

Agricultural Science

Year 1

SECTION

5

PRODUCTION AND MARKETING OF VEGETATION CROPS AND ORNAMENTAL PLANTS



Farming For Jobs and Income

Economic Production of Crops

INTRODUCTION

Hello learner! Welcome to this section. In this section, you shall be exploring the production and marketing of vegetable crops and ornamental plants. Specifically, you will be able to identify market needs for vegetables and ornamental plants. The relevance of this section is to help you acquire the prerequisite knowledge and skills needed to plan, organise, produce and market vegetables and ornamental plants successfully. To add, the activities throughout the section have been designed to encourage you to investigate and analyse existing businesses, identifying market gaps and potential opportunities. It will also develop your research, critical thinking and analytical skills, preparing you to design innovative solutions for the agricultural industry. You will also gain practical skills in managing post-harvest operations as they are taken through this section. It will enable you to establish the link between the concepts in this section and related subjects such as economics and business studies. This will help you acquire basic knowledge such as managing and marketing of produce which are directly linked to economics and business studies.

At the end of this section, you will be able to:

- Identify market needs for vegetables and ornamental plants.
- Organise and produce selected vegetable crops and ornamental plants.
- Carry out necessary post-harvest practices and market the produce.

Key Ideas

- **Goal Setting:** This refers to the process of identifying specific, measurable, achievable, relevant, and time-bound (SMART) objectives to be accomplished.
- **Production Planning:** This is the process of organising and managing the resources and activities required to produce goods or services.
- **Marketing:** Marketing is the activity or business of promoting and selling products or services including market research and advertising. Marketing is also a term used to describe the act of buying and selling a commodity between the producers, retailers and consumers.
- **Stages of vegetable or ornamental production:** Vegetable or ornamental plant production goes through three stages: Organisation stage, production stage and post-production stage.
- **Organisation / Planning Stage:** This stage is very key to the success of any production

venture. Several factors need to be considered at this stage to ensure success. These include: What to produce (i.e. which type and varieties? Where to produce it? When to produce it? How to produce it? and most importantly; To whom it must be produced?

- **Production Stage:** This is the actual on-field production of the selected vegetable or ornamental crops.
- **Post-production stage:** This is basically how to process, store or market the produce to generate income and make the business venture profitable. This is also guided by questions like When to sell it? Where to sell it? and at what price to sell it? etc.
- **Post-harvest operations:** This refers to the series of processes and practices that harvested vegetables and ornamental plants are taken through before marketing them to avoid spoilage and add value to the produce.
- **Post-harvest activities:** These include washing and cleaning, sorting and grading, packaging, advertisement of products and taking the product to the consumers.

MARKET-ORIENTED PRODUCTION OF VEGETABLES AND ORNAMENTAL PLANTS.

Vegetables

A group of edible plants or plant parts that are eaten either raw or cooked. Vegetables are classified botanically, either based on their life cycle, edible parts or common characteristics such as families. Vegetables can be grouped according to edible parts either as leafy, fruit, root or tubers. They can also be described as annuals, biennials or perennials when classification is based on their life cycle. They are also grouped into families like Solanaceae (tomatoes, peppers, eggplants and potatoes) and Brassicaceae (broccoli, cauliflower, and cabbage). See Tables 5.1 and 5.2 below for the classification of vegetables based on edible parts and life cycle.

Table 5.1: Classification of vegetables based on edible parts

S.N.	Leafy vegetables	Fruit vegetables	Root vegetables	Tuber vegetables	Flower vegetables
1	Lettuce	Tomato	Carrot	Ginger	Broccoli
2	Cabbage	Okra	Radish	Irish potato	Cauliflower
3	Spinach	Garden egg	Turnip	Sweet potato	
4	Kontomire	Aubergine			
5	Onion	Cucumber			
6		Pepper			

Table 5.2: Classification of vegetables based on plant life cycle

S.N.	Annuals	Biennials	Perennials
1	Tomato	Aubergine	Broccoli
2	Okra	Pepper	Ginger
3	Cucumber		Asparagus
4	Cabbage		
5	Lettuce		
6	Carrot		

Ornamental Plants

Ornamental plants are a group of flowering and non-flowering plants that are grown for their aesthetic values. They come in groups according to their purpose or function as ground covers or spreaders, herbaceous annuals and perennials, hedges, shrubs, trees, avenue plants and potted plants.

Marketing

Marketing is the activity or business of promoting and selling products or services including market research and advertising. Marketing is the term used to describe the act of buying and selling a commodity between the producers, retailers and consumers. This is an act of physical exchange of commodity for money. The processes involved in the marketing of vegetables and ornamental plants include assembling, sorting, grading, processing, packaging, storage, distribution, advertising and risk management.

The Market Requirements Before Taking on a Vegetable or Ornamental Plant Business.

1. Financial and personal goals
 - a. How much income is needed from the vegetable and ornamental plant business?
 - b. How much is needed for the start-up?
 - c. How much time can be invested in the vegetable and ornamental plant business?
2. Identify crops to grow: Analyse crop options based on:
 - a. Profitability
 - b. Market demand

- c. Resources needed and resources available
 - i. Capital
 - ii. Land
 - iii. Labour
- 3. Analyse market outlets based on:
 - a. Volume to sell
 - b. Crop diversity
 - c. Price premium
 - d. Special requirements (packaging, certifications, farmers agronomic preferences)
- 4. Identify when to sell and at what price:
 - a. Seasonal factors
 - b. Extending production season (greenhouse or high-tunnel production)
 - c. Consider production and marketing costs
- 5. Production planning:
 - a. Seedling and planting schedule
 - b. Harvesting schedule

Planning

This is the key to success when one is ready to start a vegetable and ornamental plant production business. Poor management and lack of planning are, in many cases, the primary causes of business failure. It all starts with planning and goal setting. Draw up a plan to help with accountability. In any business enterprise, it is necessary to identify a market for the products. Given the perishable nature of vegetables, one needs to know where one will be selling the crop even before planting. It is important to secure customers or buyers for the product before making any significant financial investment. Other elements that must be evaluated beforehand are infrastructure and capital requirements for producing, harvesting, handling and marketing the produce. Postharvest handling activities are very important to maintain the freshness of the product. Proper infrastructure must be in place, especially when going into large-scale production and distribution.

Goal setting

First, identify the financial and personal goals. It is important to determine how much income is obtainable from the vegetable or ornamental enterprise to cover farm and living expenses. Plan the farm size according to the resources available. Even if the plan is towards a large enterprise, start with a modest size and develop a sustainable growth plan.

Marketing Plan

Considering the perishable nature of vegetables and the slow demand for ornamental plants in Ghana, one must have a marketing plan that outlines what, where, when and at what price to sell vegetables and ornamental plants.

What to sell?

Some factors that can help determine what crops are best suited are product profitability, skills required for its cultivation, level of care needed, labour cost and startup capital required. Some crops may be very profitable, but they may also be labour-intensive. Consider different crops that can be produced at different times of the year. At any rate, the market needs should determine the type of crops to grow.

Where to sell?

Depending on the size of the operation, there are various marketing options:

1. Direct-to-consumer marketing
2. Farmers' markets
3. Community-supported agriculture (CSA)
4. Roadside stands
5. Direct sales to restaurants or local supermarkets
6. Food hubs
7. Wholesale markets

First, know the buyers and their preferences. Some buyers have stricter requirements. For example, hospitals, wholesalers and some supermarkets may require specific agricultural practices and quality certifications. Volume, product diversification, handling, packaging, and product transportation requirements will also depend on the type of buyer.

When to sell?

Seasonality is an important factor in vegetable production. Prices are lower during the typical production season and higher during the offseason. Alternative production methods such as greenhouse production or high tunnels allow the harvest season to be extended and thus get higher prices.

At what price?

Prices vary across market channels. Prices in direct-marketing channels such as farmers' markets are generally higher than wholesale prices. It is also important to negotiate prices. In order to negotiate the price, there is a need to be informed about price trends and prices received by other producers.

Production Planning

There is the need to establish what to produce and the market avenue for disposing of the produce, before developing a production plan. Some factors to consider in developing the production plan include:

1. **Capital needs:** Identify all the investment and cash operating needs and how much needs to be borrowed.
2. **Infrastructure and equipment:** Identify what equipment you need for the crops being produced. In addition, depending on packaging and handling requirements, identify what type of infrastructure will be needed.
3. **Management:** Identify the production, management and marketing skills necessary to make the enterprise successful. If those skills are lacking, hire additional labour.
4. **Planting and harvesting schedule:** Plan the best timing for planting and harvesting the crops, based on plant variety and availability of labour.
5. **Postharvest and sanitation:** post-harvest needs (sanitation, handling, and refrigeration) are important aspects that need careful thought. Cooling is necessary to delay produce spoilage and keep it fresh. When the product is not sold or disposed of immediately after harvest, a cold storage option may be needed.
6. **Enterprise record keeping:** Keep good production and financial records to help you make good decisions in the future. Use records to identify challenges that need to be addressed.

Market Needs for Vegetable Crops and Ornamental Plants

1. Producers must meet the market needs in terms of choice of vegetables and ornamental plants.
2. Fresh and quality produce (clean, fresh and disease-free).
3. Affordable pricing of products.
4. Convenient market location.
5. All yearlong supply of products.
6. **Certification and branding:** Develop a brand and slogan that reflect the quality and unique selling points of the produce and products.
7. **Packaging:** Attractive and informative packaging can help catch the attention of potential consumers
8. **Advertising:** Electronic and print media including television, radio, newspapers and magazines are effective advertising channels.
9. **Social media:** A strong online presence through social media helps to reach consumers.

I hope you have enjoyed the lesson so far! Having gone through the market-oriented production of vegetables and ornamental plants, try your hands on the activities below.

Activity 5.1

A new vegetable and ornamental farm wants to enter the market and needs to conduct market research to understand consumer preferences and demand. Assess the market needs for the production of vegetables and ornamentals through surveys, interviews and online research on market trends, consumer behaviour and potential target audiences. Present your findings to the class.

Materials Needed:

- Survey questionnaire
- Interview schedules
- Laptops/Tablets for online research

Follow the tasks below to achieve Activity 5.1.

Task 1: Survey Design

Design a survey questionnaire to gather information about market needs for vegetables and ornamentals.

The list of questions should include;

- a. What types of vegetables/ornamentals do you buy most?
- b. How often do you purchase them?
- c. What factors influence your purchasing decisions?

Task 2: Conduct Surveys

Conduct surveys in a designated market area (For example, a school market, local grocery store, or farmers' market).

Task 3: Interviews

Conduct interviews with at least three (3) vendors or store owners to gather more in-depth information about market trends and consumer behaviour.

Ask open-ended questions like:

- a. What are the most popular vegetables/ornamental varieties?
- b. How do you determine pricing?
- c. What challenges do you face in meeting customer demands?

Task 4: Online Research

Conduct online research to gather information about market trends, consumer behaviour, and potential target audiences. Explore websites, social media, and market reports (If available).

Task 5: Data Analysis and Presentation

Analyse the data and present your findings to the class. Identify market needs, trends, and potential target audiences for vegetable and ornamental production.

Well done for completing Activity 5.1. It is now time to undertake Activity 5.2.

Activity 5.2

Pair up with your friend and identify and evaluate existing businesses that are already serving the vegetable and ornamental plant market. In particular, consider the products, pricing strategies, marketing approaches and customer reviews and identify potential gaps in the market that can be exploited. Present your findings to the class.

Materials needed

- Internet access (Laptops/tablets)
- Business Evaluation Worksheets
- Pencils/Pens
- Market research reports (optional)

Follow the procedure below to accomplish activity 5.2.

Procedure

1. Get at least two friends to form a group.
2. Identify existing businesses (For example, vegetable farms, ornamental shops and online retailers) serving the vegetable and ornamental markets.

Task 1: Product Research

List the products offered by the identified businesses. (Consider product variety, quality, and uniqueness).

Task 2: Pricing Strategies

Analyse the pricing strategies of the identified businesses. (Consider pricing models such as Competitive, premium, discounts and promotions).

Task 3: Marketing Approaches

Identify the marketing approaches used by the identified businesses (Consider advertising channels such as social media, print, and online. Again, consider promotional tactics and branding strategies used).

Task 4. Customer Reviews

Analyse customer reviews and ratings for the identified businesses. (Consider satisfaction, complaints and suggestions).

Task 5. Market Gap Identification

Identify potential gaps in the market that the identified businesses are not exploiting. (Consider unmet customer needs, untapped markets, and innovative products/services).

Task 6: Data Analysis and Presentation

Analyse the data and present your findings to the class.

Focus the presentation on the identified products, pricing strategies, marketing approaches, customer reviews and potential market gaps identified by the businesses you chose.

Congratulations once again for completing Activity 5.2! You can now proceed to do Activity 5.3.

Activity 5.3

A new startup vegetable and ornamental plant business wants to launch a new line of organic vegetables and needs to develop a marketing plan. Pair up with your friend and develop a comprehensive marketing plan for the business. This task should involve defining their target market, positioning their products and developing strategies to reach and attract customers.

Materials Needed

- Access to the Internet for research
- Pens/pencils
- Marketing plan templates

Follow the procedure below to achieve activity 5.3.

Procedure: Get at least two friends to form a group.

Task 1: Target Market Identification

Identify the target market for the vegetable and ornamental plant business (Consider demographics (for example age, gender, income level, occupation), location, income level, and buying habits).

Task 2: Position Product

Define unique selling points of the organic vegetables (Chemical-free, nutritious, sustainable)

Determine product benefits (Health benefits, environmental benefits, taste)

Develop a product slogan and tagline (For example, “Nature’s Bounty” – “Sustainable goodness in every bite”)

Create a product positioning statement (For example, “Our organic vegetables are healthy, sustainable choice for conscious consumers”).

Task 3: Develop Marketing Objectives

State your marketing objectives (For example, to generate Gh¢10,000.00 in sales revenue for the first year)

Task 4: Develop Marketing Strategies

Develop your marketing strategies to reach and attract their target market. (**Consider** Advertising (social media, print, online), Promotions (discounts, events, loyalty programmes), and Digital Marketing (email).

Task 5: Marketing Plan Presentation

Present your marketing plan to the class highlighting the target market, product positioning, and marketing strategies.

Marketing Plan Template:

1. *Target Market*
 - a. Location:
 - b. Income Level:
 - c. Buying Habits:
2. *Product Positioning*
 - a. Unique Selling Points:
 - b. Pricing:
 - c. Quality:
 - d. Slogan and Tagline:
3. *Marketing Strategies*
 - a. Advertising
 - b. Promotion

EXTENDED READING

Click on the links below for further information on the topics discussed in this lesson.

- <https://www.agecon.msstate.edu/whatwedo/budgets.php>.
- Mississippi Department of Agriculture and Commerce website at <https://www.mdac.ms.gov/bureaus-departments/farmers-market/markets-mississippi/>.

ORGANISE AND PRODUCE A SELECTED VEGETABLE CROP AND ORNAMENTAL PLANT

Hello learner! Before we proceed to study what is in this lesson, try and recall some of the things you learnt in previous lesson. In this lesson, we are going to look at how to organise and produce selected vegetable or ornamental crops to make a profit. There are, however, three stages in vegetable or ornamental crop production and for that matter all agri-business ventures. They are the organisational or pre-production stage, the production stage and the post-production stage.

Producing a selected vegetable crop and ornamental plant involves three stages. These are the pre-production/ organisational stage, the production and post-production stage.

Pre-production stage: The organisation or pre-production stage for crop production involves gathering all resources necessary for the production such as land, capital, seeds or planting materials, tools, implements, agro-inputs and labour.

The production stage: This stage involves knowing the kind of vegetable crops and ornamental plants to produce, the available varieties, the kind of soil, climatic requirements, methods of raising or planting the selected crop, the planting distances of seedlings, management practices such as pests and diseases recognition and control, fertiliser application, weed control etc. Some crops require special land preparation methods and special nursery attention.

Post-production stage: The post-production stage mainly involves harvesting and post-harvesting operations such as processing, storage, and marketing of these vegetable crops and ornamental plants.

Pre-Production Stage

Organisational/planning stage (Factors to consider).

There are several factors to be considered at the organisational or planning stage. These factors include:

1. **Availability of capital:** The capital needed for the production must be sufficient and available.
2. **Land:** Land for the production must be available. In areas where land is not readily available, sufficient containers (i.e. metal, plastics, pots and sacks filled with appropriate soils or substrate) can be used.
3. **Kind of vegetable crop and ornamental plants to grow:** The type of vegetable crop or ornamental plants to be grown should be dependent on the market demand of the produce.
4. **Seeds/planting materials:** The type and availability of the planting materials must be considered in advance before production begins.

5. **Purpose of production (home/subsistence gardening or commercial gardening):** The purpose of production must be considered. Is it subsistence farming? Self-provision farming or commercial farming?
6. **Source of labour:** The number of labourers that may be needed to undertake the agri-business venture and the cost of them must be determined in advance and budgeted for.
7. **Tools and equipment for production:** The tools that may be needed must be procured in advance before the business venture is started. Where that is not possible, financial resources must be available to purchase them as and when they are needed.
8. **Favourable season for production:** If the production is rain-fed, then the appropriate season must be chosen for production to be carried out.
9. **Technical know-how of production of the selected crop and ornamental plant:** There must be skilled and technical know-how available to ensure the success of the agri-business venture.
10. **Market demands:** This is a very important factor because production is only profitable when the produce meets the market or consumer demands.

Production Stage

This is the stage where production itself takes place. It is guided by certain steps:

Steps in the production stage

1. **Site selection:** An appropriate site is selected if cultivation is to be done on the land. However, if a containerised method is to be used, then appropriate space or shade is to be selected or prepared.
2. **Land preparation;** If land is to be used, then land preparation is done using appropriate tools. If containerised method is to be used, drainage holes must be created on them. The containers must be filled with appropriate soil types or substrates.
3. **Nursing and nursery practices:** If seedlings are to be planted, then the seeds must be raised at a nursery into seedlings before they are transplanted. Some vegetables or ornamental seeds may be sown at stake or directly on the field without undertaking any nursery activities.
4. **Transplanting:** If nursed seedlings are to be used, then the seedlings are transplanted at the most appropriate time and stage.
5. **Irrigation:** Adequate water must be applied at some intervals to ensure the right growth of the crops.
6. **Weed control:** Weeds must be timely and appropriately controlled to ensure proper growth and yield of the crops.

7. **Fertiliser application:** Appropriate fertilisers must be applied at recommended intervals and stages to enhance the growth and yield of vegetable or ornamental crops.
8. **Pest and disease control:** Diseases and pests must be appropriately controlled to reduce losses.
9. Harvesting and post-harvesting processes (marketing, processing and storage).

Factors to consider in selecting a site for vegetable crop production

- a. **Topography of land:** The topography of the area should be ideal to support the growth of the crops.
- b. **Soil type:** The type of soil should be good enough to support plants' growth and yield.
- c. **Existing vegetative cover:** The existing vegetative crop can partly determine the type of vegetable crop or ornamental plants that can do well on that land.
- d. **Organic matter content:** High organic content in the soil supports proper plant growth and yield.
- e. **Permanent water source:** There must be a permanent source of water for irrigation/watering.
- f. **Proximity of site to human settlement:** To ensure continuous visits and monitoring of the vegetable crop or ornamental plants on the field, the site selected should be close to human settlement.
- g. **Road access and availability of market:** There should be a ready market for the produce. Again, there should be easy access to the field where actual production is taking place. This makes it easier for the farm produce to be sent to the market.

Factors influencing the choice of vegetable crop and ornamental plant production

- a. **Producer and consumer choice:** Production must be done to meet the choice of consumers.
- b. **Type of soil:** The soil must be good enough to support the growth and yield of the vegetable crops and ornamental plants.
- c. **Crop response and adaptability to locality:** The selected crop should be able to adapt to the condition of the locality where they are to be grown.
- d. **Availability of technical knowledge:** Technical knowledge about the production of the vegetable crop and ornamental plant should be available to ensure success.

Steps in the production of vegetable crops and ornamental plants

- a. Determine the type of vegetable to be grown based on market demand, climate and soil type.
- b. Secure suitable land or greenhouse facility for production.
- c. Develop a planting schedule based on the expected market demand.
- d. Procure the necessary supplies for production such as seed, fertilisers, and pesticides.
- e. Establish a pest control programme.
- f. Implement a crop rotation plan to manage soil-borne pests and diseases.
- g. Hire and train workers to handle tasks such as planting, cultivation, and harvesting.
- h. Establish a marketing strategy to identify potential buyers and secure sales channels

Post Production Stage

The post-production stage mainly involves harvesting and post-harvest operations such as the processing, storage, and marketing of these vegetable crops and ornamental plants.

NB: This post-production stage or post-harvesting and marketing of vegetable crops and ornamental plants will be treated in detail in the next lesson.

Having gone through the relevance of this section, and the stages and factors to consider under each, let us now discuss how to organise and produce selected vegetable crops and ornamental plants by undertaking the following activities.

Activity 5.4

Organise materials, select and prepare the site and construct beds and ridges for vegetable production.

Materials Needed: Cutlasses, hoes, rakes, trowels, watering cans etc. are needed to prepare land for vegetable crops or ornamental plant production. In schools or homes where there is no available land for cultivation, alternative measures like containerised cultivation could be adopted. Empty milk or milo tins, plastic containers, metal containers or sacs etc. filled with soil could be used, soil.

Water and a viable vegetable seed (such as cabbage, tomatoes, pepper, carrots etc.) or seeds of ornamental plants (such as flamboyant, milk bush, periwinkle etc.) or vegetative parts of such plants such as cuttings, suckers, bulbs, solons etc.), and a shade.

Follow Steps A and B below to undertake Activity 5.4

Procedure

Step A: Where land is available.

- a. Where land is available, the cultivation of the vegetable crop or ornamental plants could be done on prepared land.
- b. Cleared the land using traditional tools like cutlasses, hoes, etc.
- c. Marked out with pegs using a recommended dimension for the construction of beds or ridges.
- d. The size of the bed or ridge is measured and marked out using a stretched rope and a tape measure.
- e. Use a hoe and a rake to prepare a raised or sunken bed. The type of bed prepared depends on the season of cultivation. Raised beds are used during raining season while sunken beds are prepared during dry periods.
- f. Plant seedlings from the nursery or sow seeds on the prepared beds. Water the seedlings immediately after transplanting.
- g. Care and undertake all the other cultural practices such as weeding, fertilizer application, diseases and pests control etc. until the vegetables are due for harvesting or sale.
- h. Observe what happens during the growing period and record your observations at every visit to the site.
- i. Share your observation with your friends and let them also tell you what they have also done or learnt.

Step B: Where land is not available.

- a. Where land is not available, the cultivation of vegetables or ornamental crops could still be done using containerized structures like plastic containers, metal containers (like milk and milo tins), clay pots, jute sacs etc.
- b. If metal, plastic or clay pot containers are to be used, “drainage holes” must be created on them before they are filled with soil. These holes are created in the containers to allow the excess water to drain.
- c. Fill these containers or the jute sacs with soil, preferably loamy soil or any other substrates.
- d. Sow some seeds of the selected vegetables or ornamental plants in the soil-filled containers or the sacs. Where seedlings are available, they can also be planted.
- e. Water the soil immediately after sowing the seed or planting the seedlings.

- f. Place the container with the sown seeds or seedlings under a very good shade or appropriate environment.
- g. Care and undertake all the other cultural practices until they are due for harvesting or sale.
- h. Observe what happens during the growing period and record your observations at every visit to the site.
- i. Share your observation with your friends and let them also tell you what they have also done or learnt.

NB: Follow all the steps in Activity 5.4 above. The actual steps either A or B depends on the availability of land or otherwise.

Well done! I hope you and your friends have enjoyed undertaking this practical activity. Move to Activity 5.5.

Activity 5.5

Use appropriate planting materials and a guided activity plan to produce vegetables or ornamental plants on a garden plot and determine factors influencing the choice of crop.

Follow the steps below to undertake Activity 5.5.

Steps:

- a. Select a type of vegetable crop or ornamental plants you wish to grow.
- b. Share with your friends the factors you considered before selecting the type of vegetable crop or ornamental plants.
- c. Determine the planting materials that can be used for the planting or sowing. It can be using seeds or seedlings or by using vegetative means.
- d. Secure suitable land or greenhouse facilities to produce the vegetable crop or ornamental plant of your choice.
- e. Grow a vegetable crop or ornamental plant of your choice on your school premises or at home. Follow all the steps as spelt out in Activity 5.4:
- f. For each of the activities, indicate or record the date, the observation and the remarks in your field notebook. This is called the “guided activity plan”. The following is a sample of a guided activity plan.

Name of student:

Activity Title:

Type of vegetable or ornamental crop to grow:

Materials Needed:

Type of medium used (Land or Containerized) Planting:

Date	Activity	Observation	Remarks

Note 1: This template above can be used in your field notebook. This must be done for the entire duration of the growth of the vegetable crop or ornamental plant before they are harvested or sold off. You can search the internet to find out other appropriate activity plans that can best be used.

Note 2: The template can be used for Activity 5.6 below.

Activity 5.6

Discuss the process of producing vegetable crops or ornamental plants with your friend and keep records of activities regularly in a field notebook.

Follow the steps below to perform Activity 5.6 successfully.

Steps:

- You are welcome to perform the following activity on how to grow vegetable crops or ornamental crops on your own.
- To start with, you need some basic materials such as seeds or seedlings of your selected vegetable or ornamental crop, gardening tools, water and watering cans, garden beds or containers (metal or plastics).
- In pairs, select the vegetable crop or ornamental plant you wish to grow.
- Secure suitable land or greenhouse facility to produce the vegetable or ornamental crop of your choice.
- Develop a planting schedule based on the expected market demand.
- Procure the necessary supplies for production such as seed, fertilisers, and pesticides.

- g. Establish a pest control programme.
- h. Grow a vegetable crop or ornamental plant of your choice on your school premises or at home.
- i. For each activity, carried out indicate or record the date, the observation and the remarks. The template above in activity two can be used in your field notebook. This must be done for the entire duration before the crops are harvested or sold off.
- j. Share your recordings and your observations on your template with your friends in other groups.

Project work

In groups, select some vegetables and ornamental crops to grow in the school garden/farm on beds or in boxes, sacks, pots or plastic bottles using a chosen irrigation system. Make regular visits to the garden to care for the plants and take records for discussion. On maturity harvest and sell the produce in the case of vegetables.

Discuss with your friends the challenges you faced at all three stages of your production activities (i.e. the pre-production or organisational stage, the production stage and the post-production stage).

EXTENDED READING

- Food and Agriculture Organisation of the United Nations (2009). Growing vegetables for home and market.
- Diversification booklet No. 11 by Mike Nichols and Martin Hilmi; Rural Infrastructure and Agro-Industries Division; Rome.
- <https://www.agecon.msstate.edu/whatwedo/budgets.php>.

POST-HARVEST OPERATIONS FOR VEGETABLE CROPS AND ORNAMENTAL PLANTS

Hello learner! You are welcome to the final lesson in this section, and before we proceed to study, know that the knowledge and skills needed to carry out necessary post-harvest practices and market the produce are some of the most important aspects of vegetable and ornamental plant production. Managing post-harvest practices and marketing the produce of vegetable and ornamental plants in Ghana can be a rewarding and profitable venture. This section helps you to appreciate the cultivation of ornamental plants as a way of improving your income and livelihoods. Many Ghanaians grow vegetable crops, predominantly in suburban areas. Hence, introducing learners to ornamental plant production will introduce them to a new and lucrative venture for the future. The broad aim of the section is to help you acquire the prerequisite knowledge and skills needed to plan, organise, produce and market vegetables and ornamental plants successfully.

Let us now discuss the post-harvest practices for vegetables and ornamental plants.

Post-harvest operations refer to the series of processes and practices that harvested vegetables and ornamental plants are taken through before marketing them to avoid spoilage and add value to the produce. The activities include washing and cleaning, sorting and grading, packaging, advertisement of products and taking the product to the consumers.

Post-Harvest Practices for Vegetables and Ornamental Plants

1. Post-harvest practices for vegetables

- a. **Cleaning and washing:** Remove dirt and debris from vegetables to maintain their hygiene and appearance.
- b. **Sorting and grading:** Sort vegetables based on size, weight, quality and appearance to ensure uniformity of the produce.
- c. **Cooling and storage:** Rapidly cool vegetables to appropriate temperatures and store them in controlled environments to extend their shelf life.
- d. **Packaging and handling:** Use suitable packaging materials to protect and handle vegetables carefully during transportation and display.
- e. **Transportation:** Use appropriate vehicles (such as controlled temperature vans) to transport vegetables from production sites to storage and consuming centres to minimise physical damage.
- f. **Ripening:** For certain crops like tomatoes or bananas, controlled ripening may be carried out to optimise their quality before reaching the market.

2. Post-harvest practices for ornamental plants

- a. **Pruning and trimming:** Trim excess leaves and branches to improve the appearance and health of ornamental plants.
- b. **Watering:** Ensure proper watering to keep plants fresh and hydrated during storage and transportation.
- c. **Temperature and humidity control:** Maintain suitable environmental conditions to prevent wilting and stress on the plants.
- d. **Packaging and handling:** Use protective packaging and handle plants with care to prevent damage to them.
- e. **Transportation:** Use appropriate vehicles (such as controlled temperature and humidity vans) to transport the ornamentals to storage and sales points to minimise breakage and deformation.

Marketing Sites and Strategies for Vegetable Crops and Ornamental Plants

1. Marketing sites and strategies for vegetable crops

- a. **Local farmers' or farm-gate markets:** Participate in farmers' markets to directly connect with consumers seeking fresh produce.
- b. **Grocery stores and supermarkets:** Establish partnerships with local grocery stores and supermarkets to distribute vegetables.
- c. **Online sales platforms:** Utilise online platforms to reach a broader customer base and offer doorstep deliveries.
- d. **Promotional offers:** Offer discounts or promotional deals to attract customers and increase sales.
- e. **Certification:** If vegetables are produced organically, obtain organic or sustainable farming certificates to appeal to organic produce enthusiasts.

2. Marketing sites and strategies for ornamental plants:

- a. **Garden centres and nurseries:** Collaborate with garden centres and nurseries to display and sell ornamental plants.
- b. **Landscaping companies:** Partner with landscaping businesses that may require bulk orders of ornamental plants.
- c. **Online market:** Utilise e-commerce platforms to reach customers interested in buying plants online.
- d. **Social media and visual content:** Utilise social media platforms and showcase visually appealing images of ornamental plants and engage with potential customers.
- e. **Plant care guides:** Produce plant care guides to educate customers and build trust in your products.

Effective marketing often involves understanding the target audience, highlighting the unique selling points of the products and adopting multiple channels to reach potential customers.

Now that you have successfully studied the content, do the following activities below.

Activity 5.7

Visit a market, vegetable farm or garden in your community to gather information on post-harvest processes, current prices and market availability for vegetable crops and ornamental plants. Write a report about your visit and share it with friends.

OR

Search online for information on post-harvest practices and marketing strategies for vegetables and ornamental plants and discuss your findings with friends.

Steps:

- a. Search online. Make sure that your data is on.
- b. Type “*post-harvest practices on vegetable*” in the browser and hit on the enter key. Wait for it to open and read carefully. Jot down relevant notes.
- c. Type “*post-harvest practices on ornamental plants*” in the browser and hit on the enter key. Wait for it to open and read carefully. Jot down relevant notes.
- d. Type “*marketing strategies for vegetables and ornamental plants*” in the browser and hit on the enter key. Wait for it to open and read carefully. Jot down relevant notes.
- e. Discuss your findings with friends.

I hope you have enjoyed the activity with your friends.

Good! Proceed to do the next activity.

Activity 5.8

Collect some fresh unwashed tubers and vegetables from the school kitchen or from home to demonstrate washing, cleaning and sorting. Provide detailed written descriptions of the various post-harvest activities and marketing strategies for some selected vegetable crops and ornamental plants and reasons for performing those post-harvest activities. Share your experience with friends.

Steps for Sorting:

To do sorting of tomatoes, follow the steps below

- a. Observe the harvested tomatoes for defects, diseases and pests.
- b. Check for the level of ripening.
- c. Check for the sizes of the fruits.
- d. Put them into groups based on their characteristics.

REVIEW QUESTIONS

Review Question 5.1

1. Understanding market needs is key to success in the vegetable and ornamental plant industry. What factors determine the market needs for the production of vegetables and ornamental plants?
2. As a farmer/ producer, it is essential to understand the market demands for your crops. Explain the market needs for the types of ornamental plants and vegetables you plan to grow.
3. In the local market, consumer preferences and demands vary for different types of ornamental plants and vegetables. Examine the market demands and preferences for various types of ornamental plants and vegetables in the locality.
4. Analyse the market requirements and trends for a named ornamental plant and vegetable, considering factors like consumer preferences and emerging demands and submit a detailed written report.

Review Question 5.2

1. You are interested in going into backyard vegetable crops or ornamental plant production, what are the basic factors you need to consider and materials that you need to gather at the planning or organisational stage to enable you to have a successful agri-business enterprise?
2. There are three fundamental stages involved in undertaking any agri-business enterprise including vegetable crops and ornamental plant production. Identify these stages and explain the related challenges of each stage in selected vegetable crops and ornamental plant production.
3. Producing vegetable crops or ornamental plants for profit always starts with a market survey to find out the type of vegetable or ornamental crop that is in high demand. Outline, the production of selected vegetable crops and ornamental plants to meet identified needs by looking at the factors that must be considered to make that agri-business venture a very successful one.

Review Question 5.3

1. From farm to table, post-harvest practices play a crucial role in preserving the beauty and freshness of vegetable crops and ornamental plants. Describe the post-harvest practices carried out for a selected vegetable crop or ornamental plant.

2. Assuming your father/mother is into vegetable crop production, what marketing strategies should he/she use to market her produce?
3. Unlocking the full potential of vegetable crops and ornamental plants begins after harvest. Examine the reasons for performing post-harvest activities in the marketing of vegetable crops and ornamental plants.

ANSWERS TO REVIEW QUESTIONS

Review Answer 5.1

1. Factors that determine the market needs to produce vegetables and ornamental plants are
 - Capital needs
 - Infrastructure and equipment
 - Management
 - Planting and harvesting
 - Postharvest and sanitation
 - Enterprise record keeping
2. Market needs for the types of ornamental plants and vegetables you plan to grow include; *the choice of vegetables and ornamental plants, fresh and quality produce (clean, fresh and disease-free), affordable pricing of products, convenient market location, all yearlong supply of products, certification and branding, packaging, advertising, and social media.*
3. Market demands and preferences for various types of ornamental plants and vegetables in the locality include:
 - Ornamental plants: high demand for flowers (roses, bouquets), foliage plants (peace lilies, spider plants), and succulents.
 - Vegetables: High demand for leafy greens (lettuce, spinach), tomatoes, cucumbers, and bell peppers.
4. Market requirements and trends for a named ornamental plant and vegetable, considering factors like consumer preferences and emerging demands include:

Roses:

 - Consumer preferences: long-stemmed, fragrant, and disease-resistant varieties
 - Emerging demands: sustainable and organic production, unique colours and shapes

Tomatoes:

 - Consumer preferences: juicy, sweet, and vine-ripened tomatoes
 - Emerging demands: cherry tomatoes, organic and hydroponically grown tomatoes

Review Answer 5.2

1. Organisation/planning stage (Factors to consider at the organisational stage).

- Availability of capital
- Land
- Kind of vegetable crop and ornamental plants to grow
- Seeds/planting materials
- Purpose of production (home/subsistence gardening or commercial gardening).
- Source of labour
- Tools and equipment for production
- Favourable season for production
- Technical know-how of production of the selected crop and ornamental plant
- Market demands.

Materials Needed:

Cutlasses, hoes, rakes, trowels, watering cans, Garden beds or pots etc. are needed to prepare a land for vegetable or ornamental crop production. In schools or homes where there is no available land for cultivation, alternative measures could be adopted. Empty milk or milo tin, plastic containers or sacs, soil. Others include water and a viable vegetable seed (such as cabbage, tomatoes, pepper, carrots etc.) or seeds of ornamental plants (such as flamboyant, milk bush, periwinkle etc.) or vegetative parts of such plants such as cuttings, suckers, bulbs, solons etc.), and a shade.

2. The three stages are: pre-production or organizational stage, production stage and post-production stage:

The pre-production or organisation stage: This stage for vegetable crop and ornamental plant production involves gathering all resources necessary for the production such as land, capital, seeds or planting materials, tools, implements, agro-inputs and labour.

Challenges of the pre-production stage:

- Seed selection and availability.
- Soil preparation and readiness.
- Climate and weather unpredictability.
- Pests and disease management.
- Labour and resource availability.
- Market fluctuations and demand.
- Access to credit and financing.

- Regulatory and policy framework etc.

Production stage: This stage involves knowing the kind of vegetable crops and ornamental plants to produce, the available varieties, the kind of soil, climatic requirements, methods of raising or planting the selected crop, knowing the planting distances of seedlings, management practices such as pests and diseases recognition and control, fertilizer application, weed control etc. Some crops require special land preparation methods and special nursery attention.

Challenges of the production stage:

- Soil health and fertility management.
- Water management.
- Pest and diseases management.
- Weed management.
- Climate and weather extremes.
- Nutrient deficiencies and fertilization
- Pruning and training.
- Labour management.
- Equipment and tools maintenance
- Record keeping and data analysis etc.

The post-production stage: This stage also involves mainly harvesting and post-harvesting operations such as the processing, storage, and marketing of these vegetable crops and ornamental plants.

Challenges of the post-production stage:

- Harvesting and handling damage.
- Storage and preservation challenges.
- Cooling and refrigeration challenges.
- Packaging and labelling.
- Transportation and logistics.
- Market fluctuations and price volatility.
- Quality control and grading.
- Pests and disease management during storage.
- Food safety and hygiene.
- Waste reduction and management.

3. **Factors influencing the choice of vegetable crop and ornamental plant production.**

- Producer and consumer choice

- Type of soil
- Crop response and adaptability to locality
- Technical knowledge about the production of vegetable crops and ornamental plants.

Steps in the production of vegetable crops and ornamental plants.

- Determine the type of vegetable to be grown based on market demand, climate and soil type.
- Secure suitable land or greenhouse facility for production.
- Develop a planting schedule based on the expected market demand.
- Procure the necessary supplies for production such as seed, fertilisers, and pesticides.
- Establish a pest control programme.
- Implement a crop rotation plan to manage soil-borne pests and diseases.
- Hire and train workers to handle tasks such as planting, cultivation, and harvesting.
- Establish a marketing strategy to identify potential buyers and secure sales channels

Review Answer 5.3

1.

- **Cleaning and washing:** Remove dirt and debris from vegetables to maintain their hygiene and appearance.
- **Sorting and grading:** Sort the vegetables based on size, weight, quality and appearance to ensure uniformity of the produce.
- **Packaging and handling:** Use suitable packaging materials to protect and handle the vegetables carefully during transportation and display.
- **Transportation:** Use appropriate vehicles (such as controlled temperature vans) to transport vegetables from production sites to storage and consuming centres to minimise physical damage.

2. Marketing strategies for vegetable crops

- **Local farmers' or farm-gate markets:** Participate in farmers' markets to directly connect with consumers seeking fresh produce.
- **Grocery stores and supermarkets:** Establish partnerships with local grocery stores and supermarkets to distribute vegetables.
- **Online sales platforms:** Utilise online platforms to reach a broader customer base and offer doorstep deliveries.

- **Promotional offers:** Offer discounts or promotional deals to attract customers and increase sales.
- **Certification:** If vegetables are produced organically, obtain organic or sustainable farming certificates to appeal to organic produce enthusiasts.

3.

- To reduce post-harvest losses
- To maintain the quality of produce
- To improve the nutritional value of the produce
- To increase the profitability

EXTENDED READING

- Food and Agriculture Organisation of the United Nations (2009). Growing vegetables for home and market; Diversification booklet No. 11 by Mike Nichols and Martin Hilmi; Rural Infrastructure and Agro-Industries Division; Rome.
- www.ams.usda.gov

REFERENCES

1. Amoah E. (2015): General Agriculture for Senior High Schools (Exotic Series).
2. Asiedu, J.B.K, et al (2012). The Nursery Industry in Ghana: Prospects and Challenges. Asian Research Publishing Network. Volume 7, No.6
3. Farming is Science. Process of growing fresh vegetables by Korean Scientists
4. (<https://www.youtube.com/watch?v=LGF33NN4B8U>)
5. Wongnaa, A. C., et al (2019). Profitability and constraints to urban exotic vegetable production systems in the Kumasi metropolis of Ghana: a recipe for job creation. Journal of Global Entrepreneurship Research. (<https://elicit.com/notebook/53355f02-1069-4c9f-9cdf-d06a007ccc82#17cb062a67d597af07c9dadadb7a60064>)
6. Vegetable farming in Ghana gets a boost (<https://www.youtube.com/watch?v=9AIyAi4qziE>)
7. Food and Agriculture Organisation of the United Nations (2009). Growing vegetables for home and market; Diversification booklet No. 11 by Mike Nichols and Martin Hilmi; Rural Infrastructure and Agro-Industries Division; Rome.

GLOSSARY

- **Vegetables:** This refers to the group of edible plants or plant parts that are eaten either raw or cooked.
- **Ornamental Plants:** These are the group of flowering and non-flowering plants that are grown for their aesthetic values.
- **Classification:** This is the process of grouping or arranging things into different categories based on their similarities and differences.
- **Planning:** This is the process of deciding on goals, strategies, and actions to be taken in future.
- **Social media:** This refers to online platforms and technologies that enable users to create, share, and engage with content and each other.
- **Marketing:** This refers to the activities involved in promoting and selling products or services to customers.
- **Marketing Plan:** This is a detailed document that outlines a business's strategies and tactics for promoting and selling its products or services.
- **Certification:** This refers to the process of verifying that a product, service, or individual meets certain standards of requirements.
- **Branding:** This refers to the process of creating a unique name, design, or symbol to identify a product or service and distinguish it from competitors.
- **Packaging:** This refers to the design and materials used to contain, protect, and market a product.
- **Advertising:** This is the promotion of a product, service, or idea through various media channels to attract potential customers.

Acknowledgements



Ghana Education
Service (GES)



List of Contributors

Name	Institution
Rev. Emmanuel Asare	O'Reilly SHS, Accra
Eric Amoah	Achiase SHS
Stephen Gyempeh	Islamic SHS, Kumasi
Abdulai S. Gong	St. Vincent College of Education, Yendi