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GRADE 11

NOVEMBER 2015

**AGRICULTURAL SCIENCES P2
MEMORANDUM**

MARKS: 150

This memorandum consists of 10 pages.

SECTION A**QUESTION 1.1**

1.1.1 B ✓✓

1.1.2 A ✓✓

1.1.3 A ✓✓

1.1.4 C ✓✓

1.1.5 D ✓✓

1.1.6 D ✓✓

1.1.7 B ✓✓

1.1.8 B ✓✓

1.1.9 D ✓✓

1.1.10 C ✓✓

QUESTION 1.2

1.2.1 E ✓✓

1.2.2 F ✓✓

1.2.3 G ✓✓

1.2.4 H ✓✓

1.2.5 B ✓✓

(5 x 2) (10)

QUESTION 1.3

1.3.1 Vectors ✓✓

1.3.2 Mesocarp ✓✓

1.3.3 Stolons ✓✓

1.3.4 Tensiometer ✓✓

1.3.5 Soil drainage ✓✓

(10 x 2) (20)

(5 x 2) (10)

QUESTION 1.4

1.4.1 diffusion ✓

1.4.2 biological control ✓

1.4.3 micro/drip irrigation ✓

1.4.4 hydroponics ✓

1.4.5 corolla ✓

(5 x 1) (5)

TOTAL SECTION A: 45

SECTION B**QUESTION 2: PLANT NUTRITION**

- 2.1 2.1.1 **Storage organs in plants**
- Roots ✓
 - Stem ✓
 - Leaves ✓
 - Tubers ✓
 - Fruits/seeds/nuts ✓
- (Any 3 x 1) (3)
- 2.1.2 **Chemical process**
Photosynthesis ✓ (1)
- 2.1.3 **Requirements of the chemical process**
- Radiant/solar energy/sunlight ✓
 - Sufficient carbon dioxide ✓
 - Water ✓
 - Chlorophyll pigment ✓
 - Ideal temperature ✓
- (Any 2 x 1) (2)
- 2.1.4 **Main product of the process stored in storage organs**
- Sugars/carbohydrates/organic food substances ✓
- (1)
- 2.2 2.2.1 **Factors that influence upward water movement**
- Root pressure ✓
 - Capillarity ✓
 - Adhesion and cohesion ✓
- (3 x 1) (3)
- 2.2.2 **The role played by xylem in water movement**
Water moves along xylem vessel ✓ to replace water lost via transpiration. ✓ (2)
- 2.2.3 **Functions of water in plants**
- Water transports nutrients from the soil to the roots and to the leaves. ✓
 - Water transports the products of photosynthesis from the leaves to the plant organs for storage. ✓
 - Water provides structural support to plants. ✓
 - Water regulates plant temperature. ✓
 - Water provides the medium for metabolic processes such as photosynthesis and respiration. ✓
- (Any 2 x 1) (2)

2.2.4 Osmosis

It is a process where water molecules move from a high water potential to a low water potential ✓ through a differentially permeable membrane. ✓ (2)

Diffusion

It is the spontaneous movement of molecules from a region of high concentration to a region of low concentration, ✓ until it reaches a dynamic equilibrium. ✓ (2) (4)

- 2.3 2.3.1 a = nitrogen ✓
b = potassium ✓
c = calcium ✓ (3)

2.4 2.4.1 Fertiliser that could provide better yield

- Fertiliser bag A/The first fertiliser bag ✓ (1)

2.4.2 Justification for fertiliser bag A

- The proportion/percentage of nitrogen in Bag A (8) is greater than the proportion of nitrogen in Bag B (1). ✓
- Leafy vegetables require more nitrogen for vegetative growth. ✓ (2)

2.4.3 Implications of (30) on the bag

The figure 30 indicates the percentage mass of the fertiliser ✓ that actually contains the elements. ✓

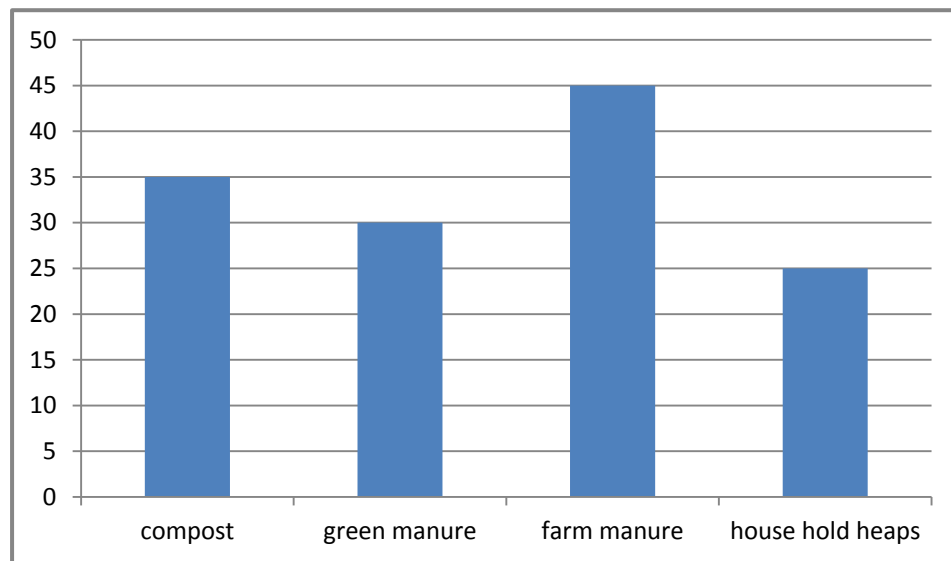
OR

30 indicates the total amount of nutrients ✓ in 100 kg of the mixture. ✓

OR

30 indicates that the fertiliser contains a 30% mixture ✓ of N.P.K. ✓ (2)

2.5 2.5.1 The performance of different organic fertilisers on the yield of maize.



Bar graph ✓ 1

Correct heading ✓ 1

Correct plotting/proportional plotting ✓ 1

Labelling and units on Y-axis ✓ 1

Labelling and units on X-axis ✓ 1

(5)

2.6 Active ion uptake

- It is the movement of nutrients against a concentration gradient/from a low to high concentration. ✓
- It is brought about by carrier molecule which is present in the cell membrane. ✓
- It requires metabolic energy/energy provided by ATP and a suitable enzyme. ✓

(Any 2 x 1)

Passive ion uptake

- Ions move from a higher to a lower concentration. ✓
- It does not need energy from metabolic reactions / ATP is not involved. ✓
- It occurs outside the casparian strip in the cortex. ✓

(Any 2 x 1)

(4)

[35]

QUESTION 3: PLANT REPRODUCTION

- 3.1 3.1.1 **Breeding process**
 • Hybridisation ✓ (1)
- 3.1.2 **Justification of the process**
 FIGURE 2 shows better yield ✓ than FIGURE 1. ✓
OR
 FIGURE 3 shows better yield ✓ than FIGURE 1 and FIGURE 2. ✓ (2)
- 3.1.3 **Advantages of hybridisation**
 • Hybridisation creates varieties that produce more yield. ✓
 • Hybridisation produce plants that grow faster/better. ✓
 • Hybridisation produces plants that are more resistant to pests and diseases. ✓
 • Hybridisation produces plants that are resistant to cold and heat / unfavourable weather. ✓ (Any 2 x 1) (2)
- 3.2 3.2.1 **Parts of a flower**
 9 = ovum ✓
 3 = stigma ✓
 4 = ovary ✓ (3)
- 3.2.2 **Function of flower stalk**
 • It is the flower stalk that holds/supports the flower/fruit in place. ✓
 • The flower stalk conducts water and nutrients from the plant to the flower. ✓ (Any 1 x 1) (1)
- 3.2.3 **Climatic conditions leading to ablation**
 • Low temperatures inhibits the germination of pollen and thus fruit setting. ✓
 • Frost damage flowers. ✓
 • Rain moisturises pollen and makes it not to disperse. ✓
 • Strong winds blow away insects from pollinating the trees. ✓ (Any 3 x 1) (3)
- 3.3 3.3.1 **Methods of propagation**
 FIGURE A – Grafting ✓
 FIGURE B – Cutting ✓ (2)
- 3.3.2 **Reasons to practice vegetative propagation**
 • Plants that do not produce seeds or viable seeds like roses can only be propagated by grafting or budding. ✓
 • Plants propagated by budding or grafting are true to type. ✓
 • It is very quick/easier/cheaper to propagate through cuttings. ✓
 • Plants propagated by cutting and grafting, produce flowers/fruits faster. ✓ (Any 3 x 1) (3)

3.4 3.4.1 **Disease causing organisms**

- (a) Viruses ✓
- (b) Vectors ✓
- (c) Fungi ✓
- (d) Bacteria ✓

(4)

3.4.2 **Preventative measures for the spread of plant diseases**

- Use registered certified disease-free seed or other propagation material. ✓
- Disinfect pruning tools to prevent disease causing organisms from infecting plants through wounds. ✓
- Select cultivars that are resistant to bacterial diseases. ✓
- Practice crop rotation using crops that are not susceptible to diseases. ✓
- Fumigate storage places and greenhouses. ✓

(Any 3 x 1) (3)

3.5 3.5.1 **Selection**

It is the process in which environmental or genetic influences that will determine if an organisms ✓ thrive better than others as a factor of evolution. ✓

(2)

3.5.2 **Advantages of gene mutation**

- It provides breeding material for conventional plant breeding. ✓
- It contributes to the conservation and use of plant genetic resources. ✓
- It contributes to food security. ✓
- It provides additional income to farmers. ✓
- Desirable traits such as disease-resistance can be induced. ✓
- Plants can be muted to bear more fruits, flowers and seeds to increase production ✓

(Any 3 x 1) (3)

3.5.3 **Two important Bt crops in South Africa**

- Bt Maize ✓
- Bt Cotton ✓

(2)

3.5.4 **A natural or artificial breeding method**

- Selection ✓

(1)

3.6 **Reason why farmers should control weeds**

- Weeds compete with crops for moisture/space/nutrients and light. ✓
- Weeds interfere with the harvesting of crops. ✓
- Weeds serve as host plants for insects and pests. ✓
- Weeds that are thorny pose health hazards to other plants and animals. ✓

(Any 3 x 1) (3)

[35]

QUESTION 4: ANIMAL REPRODUCTION

- 4.1 4.1.1 **Farming system**
Precision farming ✓ (1)
- 4.1.2 **Reasons for the use of computers and global satellites**
- To measure the correct environmental conditions. ✓
 - To determine if crops are growing at maximum efficiency. ✓ (2)
- 4.1.3 (a) **Geographic Positioning System (GPS)**
To determine a precise position on the globe. ✓ (1)
- (b) **Geographic Information System**
Computers capture, manage and analyse special data related to crop productivity and field inputs. / It makes sense of all the available data. ✓ (1)
- 4.2 4.2.1 **Best water source for sustainable irrigation**
- Rivers/bigger rivers ✓ (1)
- 4.2.2 **Water source not good for irrigation**
- Sea water ✓ (1)
- 4.2.3 **Criteria to determine water quality for irrigation**
- The salinity of the water because if plants absorb too much salt it affects crop yield/saline water is toxic to plants. ✓
 - Determine specific electrical conductivity of water/the more salts dissolved, the higher the specific electrical conductivity. ✓
 - Determine sodicity/sodium adsorption ratio/higher amounts of sodium ions (Na^+) has detrimental effects on both soil and plants. ✓
 - Determine toxic ions such as chloride and lithium. ✓ (Any 2 x 1) (2)
- 4.2.4 **Example of flood irrigation**
- Basin/border irrigation ✓
 - Furrow irrigation ✓
 - Bed irrigation ✓ (Any 1 x 1) (1)

4.3 4.3.1 **Drainage layouts**

- A – Parallel/grid drainage system ✓
 B – Herringbone drainage system ✓

(2)

4.3.2 **Factors to consider before installing pipe drain system**

- Soil information ✓
- Wetland impact ✓
- Economic feasibility regarding installation costs ✓
- Present and future cropping strategies. ✓
- Environmental impacts associated with drainage discharge. ✓
- Easements and right of way to avoid any potential conflict. ✓
- Spacing of drains ✓
- Pipe diameter ✓
- Drain slope or gradient ✓
- Layout of drains ✓

(Any 2 x 1) (2)

4.3.2 **Disadvantages of open drains**

- High maintenance cost of cleaning or removing fallen material. ✓
- Ditches may serve as breeding ground for weeds and insect pests. ✓
- Restricts accessibility of vehicles. ✓
- Some field operations cannot be done freely using heavy farm machinery. ✓

(Any 2 x 1) (2)

4.4 4.4.1 **Difference in aspects of monoculture and crop rotation**

Monoculture	Crop rotation
(a) The same crop is planted each year/The plants take the same mineral nutrients from the soil each year. ✓	(b) Different crops are planted each year. The plants will take different nutrients from the soil each year. ✓
(c) Diseases and pests settle in the soil and will be very hard to remove. ✓	(d) Disease and pests are easier to control because the diseases and pests of one crop may not affect other crops. ✓

(4)

4.5 (a) **Primary soil tillage/cultivation**

It involves the first intensive operation, ✓ which cut, turn and shatter the soil with relatively deep penetrating implements. ✓

(2)

(b) **Secondary cultivation/tillage**

It comes after primary tillage. / It involves seedbed finishing operations ✓ such as pulverising, levelling, firming the top soil, weed control, destroying soil crust and ridging. ✓

(2) (4)

- 4.6 4.6.1 **Managerial practices**
- Regular stocking ✓
 - Feeding ✓
 - Protection from predators ✓
- (Any 2 x 1) (2)
- 4.6.2 **Common species stocked in South Africa**
- Bluefish/shad/elf ✓
 - Trout ✓
 - Abalone ✓
 - Seaweed ✓
 - Oysters ✓
 - African catfish ✓
 - Prawns ✓
 - Mussels ✓
 - Tilapia ✓
- (Any 2 x 1) (2)
- 4.6.3 **Open-through flow system**
- An open through flow system allows water to pass through the system once before it is discharged ✓ and can be used in indoor tanks, if there is an abundant and continuous supply of good quality water. ✓ (2)
- 4.7 4.7.1 Greenhouse ✓ (1)
- 4.7.2 **Environmental factors to consider**
- Morning sunlight in the east ✓
 - Slope / well drained land ✓
 - Source of water supply ✓
 - Electricity supply ✓
 - Accessibility by trucks and other vehicles ✓
 - Consider the direction of storm water ✓
 - Temperature ✓
 - Plant diseases and pests ✓
- (Any 2 x 1) (2)
- 4.7.3 **Materials for greenhouse**
- Transparent / micron plastic / polyethylene ✓
 - Shade nettings / cloth ✓
 - Glass ✓
- (2)

[35]

TOTAL SECTION B: 105
GRAND TOTAL: 150