

**KANDARA SUB-COUNTY SECONDARY SCHOOLS FORM 3 2016**  
**JOINT EXAMINATION**  
Kenya Certificate of Secondary Education (KCSE)

**MARKING SCHEME**

**Agriculture (443/1)**

Paper 1

October 2016

**SECTION A (30 MARKS)**

**1. Harmful biotics factors to crops**

- i) Pests
- ii) Parasites
- iii) Predators
- iv) Weeds

**4 x ½mks**

**2. Differentiate between arable farming and nomadic pastoralism**

Arable farming is the growing of crops on cultivated land while pastoral nomadism is the rearing of livestock involving moving of the livestock from one place to another in search of fresh pasture and water.

**(2mks) (mark as a whole)**

**3. Factors determining the method of surface irrigation to use**

- i) A large supply/source of water eg a river or a dam
- ii) Fairly level topography to ensure water flows slowly by gravity
- iii) A soil with high water retention capacity eg clayey soil

**3 x ½mks**

**4. Importance of the following practices in crop production**

**a) Ridging**

- i) Controls soil erosion
- ii) Encourage tuber expansion
- iii) Eases harvesting of root crops
- iv) Conserves soil moisture

**2 x ½mks**

**b) Rolling**

- i) Control soil erosion
- ii) Improve seed-soil contact
- iii) Ensure uniform seed germination

**2 x ½mks**

**5. Four disadvantages of using organic manure**

- i) Bulky
- ii) Laborious to transport and apply
- iii) Nutrients may be lost by volatilisation and leaching
- iv) When undecomposed it releases nutrients which scorch crops

**4 x ½mks**

**6. Three conditions under which the opportunity cost is zero**

- i) When there is no alternative
- ii) When the resource is unlimited
- iii) When the resource is free of charge

**3 x ½mks**

**7. Four factors to consider when developing a crop rotation programme**

- i) Crops that require high level of nutrients should come first in the cycle
- ii) Deep rooted crops should be succeeded by shallow rooted crops
- iii) Crops from the same family should not succeed one another
- iv) Crops that are easily weeded should be alternated with those that are difficult to weed
- v) Include a legume crop in the cycle
- vi) Include a grass/fallow crop in the rotation programme

**4 x ½mks**

**8. Three advantages of individual owner operator in land tenure system**

- i) The owner has incentives to improve / receptive in extension services
- ii) Owner can grow perennial crops
- iii) Owner has security of tenure/issued with title deed
- iv) Owner can have permanent/long term planning
- v) Land disputes are minimised
- vi) Can use title deed as a security for development loans

**3 x ½mks**

9. a) Examples of pasture legumes

- i) Lucerne
  - ii) Clovers
  - iii) Stylo
  - iv) Glycine
  - v) Centro
- 2 x ½ mk

b) Two types of additives used in silage making

- i) Molasses
  - ii) Ground grains
- 2 x ½mk

10. Four characteristics of good vegetable seedlings

- i) Free from diseases/pest
  - ii) Vigorous growing
  - iii) Free from physical deformities
  - iv) Correct stage of growth/height/10 - 15cm tall/ 4-6 true leaves
- 4 x ½mks

11. Characteristics of annual weeds

- i) They only propagate by means of seeds
  - ii) They are fast in growth
  - iii) Completes their lifecycle within one season/year
  - iv) They are usually herbaceous
  - v) They have no underground structures/ usually shallow rooted
- 3 x ½mks

12. Ways in which grass cover help to conserve soil

- i) Reduce force of raindrops thus reducing splash erosion
  - ii) Reduce the quantity of surface run-off by increasing water infiltration
  - iii) Reduce the speed of surface run-off hence reducing the erosive force of water
  - iv) Provides a soil cover against wind-erosion
  - v) Grass roots hold the soil particles together reducing the erodability of the soil.
  - vi) Organic matter from grass binds the soil particles reducing the erodability of the soil.
- 4 x ½mks

13. a) Feeding habits of field insect pests

- i) Chewing and biting
  - ii) Piercing and sucking
- 2 x ½mks

b) Factors that affect efficiency of pesticides

- i) Concentration of pesticides
  - ii) Timing of application in relation to life cycle of pests /stage of growth of weed
  - iii) Persistence of pesticides
  - iv) Mode of application of a pesticides
  - v) Mode of action
- 3 x ½mks

14. Advantages of polythene sleeves in raising seedling

- i) Easy to transport the seedlings to the field
  - ii) Less likelihood of root disturbance during transplanting
  - iii) Easy to carry out root pruning in case of tree seedling
  - iv) Easy to control soil borne pests and diseases
- 2 x ½ mks

15. Ionic forms in which each of the following elements are absorbed in plants

- a) Nitrogen (1 x ½mk)
- i) Ammonium ions ( $\text{NH}_4^+$ )
  - ii) Nitrate ions ( $\text{NO}_3^-$ )
- b) Phosphorous
- i)  $\text{H}_2\text{PO}_4^-$  - Hydrogen phosphite
  - ii)  $\text{HPO}_4^{2-}$  - Hydrogen phosphate
- (1 x ½mk)

16. Distinguish between seed inoculation and seed dressing.

- Seed inoculation is coating seeds of leguminous plants with the right strain of rhizobium bacteria to promote nodulation while seed dressing is coating seeds with suitable pesticide and fungicide to control soil borne pest and diseases.

2 x ½mk

17. a) Maize fungal disease in the field

- i) Rust
  - ii) Smut
  - iii) White blight
- 2 x ½mk

b) Diseases which causes a mass of dark spores on the floral parts of maize

- i) Smut
- 1 x ½mk

**24. a) Describe the environmental conditions that may lead to low crop yields**

- Poor soil fertility/infertile soil because of lack of application of fertilizers or manure
- Less rainfall /unreliable rainfall/too much rainfall
- Inappropriate soil pH
- Pest attack
- Poor weed control compete for nutrients and lower yields
- Inappropriate temperature either too high or too low/extreme too
- Excessive wind may increase the rate of water loss from soil
- Extreme humidity is bad
- Extreme of light intensity reduce photosynthesis
- Topographic /some altitude may limit crop growth
- Disease attack lowers yields
- Hailstones damage /hailstones

**10 x 1 mks**

**b) practices carried out in the field help to control crop diseases**

- Crop rotation helps break the lifecycle of diseases causing organisms
- Rogueing/Destroying infected crops - helps crops to establish faster before attack.
- Planting diseases free plants/use of certified seeds; prevents introduction of pathogens into the fields
- Close season - helps to break the life cycle of pathogens
- Early planting/timely planting - helps crops to establish faster before attack
- Pruning/proper spacing; creates unfavourable micro-climate for some pathogens
- Weed control; prevents harbouring of some pathogens
- Application of appropriate chemicals, kills the pathogens
- Use of resistant varieties; prevent attack by pathogens
- Use of clean equipment reduces the chance of disease causing organisms

**10 x 1 = 10mks**

## SECTION B (20 MARKS)

18. a) Calculate the amount of  $P_2O_5$  contained in 600kg compound fertilizer 20:20:5

Percentage of  $P_2O_5$  in the compound fertilizer is  $10\frac{1}{2}\%$

100kg of the compound fertiliser contains 10kg of  $P_2O_5$  ✓ $\frac{1}{2}$

600kg of the compound fertilizer will contain X of  $P_2O_5$  ✓ $\frac{1}{2}$

$$X = \frac{600 \times 10}{100} = 60 \text{kg of } P_2O_5 \text{ ✓}1$$

3mks

b) Deficient nutrient elements

- i) Calcium
- ii) Nitrogen
- iii) Potassium
- iv) Phosphorous

4 x  $\frac{1}{2}$ mks (2mks)

19. a) Vegetative propagate material for the following crops

- i) Sisal
  - Bulbils
  - Suckers

- i) Bananas
  - Suckers

- iii) Pyrethrum
  - Split

- iv) Tea
  - Stem cutting

- v) Pineapples
    - Suckers
    - Slips
    - Crowns
- 5 x  $\frac{1}{2}$ mks

b) Field practise

- Staking

Reasons for staking

- enhances production of clean fruits/ improves quality of fruits
- helps in controlling diseases
- facilitates spraying /harvesting of the crop/ weeding/pruning
- Prevents infestation by soil borne pests

3 x  $\frac{1}{2}$  mks

20. a) Identify the crop pest

- cutworm  $1 \times 1 = 1mk$

b) Methods of control

- Mixing soil with appropriate insecticide
  - Hand picking and killing/physical killing
- $1 \times 1 = 1mk$

c) Other pest that attack cabbage

- Saw fly
  - Aphids
- $2 \times 1 = 2mks$

d) Types of damage caused by the above pest in (c)

- Sawfly - windowing, destroy leaves by eating them creating holes
- Aphids - suck nutrients from plants

21. a) Identify the weeds

- M - Witch weed/striga spp
  - N - Couch grass/ Digitaria scalarum
  - Q - Double thorn/ Oxygonum sinuatum
- $3 \times 1 = 3mks$

b) Identify the most difficult to control

Weed N ( $\frac{1}{2}$ mk)

Reason

- Deep underground structures ( $\frac{1}{2}$ mk)
- It is brittle - cuts at some points when one tries to uproot it

c) Identify the weed that is

- i) Parasitic maize in the field
  - Weed M /striga spp/witch weed ( $\frac{1}{2}$ mk)
- ii) Irritating to farm workers
  - Weed Q /double thorn ( $\frac{1}{2}$  mk)

## SECTION C (40 MARKS)

22. i) Rice production under the following sub-headings

a) Nursery preparation and establishment

- i) Cultivate nursery to a reasonably fine tilth
- ii) Construct a bund around the nursery
- iii) Pre-germinate seeds by soaking them for at least 24 hours
- iv) Flood the nursery to a depth of 10cm
- v) Puddle the soil to the required tilth
- vi) Broadcast the seeds evenly
- vii) Use 20 - 45Kg/ha of seeds/use the recommended seed rate
- viii) 1ha of transplanted rice required a

nursery of 18.5m x 18.5m

- ix) Apply 20 - 25kg/ha nitrogenous fertilizer/ apply nitrogenous fertilizers before sowing
  - x) Drag a board to obtain level nursery bed
- 5 x 1 mks**

**b) Field preparation**

- i) Cultivate the field to a fine tilth
- ii) Construct/repair the bunds
- iii) construct/repair water inlet and outlet
- iv) Flood the field four days before transplanting
- v) Flooding should be up to 10cm above the surface
- vii) Puddle the soil to the required tilth
- viii) level the field by dragging a board to obtain level seedbed

**3 x 1 mks**

**c) Transplanting**

- i) Seedlings are ready in 3 - 5 weeks /15 - 20cm high/4-6 true leaves stage
- ii) Drain the water in the field to 5cm just before transplanting
- iii) Broadcast 100kg/ha DSP before transplanting
- iv) Carefully uproot rice seedlings from the nursery bed
- v) Transplant the seedlings in the main field at a spacing of 10cm x 10cm

**2 x 1 mks**

**ii) Post-harvest practices carried out in the production of maize**

- Threshing/shelling- removing maize grins from the cobs
- Drying - until right moisture content for storage is attained
- Winnowing /cleaning - to remove chaff
- Dusting - applying chemical powders on seeds to prevent attack by storage pests.
- Processing - transforming a raw material into final product eg maize to flour
- Packaging - placement of produce into containers for storage, sale or transportation.

**(5 x 2 = 10mks) stating 1mk, explanation 1mk**

**23. Factors influencing soil erosion on arable land**

**i) Amount intensity of rainfall**

- When rainfall is heavy rain drops hit the ground with great force that splashes soil
- High rainfall amount saturates top soil

within a short time hence run off

**ii) Slope of land**

- The greater the slope the higher the speed of water and the greater the erosive force.

**iii) Type of soil**

- Sandy soil/coarse textured soil becomes saturated with water quickly and hence easily eroded.
- Clay soil is more resistant to water erosion

**iv) Soil depth**

- Shallow soils become more saturated with water quickly and easily eroded

**v) Vegetation cover**

- Vegetation protects soil acting as a barrier
- Allows water to percolate to greater depth
- Reduce impact of rain drop

**vi) Burning vegetation cover before cultivation**

- -Exposes land to rain and wind

**vii) Clean weeding**

- Leaving soil unprotected
- Ploughing up and down the slope

**Reject overstocking/deforestation (Stating 1mk, explaining 1 mk )**

**(5 x 2 = 10mks)**

**b) Role of agriculture in economic development**

- Food supply
- Provision of employment
- Earn foreign exchange
- Source of income/capital for investment
- Provision of raw materials for industries
- Provision of markets for industrial goods

**6 x 1 = 6mks**

**c) Roles of magnesium**

- i) Important in chlorophyll formation
- ii) Promotes the formation of fats and oils in crops eg soya beans, sunflower, groundnuts
- iii) Aids in the absorption and translocation of phosphorous
- iv) Enhances the nitrogen fixing power of legumes
- v) Activates the synthesis and translocation of carbohydrates and proteins in plants
- vi) Activates enzymes in crops

**4 x 1 mks**