



Province of the
EASTERN CAPE
EDUCATION

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NATIONAL SENIOR CERTIFICATE

GRADE 11

NOVEMBER 2024

AGRICULTURAL SCIENCES P2 MARKING GUIDELINES

MARKS: 150

TIME: 2½ hours

This marking guidelines consists of 10 pages.

SECTION A**QUESTION 1**

- | | | | | |
|-----|--------|-------------------|----------|------|
| 1.1 | 1.1.1 | C ✓✓ | | |
| | 1.1.2 | C ✓✓ | | |
| | 1.1.3 | C ✓✓ | | |
| | 1.1.4 | D ✓✓ | | |
| | 1.1.5 | A ✓✓ | | |
| | 1.1.6 | B ✓✓ | | |
| | 1.1.7 | D ✓✓ | | |
| | 1.1.8 | C ✓✓ | | |
| | 1.1.9 | D ✓✓ | | |
| | 1.1.10 | D ✓✓ | (10 x 2) | (20) |
| 1.2 | 1.2.1 | H ✓✓ | | |
| | 1.2.2 | C ✓✓ | | |
| | 1.2.3 | D ✓✓ | | |
| | 1.2.4 | E ✓✓ | | |
| | 1.2.5 | G ✓✓ | (5 x 2) | (10) |
| 1.3 | 1.3.1 | Autotrophic ✓✓ | | |
| | 1.3.2 | Dicotyledonous ✓✓ | | |
| | 1.3.3 | Ablactation ✓✓ | | |
| | 1.3.4 | Drainage ✓✓ | | |
| | 1.3.5 | Greenhouse ✓✓ | (5 x 2) | (10) |
| 1.4 | 1.4.1 | Guttation ✓ | | |
| | 1.4.2 | Fertigation ✓ | | |
| | 1.4.3 | Pistil ✓ | | |
| | 1.4.4 | Rhizomes ✓ | | |
| | 1.4.5 | Cut-off ✓ | (5 x 1) | (5) |

TOTAL SECTION A: 45

SECTION B

QUESTION 2: PLANT STUDIES (NUTRITION)

- 2.1 2.1.1 **Identification of the process**
• Photosynthesis ✓ (1)
- 2.1.2 **Substances A and C**
• A – Energy from the sun ✓ (1)
• C – Water ✓ (1)
- 2.1.3 **The gas that is produced by photosynthesis**
• Oxygen ✓ (1)
- 2.1.4 **Importance of photosynthesis to the environment**
• The process uses carbon dioxide from the atmosphere, ✓ this keeps the atmosphere clean and maintains the environment / health. ✓
- OR**
- It produces oxygen which accumulates in the atmosphere and forming a layer of ozone ✓ that protects living organisms from dangerous ultraviolet radiation from the sun ✓ (Any 2 x 1) (2)
- 2.1.5 **TWO ways to increase the rate of photosynthesis**
• Sunlight ✓
• Chlorophyll ✓
• Temperature ✓
• Carbon dioxide ✓
• Wind ✓
• Atmospheric pressure ✓ (Any 2 x 1) (2)
- 2.1.6 **Justification why photosynthesis is an anabolic process**
• Photosynthesis is a building process ✓ by which new molecules like carbohydrates are formed ✓ (2)
- 2.2 2.2.1 **Mechanisms through which roots absorb minerals**
(a) Diffusion ✓ (1)
(b) Active transport ✓ (1)
- 2.2.2 **Structural adaptability of roots to perform its function**
• Roots have root hairs that increase the surface area ✓ (1)
- 2.2.3 **Function of xylem tissues**
• They are responsible for the transportation of water from the roots to the leaves ✓ (1)
- 2.2.4 **Differentiate between *transpiration pull* and *osmotic flow* in plants**
• ***Transpiration pull*** is the upward pulling force exerted on the water column in plants when water is lost during transpiration ✓
• ***Osmotic flow*** is the movement of water through cells due to osmosis caused by osmotic gradient ✓ (2)

2.2.5 Explanation of root pressure influence to upward movement of water

- As water moves into the roots, a pressure develops that pushes the water up into ✓ the xylem vessels of the stem ✓ (2)

2.2.6 TWO adaptations of plants to reduce water loss through transpiration

- Plants have thick cuticles ✓
- Plants have small sunken stomata ✓
- Some plants have hairy leaves (trichomes) ✓ (Any 2 x 1) (2)

2.3 Primary and secondary macro-minerals

2.3.1 Phosphorus (P) ✓ (1)

2.3.2 Potassium (K) ✓ (1)

2.3.3 Nitrogen (N) ✓ (1)

2.3.4 Magnesium (Mg) ✓ (1)

2.4 2.4.1 Equipment used to collect soil samples

- Augers ✓ (1)

2.4.2 TWO facts of importance of soil analysis

- Soil analysis report assist farmers to know the type of crop to plant of different soils ✓
- Soil tests are used to determine the nutrient status of the soil and provide bases for lime and fertiliser application ✓ (2)

2.4.3 Why farmers are encouraged to take their crops for leaf analysis

- Leaf analysis give the most precise information about plant nutrients absorbed ✓ and indicate deficiencies before they affect plant health and yield ✓ (2)

2.5 2.5.1 Class of the fertiliser

Inorganic fertilizer ✓ (1)

2.5.2 Calculation of the percentage of phosphorus

$$\begin{aligned}\% P &= 2/10 \times 45 \checkmark \\ &= 9 \checkmark \% \checkmark\end{aligned}\quad (3)$$

2.5.3 Explanation of how fertilisers cause eutrophication

- Run-off and leaching of soil water with fertiliser cause accumulation of fertilisers in water sources causing algal bloom, ✓ this reduces oxygen levels in water causing death of aquatic animals ✓ (2)

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QUESTION 3: PLANT REPRODUCTION AND PROTECTION**3.1 3.1.1 Identification of the type of pollination**

- Cross pollination ✓ (1)

3.1.2 Justification to QUESTION 3.1.1

- It involves transfer of ripe pollen grains from the anthers of one flower to the receptive stigma of another flower of the same plant species ✓
- Pollen grains are being carried by the insect from anthers of one flower to the stigma of another flower of the same species ✓ (2)

3.1.3 TWO adaptations of the flowers in the diagram above for cross pollination

- Large, sticky and many pollen grains ✓
- Colourful petals to attract insects ✓ (2)

3.1.4 Functions of the following parts of the flower:

- (a) **Ovary** – contains locules in which ovules with egg cells are produced ✓ (1)

- (b) **Stigma** – Outer tip of the pistil which serves as a platform for pollen to fall on during pollination ✓ (1)

3.1.5 Explanation of how double fertilisation occurs in plants

- Two male gametes are released into the embryonic sac and one fuses with the ovum to form a zygote ✓ and the other fuses with the diploid endosperm cell and form a triploid (3n) endosperm cell. ✓ (2)

3.1.6 Differentiate between *vegetative parthenocarpy* and *stimulative parthenocarpy*

- **Vegetative parthenocarpy** is the production of fruits in plants without pollination and fertilisation of ovules to produce a parthenocarpy fruit, as in seedless cucumbers ✓
- **Stimulative parthenocarpy** requires pollination to stimulate the production of parthenocarpy fruit like in seedless watermelon ✓ (2)

3.2 3.2.1 Classification of the tomato fruit as succulent or dry fruit

- Succulent fruit ✓ (1)

3.2.2 Justification of the answer to QUESTION 3.2.1 above

- The tomato's fruit wall or pericarp is fleshy and juicy and edible ✓ (1)

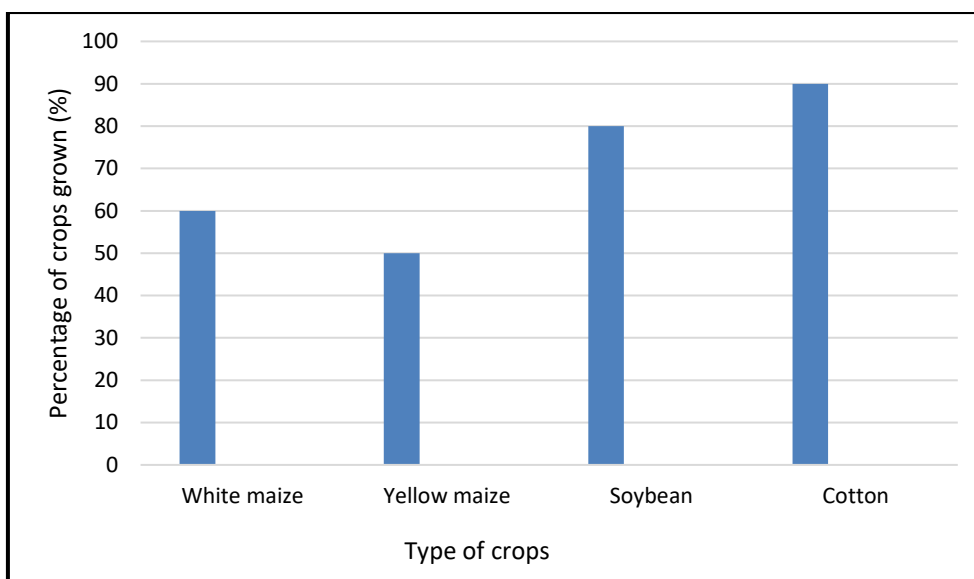
3.2.3 The part of the flower which will develop into the following:

- (a) **Fruit-Ovary** ✓ (1)
- (b) **Seeds-Ovules** ✓ (1)

3.2.4 Explanation of the following concepts

- (a) **Seed coat-enhanced dormancy** – this is when ripe seeds fail to germinate because of hard coat ✓ which is impermeable and inhibits the passage of water and oxygen needed for germination ✓ (2)
- (b) **Asexual reproduction process** – this is the growing of plants from other parts of the plant, ✓ other than seed ✓ (2)

3.3 3.3.1 A bar graph comparing the percentage of different crops grown as GM crops in South Africa



Marking guide for the bar graph

- Correct caption ✓
- Variable on y-axis correctly labelled and calibrated (Percentage of crop grown) ✓
- Variable on x-axis correctly labelled and calibrated (Type of crops) ✓
- Units indicated on y-axis (%) ✓
- Bar graph ✓
- Accuracy (80% + correctly plotted) ✓ (6)

3.3.2 State THREE advantages of genetically modified organisms

- High ability to resist diseases and pests ✓
- Less damage to the environment due to less application of pesticides ✓
- High nutritional value and commercial properties ✓
- High yield and production ✓ (Any 3 x 1) (3)

3.4 Biological control of weeds

3.4.1 **TWO examples of biological weed control methods a farmer can use**

- Natural enemies ✓
 - Crop rotation ✓
- (2)

3.4.2 **TWO advantages of biological control of weeds**

- Reduces environmental risks/ ecologically friendly ✓
 - Cheaper way to control weeds ✓
- (2)

3.4.3 **THREE benefits of Integrated Pest Management strategy**

- Promotes healthy plants ✓
- Reduces environmental risks by promoting ecologically friendly and bio-based ways ✓
- Maintains and increases the cost-effectiveness of pest management programmes ✓
- Decreases the exposure of workers and public to pesticides ✓

(Any 3 x 1) (3)

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QUESTION 4: OPTIMAL RESOURCE UTILISATION

- 4.1 4.1.1 **Aim of soil survey from the scenario.**
• To determine the suitability of soil for agricultural purposes ✓ (1)
- 4.1.2 **THREE factors to consider when a soil survey is done**
• Physical, chemical and biological factors (soil factors) ✓
• Topography ✓
• Climate ✓ (3)
- 4.1.3 **Explanation of the usefulness of data captured on the soil map to the farmer**
• It helps the farmers to decide how to utilise the soil as it shows boundary lines that divide the different soil types ✓
• The data can be used by the farmer to make informed decisions on what type of plant or animal would be best suitable on that soil type ✓ (2)
- 4.1.4 **THREE steps to follow in the physical analysis of soil**
• Digging soil pits ✓
• Determining soil profile ✓
• Determining physical and chemical properties ✓ (3)
- 4.2 4.2.1 **Identification of the farming approach**
• Precision farming ✓ (1)
- 4.2.2 **TWO main aims of adopting the modern farming method outlined in QUESTION 4.2.1 above**
• Enables the farmer to have a more precise control over the natural variation in the soil on the farm ✓
• Aim to minimise input risks and maximise yield and return on investment ✓ (2)
- 4.2.3 **Benefits of smart soil fertilisation to the farmer**
• Assist the farmer to apply the necessary fertiliser for each small unit's yield potential, ✓ making sure that over and under fertilisation do not occur and reduce wastage ✓ (2)
- 4.3 4.3.1 **Type of flood system in picture A**
• Furrow irrigation system ✓ (1)
- 4.3.2 **TWO advantages of flood irrigation**
• Cheap method where water is abundant ✓
• Allows salts to be flushed out of soil ✓
• Weed control method for rice ✓
• Not much labour is needed ✓ (Any 2 x 1) (2)

- 4.3.3 **Explanation of negative effects of improper irrigation scheduling**
• The farmer will not know the quantities of water to be applied to the soil at fixed times ✓ and this increases costs of energy to drive the system and can cause leaching of nutrients ✓ (2)
- 4.3.4 **Identify the source of water for irrigation in picture B**
• Groundwater ✓ (1)
- 4.3.5 **TWO criteria used to determine water quality used for irrigation**
• Total dissolved salts ✓
• Sodium-adsorption ratio ✓
• Toxic ions ✓
• Organic and inorganic content ✓ (Any 2 x 1) (2)
- 4.4 4.4.1 **Identification of the type of soil cultivation**
(a) Conservation tillage ✓ (1)
(b) Conventional tillage ✓ (1)
- 4.4.2 **TWO disadvantages of conventional tillage**
• Natural vegetation is disturbed ✓
• Soil erosion increases ✓
• Organic fraction content of the soil decreases ✓ (Any 2 x 1) (2)
- 4.4.3 **TWO advantages of crop rotation**
• Enables proper utilisation of soil nutrients ✓
• Legumes increases the nitrogen content in the soil ✓
• Way to control disease and pest outbreak ✓
• Economic way to maintain soil fertility ✓
• Reduces soil erosion ✓
• Helps to control weeds ✓ (Any 2 x 1) (2)
- 4.5 4.5.1 **Identification of the farming system**
• Hydroponics ✓ (1)
- 4.5.2 **THREE advantages of the system mentioned in QUESTION 4.5.1 over the open field system**
• Hydroponics have a high-density maximum crop yield ✓
• Crop production is possible where no suitable soil exists ✓
• Plants are irrigated automatically in hydroponics ✓
• Soil-borne diseases are eliminated ✓ (3)

4.5.3 **ONE disadvantage of drain-to-waste system illustrated in the picture above**

- Build-up of salt can occur ✓
- Growth mediums must be replaced often ✓
- Fermentation of growth mediums can lead to negative nitrogen periods ✓
- Use more water and fertiliser ✓
- More impact to the environment

(Any 1 x 1) (1)

4.5.4 **Explain what is *aquaculture***

- The farming of marine ✓ and freshwater aquatic organisms ✓ (2)

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TOTAL SECTION B: 105

GRAND TOTAL: 150