



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2019**

**AGRICULTURAL SCIENCES P2  
MARKING GUIDELINE**

**MARKS: 150**

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This marking guideline consists of 10 pages.

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**SECTION A****QUESTION 1**

1.1	1.1.1	B ✓✓		
	1.1.2	C ✓✓		
	1.1.3	C ✓✓		
	1.1.4	D ✓✓		
	1.1.5	A ✓✓		
	1.1.6	B ✓✓		
	1.1.7	C ✓✓		
	1.1.8	A ✓✓		
	1.1.9	A ✓✓		
	1.1.10	B ✓✓	(10 x 2)	(20)
1.2	1.2.1	D ✓✓		
	1.2.2	H ✓✓		
	1.2.3	E ✓✓		
	1.2.4	A ✓✓		
	1.2.5	G ✓✓	(5 x 2)	(10)
1.3	1.3.1	Fertigation ✓✓		
	1.3.2	Capillarity ✓✓		
	1.3.3	Pesticides ✓✓		
	1.3.4	Integrated Pest Management ✓✓		
	1.3.5	Drainage ✓✓	(5 x 2)	(10)
1.4	1.4.1	Macro-elements ✓		
	1.4.2	Vectors ✓		
	1.4.3	Aquaculture ✓		
	1.4.4	Tensiometer ✓		
	1.4.5	Mulching ✓	(5 x 1)	(5)

**TOTAL SECTION A: 45**

**SECTION B****QUESTION 2: PLANT STUDIES (NUTRITION)**

2.1 2.1.1 **Name of the process**  
Photosynthesis ✓ (1)

2.1.2 **Deduction of substances**  
A – Oxygen ✓  
B – Water ✓ (2)

2.1.3 **Justification of statement**  
They make their own food ✓ through the process of photosynthesis ✓ (2)

2.1.4 **Differences between photosynthesis and cellular respiration**

<b>Photosynthesis</b>	<b>Respiration</b>
Is an anabolic process ✓	Is a catabolic process ✓
Carbon dioxide is consumed and oxygen is released ✓	Oxygen is consumed and carbon dioxide is released ✓
Can only take place in the presence of light ✓	Takes place in light and darkness ✓
Takes place in plants only ✓	Takes place in both plants and animals ✓
Energy from the sun is used ✓	Chemical potential energy is used ✓
30 times faster than respiration ✓	Much slower than photosynthesis ✓

(Any 4 + Table) ✓ (5)

2.2 2.2.1 **Negative effects of the hit and miss approach**  

- Inadequate fertilisers will be applied resulting in low yields ✓
- Excess fertilisers will be applied resulting in high inputs costs ✓

(2)

2.2.2 **Methods that can be used by farmers to determine the amount of fertiliser to be applied**  

- Soil analysis/Soil samples ✓
- Plant analysis/Leaf samples ✓

(2)

2.2.3 **Factors influencing nutrient availability**  

- Soil texture ✓
- Soil pH ✓

(2)

2.2.4 **Effect of the factors mentioned in QUESTION 2.2.3 on nutrient availability**  

- Sand texture are easily leached while clay soils hold nutrients making them available to plants. ✓
- Some nutrients are unavailable at low pH. ✓

(2)

- 2.3 2.3.1 **Mechanisms through which roots absorb the following substances:**
- (a) – Osmosis ✓ (1)
  - (b) – Diffusion/passive uptake ✓ (1)
  - (c) – Active uptake ✓ (1)
- 2.3.2 **Adaptations of plants to reduce water loss**
- Leaves have a thick cuticle ✓
  - Lose their leaves in winter ✓
  - Small needle shaped leaves ✓
  - Leaves are covered with hairs ✓
  - Stomata are found on the underside of leaves ✓
  - Stomata are closed at night ✓
  - Storage of water in stems ✓ (Any 2 x 1) (2)
- 2.3.3 **Importance of transpiration**
- Cools the plant down ✓
  - Assists in transport of nutrients ✓ (2)
- 2.4 2.4.1 **Example of an organic fertiliser**
- Manure ✓
  - Compost ✓
  - Bone meal ✓
  - Blood meal ✓
  - Seaweed ✓
  - Cottonseed meal ✓ (Any 1 x 1) (1)
- 2.4.2 **Environmental benefits of organic fertilisers**
- They cannot be easily leached into water sources ✓
  - Stimulate growth of micro-organisms ✓ (2)
- 2.4.3 **Advantages of chemical fertilisers over organic fertilisers**
- Amount of nutrients to be applied can easily be calculated ✓
  - Available to plants immediately ✓
  - Required in relatively smaller quantities ✓ (Any 2) (2)
- 2.5 2.5.1 **Labels for letters A–E**
- A – NO<sub>3</sub><sup>-</sup> /Nitrate ions ✓ (1)
  - B – Macro element ✓ (1)
  - C – Phosphate /Phosphorus ✓ (1)
  - D – Purple leaves ✓ (1)
  - E – Micro element ✓ (1)

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**QUESTION 3: PLANT REPRODUCTION AND PROTECTION**

- 3.1 3.1.1 **Types of pollination**  
B – Self pollination ✓  
C – Cross pollination ✓ (2)
- 3.1.2 **Advantages of self-pollination**  
• Desirable characteristics are maintained ✓  
• Produces uniform progeny ✓ (2)
- 3.1.3 **Description of double fertilisation**  
It involves two sperm cells, one fertilises the egg cell to form the zygote, ✓ while the other fuses with two polar nuclei to form the endosperm. ✓ (2)
- 3.1.4 **Type of reproduction**  
Sexual ✓ (1)
- 3.1.5 **Deduction**  
Insect pollinated ✓  
  
**Justification**  
Large petals ✓ (2)
- 3.2 3.2.1 **Classification of fruits A, B and C**  
• A – Compound ✓  
• B – Accessory ✓  
• C – Simple ✓ (3)
- 3.2.2 **Reason behind classification of fruit B**  
Fruit B developed from a receptacle ✓ instead of an ovary ✓ (2)
- 3.2.3 **Part of a flower from which each structure develops**  
(a) – ovules ✓ (1)  
(b) – ovary ✓ (1)
- 3.3. 3.3.1 **How weeds reduce yields**  
They compete with cultivated crops for space / water / nutrients ✓ (1)
- 3.3.2 **Name given to chemicals used to control weeds**  
Herbicides (1)

### 3.3.3 Reasons why weeds grow more than cultivated species

- Weeds grow easily in disturbed environments ✓
- Weeds produce large quantities of seeds ✓
- Weed seeds stay dormant in the soil for many years without being damaged ✓
- Perennial weeds have underground parts that spread out under the soil surface ✓
- Weeds are able to survive extreme environmental conditions such as drought ✓

(Any 2 x 1) (2)

### 3.3.4 Examples of weed seed dispersal agents

- Wind ✓
- Animals ✓
- Water ✓
- Birds ✓

(Any 2 x 1) (2)

### 3.3.5 Ecologically sustainable weed control methods

- Biological control ✓
- Cultural control ✓
- Integrated weed control ✓

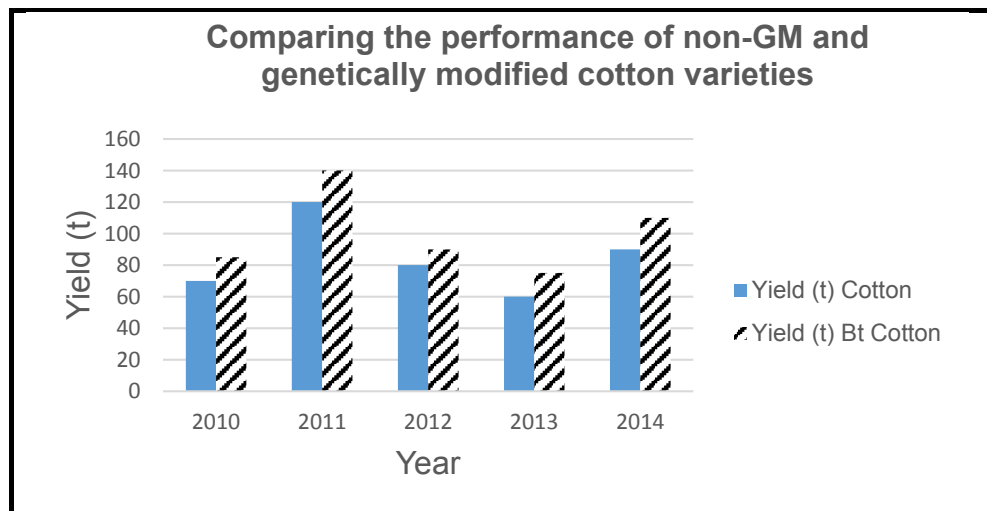
(Any 2 x 1) (2)

### 3.3.6 Role of the state in plant protection

- Passes laws which regulate pest control ✓
- Sets up research councils to spearhead pest control research ✓
- Provides advisory services to farmers ✓
- Provides quarantine services ✓

(Any 2 x 1) (2)

## 3.4 3.4.1



### Rubric

- Correct heading ✓
- X axis correctly calibrated with label (Year) ✓
- Y axis correctly calibrated with label (Yield) ✓
- Graph type (Bar graph) ✓
- Correct units (t) ✓
- Accuracy ✓

(6)

- 3.4.2 **More productive cotton variety**  
Bt cotton ✓ (1)
- 3.4.3 **Possible reason for the differences in performance between the two varieties**  
Bt cotton is resistant to bollworms (a pest) ✓ which results in higher yields ✓ (2)

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**QUESTION 4: OPTIMAL RESOURCE UTILISATION**

- 4.1 4.1.1 **Identification of practice**  
Crop rotation ✓ (1)
- 4.1.2 **Principles used to design the crop rotation program**
- Crops that require the same nutrients should not follow each other ✓
  - Crops that are affected by the same pests and diseases should not follow each other ✓
  - Shallow rooted crops should be followed by deep rooted crops ✓ (Any 2 x 1) (2)
- 4.1.3 **Advantages of crop rotation**
- Protects the farmer from total crop failure ✓
  - Maintains soil fertility ✓
  - Improves soil structure ✓
  - Controls pests and diseases ✓
  - Increases soil nitrogen content ✓ (Any 2 x 1) (2)
- 4.1.4 **Disadvantages of crop rotation**
- Requires greater management skills ✓
  - Requires more crop specific machinery ✓
  - May not allow for maximum profitability as the space available for the most profitable crop is limited ✓ (Any 1 x 1) (1)
- 4.2 4.2.1 **Example of growing media mentioned in the passage**
- Perlite ✓
  - Gravel ✓ (Any 1 x 1) (1)
- 4.2.2 **Benefits of hydroponics**
- Low water costs ✓
  - Fewer fertilisers are used ✓
  - Reduced pollution of land and water sources since nutrients are recycled ✓
  - Soil borne diseases are eliminated ✓
  - No soil is needed so plants can be grown anywhere ✓ (Any 2 x 1) (2)
- 4.2.3 **Difference between open and closed hydroponic production**  
In an open system the nutrient solution is not saved for recycling onto the same crop ✓ while in a closed system the same nutrient solution is re-circulated. ✓ (2)
- 4.2.4 **Suitability of hydroponics for subsistence farming**  
Not suitable ✓ because the system is expensive to install ✓ / requires technical knowledge ✓ (2)
- 4.3 4.3.1 **Identification of implement**  
Plough / Ox drawn plough ✓ (1)



- 4.3.2 **Determination of appropriate type of tillage**  
A – Primary tillage ✓  
B – Primary tillage ✓ (2)
- 4.3.3 **Advantages of using implement B over A**  
• Cheaper to purchase and run since no fuel is used ✓  
• Droppings from draft animals add organic matter to the soil ✓  
• Less soil compaction ✓ (Any 2 x 1) (2)
- 4.3.4 **Aims of primary soil cultivation**  
• To break up soil crusts ✓  
• To incorporate fertilisers and organic matter into the soil ✓  
• Destroy weeds ✓  
• To improve soil aeration and infiltration capacity ✓ (Any 2 x 1) (2)
- 4.3.5 **Practices of conservation tillage**  
• No tillage ✓  
• Strip/Minimum tillage ✓  
• Mulching ✓ (Any 2 x 1) (2)
- 4.4 4.4.1 **Identification of irrigation systems**  
A – Sprinkler irrigation ✓  
B – Drip irrigation ✓ (2)
- 4.4.2 **Criteria used to determine water quality**  
• Turbidity ✓  
• Soil salinity ✓ (2)
- 4.4.3 **Advantages of the sprinkler irrigation system**  
• It can be used on uneven land ✓  
• Water is applied uniformly ✓  
• Water is measured accurately ✓  
• There is no loss of water through seepage ✓ (Any 2 x 1) (2)
- 4.5 4.5.1 **Name of the structure**  
Green house ✓ (1)
- 4.5.2 **Materials used to construct the greenhouse**  
• Polyethylene/plastic ✓  
• Steel poles ✓ (2)
- 4.5.3 **Justification for using greenhouses**  
• Crop damage due to frost and rain is eliminated ✓  
• Crops can be grown all year round ✓  
• High quality crops can be produced ✓  
• Yields can be improved ✓  
• Crops that would normally not grow in particular area can be grown ✓ (Any 2 x 1) (2)

4.5.4 **Environmental factors to consider before setting up greenhouses**

- Light ✓
- Temperature ✓
- Wind ✓
- Water supply ✓
- Drainage ✓
- Topography ✓

(Any 2 x 1) (2)

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**TOTAL SECTION B: 105**  
**GRAND TOTAL: 150**