CARIBBEAN EXAMINATIONS COUNCIL

CAPE® AGRICULTURAL SCIENCE UNIT 1

Subject Report

May-June 2025

CARIBBEAN EXAMINATIONS COUNCIL

REPORT ON CANDIDATES' WORK IN THE CARIBBEAN ADVANCED PROFICIENCY EXAMINATION

MAY-JUNE 2025

AGRICULTURAL SCIENCE
UNIT 1

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INTRODUCTION

The CAPE Agricultural Science Unit 1 examination assesses candidates on the topic The Fundamentals of Agriculture and Crop Production. This topic is covered in three modules.

Module 1: The Science and Business of Agriculture
Module 2: Horticulture and Management
Module 3: Postharvest Technology and Innovation

The examination consists of three papers; these are Paper 01, the multiple-choice paper; Paper 02, structured short answer and essay questions; and Paper 03, an SBA project.

This year (2025), 171 candidates sat the Unit 1 examination compared with 202 in 2024 and 264 in 2023. The percentage of candidates earning acceptable grades, Grades I–V was approximately 85.99 per cent compared with 78.71 per cent in 2024 and 84.21 per cent in 2023.

This report has been put together with a focus on candidates' responses to Paper 02 of the examination; it reflects the original design of that examination paper.

PAPER 01 – MULTIPLE CHOICE

This paper consists of 45 multiple-choice items, 15 items on each module. Each question is worth one mark and is weighted by two, totalling 90 marks altogether. The paper contributes 30 per cent to the total score.

Paper 01 allows for a broader coverage of the syllabus. The questions test knowledge, comprehension and application.

In 2025, the mean score on this paper was 50.72 out of 90 (56.35 per cent) compared with 49.88 out of 90 (55.42 per cent) and 52.80 out of 90 (58.66 per cent). The maximum score was 82 in 2025 compared with 78.77 in 2024 and 82 in 2023.

PAPER 02 – STRUCTURED ESSAY

This paper is divided into two sections. Section A consists of three compulsory structured questions, one on each module. Each question is worth 15 marks. Section B consists of three essay questions, one on each module. Each question is worth 15 marks. The paper contributes 30 per cent to the total score.

Paper 02 requires greater in-depth knowledge of the syllabus. The questions focus on application, analysis, synthesis and evaluation.

In 2025, the mean score on this paper was 22.90 out of 90 (25.44 per cent) compared with 29.14 out of 90 (32.38 per cent) and 26.52 out of 90 (29.47 per cent). The maximum score was 74 in 2025 compared with 67 in 2024 and 52 in 2023.

Question 1

Part (a) (i)

Task
Identify structures of the female reproductive system of a chicken.

Comments
Most candidates were able to score full marks on this question. Candidates who failed to score full marks were those who could not identify the uterus. The part labelled 'R' on the diagram was the uterus.

Recommendation
Candidates should be exposed to the different reproductive structures of different farm animals with respect to diagrams.

Part (a) (ii)

Task
Name two structures found in the male reproductive system of both chickens and pigs.

Comments
Most candidates were only able to score half of the marks for this question. Candidates misinterpreted this question and named common male reproductive structures but not those which pigs and chickens have in common, which are *testes* and *vas deferens*.

Part (a) (iii)

Task
State the function of the structures named in (a) (ii).

Comments
Many candidates were unable to earn full marks on this question because the structures they identified in the previous section were incorrect. As a result, they described the functions of the wrong structures, which prevented them from gaining full credit.

Part (b) (i)

Task
Calculate breakeven.

Comments
Most candidates responded to this question very poorly as it seems there was no prior knowledge of how to calculate breakeven. Candidates used the market pricing instead of the suggested pricing to perform the calculation. It was mainly this error that resulted in the incorrect answer.

Recommendations

- Candidates should be exposed to the concept of breakeven and how it should be calculated.
- Teachers can create worksheets so that students can practise accurately calculating breakeven for different products.

Part (b) (ii)

Task
State whether the farmer would make a profit, make a loss or break even for each product.

Comments
This section was generally poorly done, as many candidates demonstrated limited understanding of how to calculate breakeven. In numerous responses, candidates simply subtracted unrelated figures in an attempt to arrive at an answer, rather than applying the correct breakeven method.

Recommendations
Teachers can provide students with worksheets for different business plans and have the students analyse different costs and pricing in order to determine if the business made a profit, a loss or reached a break-even point.

Part (b) (iii)

Task
Explain why reducing the breakeven cost by increasing the price to $1200 in Product B would not be recommended.

Comments
Most candidates failed to obtain a mark for this question because they did not understand the concept of breakeven or the costs associated with it. Most responses included general reasons why it would not be recommended to increase the price of a product. Some of the responses were also not about Product B.

Recommendations

- Candidates must be aware of the risks associated with increasing the price of a product in order to reduce the breakeven cost.
- Candidates should also pay close attention to what the question is asking before they start answering.

Part (b) (iv)

Task

Suggest one way in which the farmer can reduce the breakeven cost of Product B.

Comments

This question was well done with the majority of the candidates scoring full marks. Correct responses included the following.

- Reducing the labour cost with the use of advance machinery
- Source cheaper materials for production.

Incorrect responses included 'reducing labour' and 'producing more products'.

Part (c)

Task

Discuss how liming, organic matter and the incorporation of clay can improve the cation exchange capacity of the soil.

Comments

This question was poorly done; most candidates barely attempted it. Candidates seemed unaware of the term *cation exchange capacity*. This resulted in candidates speaking generally about the effect of adding lime, organic matter and the incorporating of clay to the soil. For the most part, candidates did not explain how the addition of these techniques would improve the cation exchange capacity, which prevented them from scoring a lot of marks.

Recommendations

- Candidates should be exposed to the different techniques used in soil management and how these techniques may be used to improve the different soil qualities.
- Candidates should also be aware of the disadvantages and possible outcomes to the soil if these techniques are not utilized.

Question 2

Part (a) (i)

Task

Define the term *horticulture*.

Comments

Most candidates were able to partially define the term. Responses mainly focused on 'the planting of crops such as flowers and fruits'. A complete definition is provided below.

> Horticulture is the branch of plant agriculture which deals with garden crops, fruits, vegetable and ornamental plants and its management.

Part (a) (ii)

Task

State one feature of the following branches of horticulture.

Comments

Floriculture – Most candidates stated that it involves the study of flowers.
Pomology – Most candidates stated accurately that it is the study of fruits.
Olericulture – Less candidates were aware that it involved the study of vegetables
Arboriculture- Less candidates were aware that it involved the study of trees.

Recommendations

Candidates must be aware that the definition of floriculture includes all flowering plants. It does not solely refer to cut flowers.

Part (a) (iii)

Task
State two benefits of using greenhouses in horticulture.

Comments
A few candidates were able to provide accurate and complete responses for the benefits of greenhouses. More candidates gave vague or incomplete responses. For instance, they stated that 'it provides a controlled environment', or 'it reduces sunlight'; or 'it is a healthier and safer environment for growing crops'.

Recommendations
Candidates had some knowledge on the general use and benefits of greenhouses; however, many candidates gave incorrect responses such as 'protection from stray animals and theft', or 'keeping out the sun to prevent burning of the leaves'.

Part (b) (i)

Task
Outline two reasons why the crops should be established using seedlings and not seeds.

Comments
Many candidates were able to state two benefits of using seedlings instead of seeds for planting in barrel containers. However, many misinterpreted the question and provided responses related to hydroponics. They may have been led to so because of the statement "hydroponics and protective cover will not be used", which was a part of the stimulus. Expected responses regarding why seedlings should be used instead of seed include the following.

- It may be less costly than buying a large amount of good quality seeds by preventing wastage of unplanted seeds.
- Seedlings will give a more even strand than seeds because they allow the farmer to avoid problems with low seed quality during germination.
- Crops grown from seedlings can be harvested earlier compared with direct seeding which involves the early, slow growing phase of spinach seedlings that extends the time to harvest.

Part (b) (ii)

Task

Suggest one key consideration for effectively managing water, nutrition and pests when using barrel planters to produce spinach, giving one reason to support the answer.

Comments

Some candidates were able to state ways in which farmers can manage the water, nutrition and pests when using barrel planters to cultivate spinach. Many candidates, however, gave reasons why plants need water, nutrients and the effects of pests on crops. For example, some candidates stated that 'plants need water to carry out chemical reactions' or 'Nutrition helps plants to grow at a fast and healthy rate' or 'Pests cause losses to farmers'. Not many candidates referred to how farmers can supply adequate amounts of water and nutrients to crops, or how farmers can control the pests that would affect the crops.

Expected responses include the following.

- In relation to water, candidates could have noted the consideration of watering the spinach daily or mulching them or placing the bins in a location where they would receive full sunlight in the mornings and partial shade in the afternoons to prevent the soil from drying out.
- Regarding nutrition, candidates could have mentioned using soil with adequate amounts of organic matter, for example, incorporating compost into the soil before planting or applying a balanced fertilizer to the soil or the weekly application of foliar fertilizer to the plants, in low concentrations since a consistent but moderate supply of nutrients is needed for steady and healthy growth.
- In responding to the management of pests, candidates could have provided any of the following points.
    - Avoid over-fertilization as this causes plants to be more susceptible to pests.
    - Use a clean growing medium or sterilize it before planting to reduce the presence of soil-borne pests and pathogens.
    - Monitor the crop for early detection of pest problems as pests are easier to manage when they first appear than when their population increases/ cheaper measures can be taken to control or eliminate the pests earlier.

Part (c)

Task

Discuss why the physical features — adequate sunlight, soil quality and wind protection — are important when selecting a suitable site for the field production of leafy vegetables.

Comments

Many candidates were unable to provide a fully accurate response. Candidates were able to state the benefits of sunlight, soil quality and wind protection; however, many candidates did not link the physical features to the selection of a suitable site for the cultivation of leafy vegetables. In addition, candidates did not make a link on how the suitable site would lead to increased production of leafy crops. Below is a sample of a complete discussion that effectively elaborates on accurate and relevant points.

- Adequate sunlight to support healthy leaf growth: A suitable site for leafy vegetable production should receive full sun exposure for a substantial portion of the day. Ideally, the site should be free from obstructions like tall trees or buildings that may cast shadows and reduce available sunlight. Proper sunlight exposure promotes robust plant growth, leaf colour, and overall crop yield. Most leafy greens such as lettuce, spinach, and kale require a significant amount of sunlight to photosynthesize and produce food for their growth.
- Soil quality (well-drained and good moisture retention) to minimize disease and maintain plant growth to harvest: Soil should have good fertility, sufficient organic matter content and a well-balanced pH level. Leafy vegetables generally prefer well-draining soils to prevent waterlogging, which can lead to root rot and other moisture-related issues. Excessively sandy soils may drain too quickly, leading to inadequate water and nutrient retention. A suitable site should have loamy soil or soils that can be amended to improve drainage and fertility, creating an ideal growing environment for leafy vegetables.
- Wind Protection is important: While some air movement is beneficial for preventing disease and promoting pollination, strong winds can damage or uproot young seedlings and reduce overall crop productivity. Therefore, a suitable site should have natural or artificial windbreaks, such as hedgerows or wind barriers, strategically placed to protect the leafy vegetables from excessive wind exposure. Windbreaks can also help create a microclimate within the field, reducing wind-related stress on plants and improving overall growing conditions.

Question 3

Part (a) (i)

Task

State two reasons why it is important to control temperature in harvested ornamental plants.

Comments

Most candidates were unable to provide two correct responses. The most popular correct response was *to extend shelf life*. Two other reasons from which candidates could have chosen were *to preserve aesthetic appeal* and *to prevent pathogenic growth*.

Recommendation

Candidates should be exposed to the different reasons for temperature control in harvested ornamental plants.

Part (a) (ii)

Task

To analyse cooling techniques that are used with respect to harvested ornamental plants.

Comments

The responses to this part were poor. Most candidates were unable to identify advantages and disadvantages of the three different cooling techniques, especially hydro cooling and forced air cooling. One advantage and one disadvantage of each cooling system about which candidates were asked are given below.

- Refrigeration
  - Advantage: It slows down the aging and senescence processes in harvested ornamental plants, ensuring that the ornamental plants remain vibrant and visually appealing for a longer period, making them more attractive for display and purchase.
  - Disadvantage: It requires constant power supply

- Hydro cooling
  - Advantage: It rapidly cools harvested ornamental plants.
  - Disadvantage: Immersing the plants in water can lead to water uptake through the stem, causing possible issues like bacterial growth, softening of tissues and increased susceptibility to decay.

- Forced air Cooling
  - Advantage: It is a uniform way of cooling the harvested ornamental plants
  - Disadvantage: It calls for higher energy consumption compared to some other cooling techniques.

Recommendation

Candidates should be made aware of the different cooling techniques used for cooling harvested ornamental plants, how they work, and the advantages and disadvantages associated with each.

Part (b) (i)

Task

Give three pricing strategies which could be used to improve fruit sales.

Comments

Many candidates attempted this question but provided poor answers. Some of the poor answers included 'give a discount' or 'drop the price using a buy-one-get-one-free offer'. Overall, the question was poorly done. Possible strategies candidates could have mentioned include the following.

- Penetration pricing — setting a low price in order to enter a competitive market and then raising it later.
- Competitive pricing — setting a price based on what the competition charges.
- Value-based pricing — basing the product price on what the customers believe it is worth.

Recommendation

Candidates should be exposed to the different pricing strategies that can be used to improve sales of agricultural products and how the various pricing strategies work.

Part (b) (ii)

Task

Outline how the market behaviours awareness and preference can affect the availability of a particular fruit from a table, Fruit B.

Comments

Candidates' performance on this part was poor; they did not refer to how the data presented in the table influenced market behaviour. A complete outline was worth two marks; a few candidates gave partially correct answers. Expected responses include the following.

- Awareness may occur through mass media marketing such as television and radio, or word of mouth. Based on the data consumers are more aware of Fruit B.

- Preference behaviour is decision-making based on comparing prices and value of the commodity with that of other competitive commodities. Based on the given data, consumers are showing a preference for Fruit B.

Recommendation

Candidates should be made aware of the different market behaviours and how they can affect consumers' decisions and actions.

Part (c)

Task

Discuss how the key factors affect the postharvest quality and shelf life of tropical fruits such as mangoes, papayas and bananas. Include how each factor can impact the fruit's overall quality and market value.

Comments

Most candidates were unable to present a complete discussion on each of the factors (temperature, humidity, and sorting and grading) affect the overall quality and market value of tropical fruits. While there were some encouraging discussions, candidates generally could not elaborate on at least three accurate and relevant points related to the contribution of each factor to the quality or market value of the fruits about which they were writing.

In the discussion regarding the temperature factor, candidates should have noted that tropical fruits are highly sensitive to temperature fluctuations. If some fruit cannot tolerate a low temperature, it can suffer from chilling injury while too high a temperature can lead to its unnatural ripening. Both of these situations can reduce the quality of the fruit's texture and taste. It can also reduce shelf life.

A similar discussion could have been used in relation to humanity, noting the effects of moisture loss from low humidity (such as the shriveling of the fruit) or the effects of high humidity which can promote the growth of mold and decay. Proper RH levels are therefore important for maintaining overall fruit quality and market value.

In the discussion regarding sorting and grading, candidates could have written about proper storage and handling techniques that take into account the natural plant hormone, ethylene. Careful management of this hormone would control premature ripening which can otherwise have a severe impact on the quality and market value of tropical fruits.

Recommendation

Candidates should be exposed to the different factors that can affect the post-harvest quality of different tropical fruits in terms of how they can extend or shorten the shelf life of the different tropical fruits.