# Nyaraya Cluster Examination

**Kenya Certificate of Secondary Education**

**Form Four Mock Evaluation Programme**

MARKING SCHEME

**NYARAYA AGRICULTURE PAPER 1, 2023**

**SECTION A: (30 MARKS)**

1. State **THREE** influences of soil pH on crop growth. (1½ Marks)

*-* ***pH determines the availability/presence or absence of certain soil nutrients;*** √

*-* ***Low pH inhibit the activity of soil microorganisms/activity of most beneficial soil microorganisms is optimum at pH 5.5 to 7.8 pH determines the availability/presence or absence of certain soil nutrients;*** √

*-* ***Low pH encourages fungal diseases/high pH encourages bacterial diseases; pH determines the availability/presence or absence of certain soil nutrients;*** √

*-* ***Low pH lowers plant resistance to pests; pH determines the availability/presence or absence of certain soil nutrients;*** √

*-* ***Different crops react differently to different soil pH; pH determines the availability/presence or absence of certain soil nutrients;*** √

2. State **FOUR** factors considered when selecting planting materials. (2 Marks)

*-* ***Suitability to the ecological conditions;*** √

*-* ***Purity of the materials;*** √

*-* ***Germination percentage;*** √

*-* ***Certified seeds;*** √

3. Name **FIVE** sources of agriculture credit in Kenya (2½ Marks)

- ***Co-operatives*** √

- ***Commercial banks*** √

- ***Crop boards*** √

- ***Settlement and trustees*** √

- ***AFC*** √

4. State **FOUR** reasons for pruning in coffee. (2 Marks)

- ***Regulates bearing (by ensuring high yields every season);*** √

- ***To remove old and unproductive branches/stimulate production of new more productive branches;*** √

- ***To make harvesting easy by regulating the height of the trees;*** √

- ***Facilitates easy penetration of sprays for effective control of pests and diseases;*** √

- ***It economizes use of sprays thus reducing the cost of production;*** √

- ***Opens up the bush allowing more sunlight and air circulation thus controls pests and diseases by destroying the favourable microclimate within the coffee bush;*** √

5. Give **TWO** limitations of chemical weed control. (1 Mark)

- ***Requires skills in mixing and applying of herbicides;*** √

- ***May cause environmental pollution;*** √

- ***It is expensive***; √

- **There is a possibility of poisoning the user;** √

- **Some have long residual effects which may interfere with future crops;** √

6. List any **FOUR** basis for classification of crop pests (2 Marks)

- ***Mode of feeding;*** √

- ***Crops attacked;*** √

- ***Stage of development of the pest;*** √

- ***Stage of growth of the crop attacked;*** √

- ***Scientific classification;*** √

- ***Level of damage;*** √

- ***Place where they are found;*** √

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7. Name **FOUR** disadvantages of mulching. (2 Marks)

- ***Provides a breeding ground for pests that may attack crops;*** √

- ***Traps light showers of rainfall thus lowering chances of raindrops reaching the ground;*** √

- ***Dry organic mulch is a fire risk;*** √

- ***Synthetic mulch is expensive to acquire;*** √

- ***May transmit diseases and pests to crops;*** √

8. State **TWO** importance of tissue culture. (1 Mark)

- ***Used to recover and establish pathogen-free plants;*** √

- ***Used in the mass production of propagules;*** √

- ***It is fast;*** √

- ***Requires less space compared to cultural methods;*** √

9. State **FOUR** factors that influence crop rotation programme. (2 Marks)

- ***Crop root depth;*** √

- ***Crop nutrient requirement;*** √

- ***Weed control;*** √

- ***Pest and disease control;*** √

- ***Soil fertility;*** √

- ***Soil structure;*** √

|  |  |  |
| --- | --- | --- |
| 10. | Give **FOUR** nursery management practices.- ***Mulching;*** √ | (2 Marks) |
|  | - ***Watering;*** √- ***Weed control;*** √- ***Pricking out;*** √- ***Shading;*** √- ***Pest and disease control;*** √- ***Hardening off;*** √ |  |
| 11. | State **FOUR** factors that determined spacing of crops | (2 Marks) |
|  | - ***Type of machinery to be used;*** √- ***Soil fertility;*** √- ***Size of the plant;*** √- ***Moisture availability;*** √- ***Use of the crop;*** √- ***Pest and disease control;*** √- ***Growth habit of the crop;*** √ |  |
| 12. | Differentiate between a ***complete*** and ***incomplete fertiliser.*** | (2 Marks) |

***Complete fertilizer is a compound fertilizer that contains all the three primary macro-nutrients (i.e Nitrogen,***

***Phosphorus and Potassium) while an incomplete fertilizer is a compound fertilizer that contains only two of the primary macro-nutrients;***

*[Mark as a whole]*

13. Give **FOUR** objectives of land tenure reform in Kenya (2 Marks)

- ***To encourage conservation measures on the land and general improvement of land.*** √

- ***To increase productivity of both land and labour.*** √

- ***To encourage commercial instead of subsistence production to ensure meaningful self-employment in rural areas.*** √

- ***To encourage farmers invest more through offering security of tenure.*** √

- ***To achieve flexibility in farming patterns to meet changing national and market demands.*** √

- ***To achieve effective utilization of national land resources, including settlement of unused land and introduction of irrigation schemes.*** √

|  |  |  |
| --- | --- | --- |
| 14. | List **THREE** post-harvest practices carried out in the growing of maize.- ***Threshing/Shelling;*** √ | (1 ½ Marks) |
|  | - ***Drying;*** √- ***Cleaning;*** √- ***Sorting and grading;*** √- ***Dusting;*** √- ***Processing;*** √- ***Packaging;*** √ |  |
| 15. | Name **THREE** materials required during budding. | (1½ Marks) |
|  | - ***Budding tape/ Rubber strips/polythene papers;*** √- ***Budding knife;*** √- ***Scion;*** √- ***Root stock;*** √ |  |
| 16. | Give **THREE** methods of forage conservation. | (1½ Marks) |
|  | - ***Hay;*** √- ***Silage;*** √- ***Standing forage;*** √ |  |
| 17. | Give **THREE** disadvantages of using plastic pipes. | (1 ½ Marks) |
|  | - ***They can burst under high pressure;*** √- ***Become brittle when exposed to the sun for a long period of time;*** √- ***They can be gnawed by rodents;*** √ |  |

**SECTION B (20 MARKS)**

*Answer all questions in this section in the spaces provided*

18. The diagrams labelled **A** and **B** below illustrate some of the methods used to propagate some field crops. Study the diagrams and use them to answer the questions that follow.

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**Shoot**

**Peg**

**K**

**L**

**A B**

a) Identify the two methods of propagation. (2 Marks)

***A – Tip layering; [Acc: Layering] B – Whip/Tongue grafting; [Acc: Grafting]***

b) Name **one** crop each propagated using methods **A** and **B** above. (2 Marks)

***A – Sweet potatoe;***

***B – Mango, Orange;***

c) Name the parts labelled **K** and **L** in **B**. (1 Mark)

***K – Scion;***

***L – Root stock;***

18. A farmer has a 2 hectare piece of land on which to grow wheat. His farm records for wheat production for 9 year period is as follows.

|  |  |  |
| --- | --- | --- |
| **Year** | **Fertilizer Applied (50kg bags)** | **Wheat output (90kg bags)** |
| 1999 | 0 | 4 |
| 2000 | 2 | 10 |
| 2001 | 4 | 28 |
| 2002 | 6 | 42 |
| 2003 | 8 | 52 |
| 2004 | 10 | 60 |
| 2005 | 12 | 66 |
| 2006 | 14 | 66 |
| 2007 | 16 | 64 |

a) (i) Using the appropriate scale draw a graph on the space provided below to show the relationship between input and output. (3 Marks)

***80***

***70***

***60***

√ *1 Mark production function curve*

***50*** √ *1 Mark output scale on Y-axis*

√ *1 Mark input scale on X-axis*

***40***

***30***

***Wheat output (90kg bags)***

***20***

***10***

***0 2 4 6 8 10 12***

***Fertilizer applied (50 kg bags)***

***14 16***

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(ii) From the graph above, how many bags of wheat would be produced if the farmer applied 9 bags of fertilizer. (½ Mark)

***56.5 ± 0.5 90 kg bags;***

(iii) Calculate the farmer’s marginal product for the year 2001. (½ Mark)

***Marginal product 28 – 10 = 18 (90 kg) bags;***

***=***

b) Assuming the average price of wheat is Kshs. 1,000.00 per bag and the cost of fertilizer is Kshs. 1,200.00 a bag. Calculate the gross income for the year 2002. (1 Mark)

***Gross income Sales – Expense***

***=***

***Gross income (Ksh.1,000 X 42) – (Ksh. 1,200 X 6);***

***=***

***= Ksh.34, 800;***

19. Study the illustration below of a tomato fruit as observed in field production.

i) Identify the condition illustrated above. (1 Mark)

*-* ***Blossom end-rot;***

ii) State **TWO** conditions that predispose a tomato plant to the conditions stated in (a) above (1 Mark)

*-* ***Irregular application of water;***

*-* ***Excess application of Nitrogen in the early stages;***

*-* ***Deficiency of calcium in young fruits;*** *[2 X ½ mark = 1 Mark]*

iii) Suggest **FOUR** possible ways of controlling the condition stated in (a) above (2 Marks)

*-* ***Regular watering;***

*-* ***Liming the soil/addition of calcium ;***

*-* ***Mulching to avoid moisture stress ;***

*-* ***Topdressing with enough nitrogen;*** *[4 X ½ mark = 2 Marks]*

iv) Name **TWO** other tomato diseases (1 Mark)

*-* ***Bacterial wilt;***

*-* ***Tomato blight;***

*[2 X ½ mark = 1 Mark]*

20. The diagrams below show certain varieties of a field crop. Study them and use them to answer the questions that follow.

**A B**

a) Identify the field crop shown above. (1 Mark)

***Sorghum (****Sorghum vulgare)***;**

b) What is the advantage of **B** over **A**? (1 Mark)

***Has some resistance to birds’ damage;***

c) Describe the harvesting of the field crop shown above. (3 Marks)

*-* ***Ready for harvesting 3 to 4 months after planting;***

*-* ***Heads are cut off using a sharp knife and sun-dried;***

*-* ***Dried produce is threshed, winnowed and stored;*** *[3 X 1 mark = 3 Marks]*

**SECTION C (40 Marks)**

**Answer two questions from this section.**

21. (a) Outline the factors to consider when selecting a farm enterprise. (12 Marks)

***˗ The period / time the enterprise will take to mature;***

***˗ Availability of market for the produce;***

***˗ The size of land available for the enterprise;***

***˗ The current government policy relating to the enterprise;***

***˗ The common pest / parasites and diseases that may hinder the enterprise implementation;***

***˗ Technical skills required to manage the enterprise / availability;***

***˗ Profit margin in relation to the price fluctuation at different times of the season / year;***

***˗ Availability of infrastructure to allow good communication;***

***˗ Availability of proper security for the enterprise;***

***˗ Availability of enough capital / money;***

***˗ Availability of inputs;***

***˗ Suitability of soil to the enterprise;***

***˗ Land tenure system;***

***˗ Social cultural factors / religious beliefs and customs;***

***˗ Land topography / drainage;***

***˗ Taste and preferences of the farmer;***

(b) Explain any **four** cultural methods of soil erosion control (8 Marks)

*-* ***Contour farming - Cultivation and planting done across the slopes helps in holding water thereby increasing infiltration and reducing runoff.***

*-* ***Mulching - covers the soil thereby reducing splash erosion / reduce speed of run off.***

*-* ***Strip cropping - give good soil cover with those that give soil cover controls movement of soil particles helping in soil control.***

*-* ***Vegetated waterway - Slow down runoff / eroded soil preventing further erosion.***

*-* ***Afforestation / reforestation trees protect soil from splash erosion by controlling the strength of raindrop.***

*-* ***Intercropping - cover the ground preventing splash erosion / surface run-off.***

*-* ***Minimum tillage - so as to maintain good soil structure / have a seedbed which is not easily detached.***

*-* ***Cover cropping - protect soil from effect of raindrop.***

*-* ***Grass strip / filter strips - reduce speed of run-off and filter out eroded soil.***

*[Any 8 × 1 = 8 marks]*

22. (a) State and explain **THREE** factors that influence choice of the type of irrigation to be used. (6 Marks)

***i. Capital availability – sub-surface irrigation and overhead irrigation costly to install and maintain due to the cost of pipes, pumps, sprinklers and expertise required in laying them***

***ii. Topography of the land – flood irrigation requires a fairly flat land surface to avoid draining away of water iii. Water availability – flood irrigation and basin irrigation require large volumes of water to be available***

***iv. Type of soil – flood and basin irrigation is only applicable in soils that have a high water holding capacity.***

***v. Type of crop to be irrigated – basin irrigation is suitable for crops such as rice which requires constantly flood fields enclosed by embankments throughout the growing period.***

*[Stating = 1 Mark; Explanation = 1 Mark)]*

(b) State **SIX** importance of farm records. (6 Marks)

***i. They help to determine the value of the farm in terms of assets and liabilities. ii. They show the history of the farm and help in future reference***

***iii. They enable the farmer to plan farm operations and budget with the available resources iv. They help in assessment of income tax, to avoid under or over taxation.***

***v. They help to determine whether the farm is making profits or losses. This information is important in determining the credit worthiness of a farmer.***

***vi. Farm records enable fair sharing of profits and losses in a partnership.***

***vii. Farm records help to settle disputes among heirs to the estate in case a farmer dies without leaving a will. viii. They help in proper management of routine livestock and crop production practices.***

***ix. They help to detect losses of property, breakages or theft in the farm***

***x. Farm records help in supporting insurance claims on death, theft and destruction of farm assets by natural calamities***

***xi. Farm records provide labour information such as terminal benefits, NSSF remittances and SACCO shares and dues.***

***xii. Farm records are useful in comparing the performance of different enterprises in the farm.***

(c) Describe the various management practices carried out in the nursery bed. (8 Marks)

*-* ***Mulching; – application of plant residue or polythene sheet between rows of crops;***

*-* ***Watering; - artificial application of water to plants;***

*-* ***Weed control; - removal of unwanted plants growing in the nursery bed;***

*-* ***Pricking out; - removal of overcrowded seedlings and transferring them to the seedling bed;***

*-* ***Shading; - erecting of a shelter above the seddlings;***

*-* ***Pest and disease control; - reducing incidences of pest and disease;***

*-* ***Harrdening off; - gradual reduction of watering and shade to adapt seedlings to field conditions;***

23. a) State and explain **FIVE** factors considered when choosing seed rates. (10 Marks)

***i) Seed purity; – less seeds are required when planting pure seeds/seeds with a high germination percentage;***

***ii) Spacing; - when closer spacing is applied, more seeds are used;***

***iii) Germination percentage; – seeds of lower germination percentage is required in larger amounts;***

***iv) Number of seeds per hole;*** – ***when two or more seeds are planted per hole, higher seed rate is required than when one seed is planted per hole;***

***v) Purpose of the crop; – a crop to be used for silage making is spaced more closely, hence more seeds***

***required than one meant for grain production;*** *[Stating = 1 Mark; Explanation = 1 Mark)]*

b) Explain **FIVE** reasons why crop rotation is important. (10 Marks)

***i) Maximum utilisation of nutrients; – alternating different crops with varying nutrient requirements leads to better utilisation of available soil nutrients;/alternation of deep rooted crops with shallow rooted crops ensure that nutrients from different soil layers are well utilised;***

***ii) Control of soil-borne pests and diseases; - when crops from different families are alternated pests and diseases specific to a given crop family are controlled;***

***iii) Control of weeds; - planting of non-grass crops controls parasitic weeds such as striga which are specific to some grass family crops;***

***iv) Improvement of soil fertility; - inclusion of leguminous crops in a crop rotation programme improves soil fertility by fixing nitrogen into the soil;***

***v) Improvement of soil structure; - inclusion of a grass ley in a crop rotation programme binds soil particles together thus improving soil structure;***

***vi) Control of soil erosion; - alternating row crops with cover crops checks soil erosion by covering empty spaces left during establishment of row crops;***