and sells goods.

PC (a) Forms and materials for packaging

Citrus fruits are packed in forms that deliver protection, branding and speed to market.

Forms of packaging:

Cardboard and paper

Whilst these traditional materials are generally readily available and inexpensive, they have several drawbacks: porous to gas, permeable to water, easily torn or crushed.

Plastic

Plastic packaging delivers the best quality produce, minimizing wastage. It is flexible, unbreakable and light in weight. Plastic is selectively permeable to gas and water, depending on the type of polymer. Some polymers are therefore ideally suited to creating a modified atmosphere around fresh fruits.

MATERIALS FOR PACKAGING

Citrus fruits in different plastic containers

Citrus fruits in Baskets

PC (b) Importance of packaging

The Importance of packaging in marketing cannot be overemphasized. The following are some examples, it/at:

i. is one of the ways companies can get consumers to notice products ii. plays an important role in ensuring sells of goods
iii. is considered to be credible medium of communication

iv. the point of sale packaging is consulted willingly and intensively by the consumer as indicator of quality.

PC (c) Appropriate tools and equipment for packaging

Equipment for packaging citrus fruits include bags, crates, hampers, baskets, cartons, bulk bins, and palletized containers.

Citrus fruits in packs

PC (d) Appropriate method of packaging fruits

Packaging fresh fruits is one of the most important steps in the long and complicated journey from grower to consumer. There are several methods of packaging, examples are Face packing, Modified Atmosphere packaging, Layer packing and Field packing.

i. **Face packing.** A packing method where most of the container is loose or volume filled except for top layer. Items in the top layer are arranged in an orderly pattern for appearance.

ii. **Modified Atmosphere packaging.** A method of packaging in which the produce is packed in a sealed container into which a specific mix of gases are introduced. The container only prevents the gases from escaping and does not regulate the mix.

iii. **Layer packing.** Packing method where the entire package of produce is packed in orderly layers.

iv. **Field packing.** A packing method in which all harvesting, grading, and packing functions are performed at the same time in the field or orchard.

PC (e) Design and make appropriate labels

Appropriate label

A label is a piece of paper, polymer, cloth, metal, or other material affixed to a container or article, on which is printed a legend, information concerning the product, addresses, etc. The objective of foodstuff labelling is to guarantee that consumers have access to complete information on the content and composition of products, in order to protect their health and their interests.

An appropriate label for citrus products must be:

- clear and easy to read
- permanent
- easy to understand
- easily visible
- not misleading
- dated (manufacturing date and best before)
- Nutritional facts
- bar code

Examples of labels

Self-assessment

PC (a)

1. State the appropriate materials used for packaging citrus fruits and state one reason each for choosing the materials

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PC (b)

2. Explain the importance of packaging citrus fruits

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PC (d)

3. Describe any two (2) methods for packaging citrus fruits

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PC (e)

4. Appropriate label for citrus product must have certain qualities. State and explain any six of them.

Activity:

Design and make a label for a citrus fruit container showing all the features

LEARNING OUTCOME **3**

Demonstrate knowledge of storage

In this LO, you will learn about the importance of storing processed products, identify suitable facilities and materials for storing processed products and demonstrate the methods of storing processed products.

PC (a) Explain importance of storing processed products

Food storage is a traditional, domestic and an important industrial skill. Food is stored by almost every human society. Storing of food has several main purposes:

i. Shelf life: To extend shelf life of the produce
ii. Creation of time utility: There are products which are produced continuously throughout the year while consumption is seasonal. Storage enables goods to be made available to buyers whenever they are in demand.
iii. Creation of place utility: Another function of storage is to make goods available to a buyer at his place of business when he needs them.
iv. Stabilizing prices: Another function of storage is to stabilize price by making the goods available in the market whenever there is demand.

Pc (b) Identify suitable facility and materials for storing processed products

FACILITIES

Citrus dryer

Citrus freezer

Citrus fruit in plastic containers

Citrus fruit

Citrus fruits in pap kages

PC (c) Demonstrate the method of storing processed products

Citrus products are preserved using the methods below:

Canning and bottling

A resurgence of interest in canning is taking place as it has become easier with more fool-proof methods and good equipment like regular jars, lids and more reliable and safer pressure cookers.

Citrus Jam

- Mother plants (usually 10 - 15 years of age) having exceptionally good health, regular bearing and consistently high yield with good quality fruit must be selected.
- Inspection for pests must be conducted and managed if any is detected.
- The virus detection tests must be performed to know disease status of trees. Virus indexing should also be conducted. It is a process of testing plants for the presence or absence of viruses. Plant must be tested before using it as a mother plant to produce 'virus free stock'.

The primary method of detecting viruses is to transmit them by grafting or budding to a sensitive indicator plant under insect-proof, controlled conditions which then develops identifiable symptoms within a certain length of time.

PC (c) Prepare seedling for budding and grafting

In preparing seedling for budding and grafting, the following steps must be considered:

- Amend the soil
- Select the variety of tree you wish to cultivate.
- Protect the seedling eyes from damaging
- Prune the basal leaves
- Spray insecticide to drive away pests

Self-assessment

PC (a)

1. Explain the importance of storing processed citrus fruits

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PC (b)

2. Sketch any two (2) facilities for storing processed citrus fruits

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3. Explain the main methods of storing citrus fruits

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3. Explain when each of the methods in question 2 are best employed

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Activity:

Make a visit to a nearby Citrus fruit processing site and report on the following;

I. The types of facilities and materials used for storing processed fruits
ii. The methods used for storing citrus fruits

LEARNING OUTCOME **4**

Demonstrate understanding of by-products

A by-product is a secondary product derived from a manufacturing process or chemical reaction. It is not the primary product or service being produced. Citrus by-products are the processing wastes generated after citrus juice extraction and constitute about 50% of fresh fruit weight.

In this LO, you will learn about citrus by-products, explain their importance, demonstrate the method of making by-products and apply safety measures in citrus processing.

PC (a) Identify by-products of citrus

The by-products are the seed, the peel and the pulp from which seed meal, molasses, and cleaning products can be made from.

Citrus seed meal

Citrus seed meal is the by-product of oil extraction of citrus seeds collected in canning plants

Citrus molasses is a by-product of citrus juice extraction. The fresh pulp obtained after pressing the fruit is mixed with lime and pressed to remove moisture.

Examples of cleaning products from cit

PC (b) Explain the importance of citrus by-products

Some example of importance of citrus by-products includes:

i. additional income
ii. source of raw material iii. create employment
iv. for farm manure
v. production of root stock

PC (c) Demonstrate the method of making by-products in citrus

Composting method is described

i. Slice the citrus fruit and leaves into pieces between 1 and 3 inches long. (Smaller pieces break down faster.)
ii. Mix citrus scraps and other green materials such as grass clippings, vegetable peels or weeds with an equal amount of brown materials. Brown materials such as dry leaves.
iii. Make compost pile by layer green and brown materials in 3-inch layers or mix green and brown materials together before adding to the pile.
iv. Keep the compost area evenly moist. Moisture is crucial to aid microorganisms in breaking down the organic materials into the end product - compost.
v. Periodically mixing the pile with a pitchfork or a garden spade, this helps to aerate the pile.

PC (d) Safety measures in citrus processing

Personal

- Maintain order in your work area.
- Always bend your knees when you lift objects and get help with heavier loads
- Wear personal protective equipment if the job requires it.
- Wear clothing appropriate for the temperature and weather conditions
- Know where first aid equipment is located
- Do not consume alcoholic beverages and non-prescription drugs on the job
- wear gloves and other protective clothing

Tool Safety

- Use the proper serviceable tool for the job
- Never remove safety guards/shields from power tools
- Wash , clean and oil tools after use

Self-assessment

PC (a)

1. List five (5) citrus by-products and stste their uses

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PC (b)

1. Explain three (3) economic importance of citrus by-products

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PC (d)
State the necessary safety measures to be observed when processing citrus fruits.

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Activity:

1a. Visit a nearby Citrus Fruit Processing site and report on the following;

i. The types of by-products produced at the processing site and their uses
ii. The steps used in producing the identified by-products
iii. Safety measures observed at the processing site

1b. Prepare any one citrus by-product identified at the processing site

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