

Penang Sangam High School
P.O. Box 44, Rakiraki
Year 13 Agriculture Lesson Notes Week 16

Strand	AS 13.3 Agronomy
Sub-Strand	AS 13.3.2: Horticulture
Content Learning Outcome	AS 13.3.2.3 Demonstrate the skills in container organic vegetable gardening by using available recycle materials.

Lesson 1: Organic Container Gardening

Lesson Outcome: At the end of this lesson student should be able to:

- 1. define organic gardening**
- 2. identify the two methods of organic vegetable container gardening**

What is organic container gardening?

- is the practice of applying organic gardening (without using chemicals) by using recycle materials such as milk packets, juice bottles or oil gallons.

Advantages of container gardening

- ✓ cheap and practical method
- ✓ requires little space, care, and attention and can be done by whole family
- ✓ satisfies food needs of families and helps to generate income
- ✓ helps to reduce impact of climate change on food security (reduces pollution)

Two Methods of Growing Organic Vegetables in Container Gardening

1. Horizontal Container Growing Method

- growing plants or vegetables in containers in a horizontal position on ground. This method can be applied in a small-space gardening using different recycled containers, eg. leafy vegetables



2. Vertical Container Growing Method

- growing plants in an upward position as alternative to the traditional horizontal garden bed, especially when there is a limited space to grow vegetables at home. Eg A-frame system



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Lesson 2: Selecting and Preparing Containers

Lesson Outcome: At the end of this lesson student should be able to:

- 1. list the ten steps in growing organic container vegetable gardening**
- 2. describe the ten steps successfully**
- 3. select and prepare containers for growing organic vegetables successfully**

Ten steps in growing organic vegetables in containers:

1. Plan the organic container vegetable garden	6. Seeding and transplanting
2. Select right containers for crops to be grown	7. Control weeds, pests, and diseases
3. Prepare containers for planting	8. Nutrient management
4. Prepare soil medium	9. Water management
5. Select vegetable crops to plant	10. Harvesting

Step 1: Planning an organic container vegetable gardening

1. Choose a suitable location for the container garden.
2. Identify a place in the backyard to provide sunlight and protection from extreme weather.
3. Consider the type, quantity, nutritional value and food security it would provide for household.

Step 2: Selecting the right containers for the plant

1. Large containers are selected to hold plants and accommodate the root system of plants. The size and number of containers to be used will depend on available space and crop selected.

2019 – Importance of selecting the right size of containers for the crop to be planted. (2 marks)

Follow the types of vegetables and the recommended size of containers:

Leafy vegetables (lettuce, Chinese and English cabbage, raddish, green onions, parsley) and herbs	Small size containers 6-10 inches (15.2 - 25.4 cm)
Okra, eggplant, tomato including corn	Larger containers 15-25 inches (38 - 64 cm)

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2. Any type of used container can be used if it can be provided with good drainage holes in the sides.

Plastic containers that are used for petroleum products and chemicals should be avoided.

Step 3: Preparing containers for planting

The following hand tools are needed when preparing containers for planting:

- ✓ garden trowel
- ✓ kitchen knives
- ✓ iron rod (5 mm diameter)
- ✓ scissors

1. Cut upper large side of rectangular shaped containers or upper part of cylindrical containers.
2. Provide adequate drainage holes at sides of containers.
 - a. Inadequate drainage is one major reason for failure of vegetable container gardening.
 - b. The required height of drainage holes from bottom of containers should be:
 - ✓ Small containers: 2.5 cm (1 inch)
 - ✓ Big containers: 5 cm (2 inch)

2018 – Explain the purpose of constructing drainage hole 2.5cm from the bottom of the container. (2 marks)

- c. The scissors, pointed kitchen knife, or small diameter heated iron bar/rod can be used to punch drainage holes.
- d. The space from bottom and height of drainage holes around containers will serve as water storage for plant use.
3. Small kitchen knife is used for cutting and making drainage holes 1 inch from bottom of the small containers. Heated tip of iron rod used to make drainage holes at the sides of the medium and large hard plastic containers.
4. Steps in fabricating an A-frame bamboo system using bamboo or use old house gutter
- ✓ Measure and cut bamboo materials
 - ✓ Make the bamboo container
 - ✓ Drill drainage holes for bamboo container
 - ✓ Fill bamboo container with soil medium

Student Activity

1. List one factor that should be considered when choosing a suitable location for a container garden.
2. List two vegetable crops that can be planted in a 15-25cm container.
3. Explain one importance of preparing drainage holes using the recommended height.
4. Why plastic containers that are used for petroleum products and chemicals not recommended for container gardening?

Lesson 3: Preparing Soil Medium

Lesson Outcome: At the end of this lesson student should be able to:

- 1. list components of an ideal soil mixture**
- 2. calculate ideal soil mixture based on soil type**

Container gardening requires a specific soil mixture to be used for better crop growth:

- ✓ sufficient nutrients, aeration and drainage
- ✓ dark brown in color

Consider the following to prepare the right soil medium ration

1. use a light weight potting soil
2. do not use garden soil because it is too heavy and will compact in the container

It is not recommended to use ordinary garden soil due to the following:

1. does not have sufficient soil properties and nutrients to promote healthy growth.
2. watering will compact, squeeze out air from soil and cause waterlogging which will result in stunted plant growth, wilting, or death.

A healthy growing medium for container garden should follow the ideal soil mixture ratio:

Soil Type	Ideal Soil Mixture Ratio
Using Loam and Alluvial Soil	<u>Ideal soil mixture ratio is 1:1:1</u> 1 part Alluvial soil + 1 part composted manure/kitchen or agricultural waste + 1 part saw dust/rice hulls/coconut coir dust/ sand
Using Clay Soil	<u>Ideal soil mixture ratio is 1:2:1</u> 1 part clay soil + 2 parts composted manure/kitchen or agricultural wastes + 1 part saw dust/rice hulls/ coconut coir dust/ sand

Preparing soil medium for container gardening

1. Soil mixture ratio is prepared and mixed thoroughly
2. Container is filled with soil mixture medium up to 1 inch from top of the container
3. Soil medium ready for planting and transplanting

2018 – Discuss the three steps in preparation of soil medium for container gardening. (3 marks)

Student Activity

1. State the type of soil used for container gardening.
2. List the component of an ideal soil mixture ratio for clay soil.
3. Explain one reason why ordinary soil should not be used for container gardening.

Lesson 4: Selection of Vegetable Crops and Crop Husbandry Practices

Lesson Outcome: At the end of this lesson student should be able to:

- 1. list vegetable varieties specifically developed for growing in small spaces**
- 2. identify vegetables that can be grown in container garden**

Vegetable can be grown where environment is favorable for plant growth. Any vegetable that will grow in a backyard garden will also grow well as a container-grown plant. Those vegetable varieties with compact or dwarf growth habits can be developed for growing in small spaces.

The following are vegetables that can be grown in container garden.

<u>Leafy vegetables</u>	<u>Fruit crop vegetables</u>	<u>Root crop vegetables</u>
Chinese cabbage	Cauliflower	Carrot
Coriander	Cucumber	Radish
English cabbage	Cowpea	Taro (dalo)
Lettuce	Tomatoes	Sweet potato (kumala)
Mint	Capsicum	
Spring onion	Maize	

Vegetable crop can be grown from seeds and seedlings. Seedlings can be raised in nurseries and transplanted when it is ready or vegetable crop can be planted by the use of seeds.

Seedlings can be germinated in a range of different trays and containers eg. cartons, trays, etc

Some tips when growing seedlings:

1. Trays or containers to be 3 inches deep for root growth and have small holes for drainage
2. Fill containers with organic soil starting mix and cover seeds with ½ inch of soil
3. Place germinating seeds in a warm area with sufficient sunlight
4. Water the newly sown seeds and repeat daily until seedlings become ready for transplanting
5. Transplant seedlings when they have formed 1 to 2 pairs of true leaves
6. Lift seedling carefully as not to damage young root system during transplanting
7. Follow the required spacing when transplanting

Student Activity

1. List two ways of growing vegetable crops.
2. State one reason for covering the sowed seeds with ½ inch of soil in a plastic tray.
3. Discuss why not all vegetable crops can be planted directly.

Lesson 5: Nutrient, Pest, Weeds and Disease Management Practices

Lesson Outcome: At the end of this lesson student should be able to identify appropriate and suitable organic nutrient required by selected vegetable grown.

1. Top dress - an application of manure or fertilizer to the surface layer of soil or a lawn.
2. Pest- repelling plants - plants for their ability to repel insects, nematodes, and other insects.

It is important to maintain plant growth once it is planted directly or transplanted. Plants grown in containers have shorter and compact root system which makes it difficult for plants to obtain nutrients from the soil. They can also be attacked by various insects and diseases.

The following operations are conducted to avoid infestation of pest, weeds and diseases:

1. plastic containers should be placed on a covered ground
2. plastic sheet to be used to cover the ground surface
3. weeds to be removed from the container by hand picking
4. periodic inspection of plants is required for presence of insects and occurrence of diseases
5. planting insect plant repellent such as lemon grass (Coboi) and marigold flowers around the container garden will help drive the insects away from the vegetable plants.

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2018 – Name one aromatic plant used to control pests and diseases in organic container gardening. (1 mark)

1. Nutrient management

- ✓ supply required nutrients to keep plants healthy and productive
- ✓ top dress or apply well composted manure every two weeks

2. Sunlight management

- ✓ ample sunlight required for photosynthesis and producing quality vegetables
- ✓ vegetables grow and produce best when grown in full sunlight (5 hours per day)

3. Water management

- ✓ routine watering to keep soil moist but not waterlogged (one watering/day is sufficient)
- ✓ waterlogged soil starves plant roots of oxygen
- ✓ dry soil causes plants to drop flowers and leaves
- ✓ monitor drainage and soil moisture retention

Student Activity

1. Explain one reason why organic vegetable container garden needs to be supplied with compost nutrient.
2. State an advantage of using pest repelling plants to control pests.
3. Discuss one characteristic of pest-repelling plants and why they are used for controlling pest, weeds and diseases.