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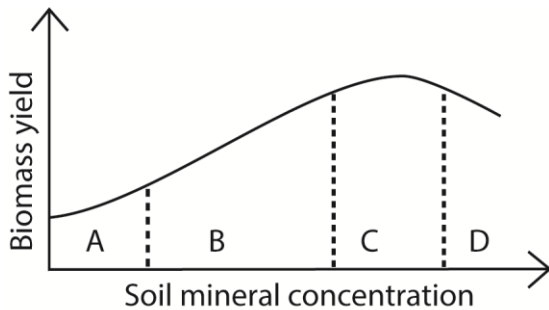


UACE P515/2 Principles and practices of agriculture2 2022

Instructions

- This paper consists of sections: **A, B, C, D and E**
- Answer **question 1** in section A and four other questions, selecting **one** from each of the sections **C, D and E**.
- Write your answers in the answer booklets provided
- Any additional question(s) answered will not be marked

1. Figure 1 shows the effect of soil mineral nutrient concentration on biomass production of pasture plant. Study the figure and answer questions that follow:



- (a) Account for the biomass yield in each of the stages A, B, C and D
- Stage A (02marks)
 - Stage B (02marks)
 - Stage C (02marks)
 - Stage D (02 marks)
- (b) (i) From figure 1, suggest the stage that is most suitable for feeding the pasture plants to livestock (01mark)
- (ii) State reasons for your answer in (b)(i)
- (c) Explain three factors that may affect biomass yield of pasture plants (06marks)

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) State the qualities of a good seed for planting (07marks)
(b) Give the treatment that can be done to seed before planting. (03marks)
(c) Outline the physiological process that take place during seed germination (10marks)
3. (a) Explain the effects of pests in crop production (08marks)
(b)(i) Outline the effect the cultural methods of controlling crop pest in the field (08marks)
(ii) Suggest ways of controlling storage pests. (04marks)

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Explain factors that should be considered when selecting animals for establishing a beef herd
(08marks)

(b) Explain factors that influence the productivity of beef animals. (04marks)

(c) What strategies should be adopted to improve beef production in Uganda? (08marks)
5. (a) Explain factors that predispose farm animals to disease infection. (07 marks)
(b) In what ways are pathogens transmitted to farm animals? (07marks)
(c) Suggest ways of caring for sick animals. (06marks)

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Outline the qualities of a good wall. (06marks)
(b) Explain the factors that influence the choice of the type of material to use when constructing walls of farm buildings. (08marks)
(c) Give the advantages of using mud as a building material for constructing the walls of farm buildings. (06marks)
7. (a) Outline the qualities of a good yoke for draught animals. (08marks)
(b) Explain how a farmer can improve the efficiency of a draught animal to perform work. (12 marks)

SECTION D (20MARKS)

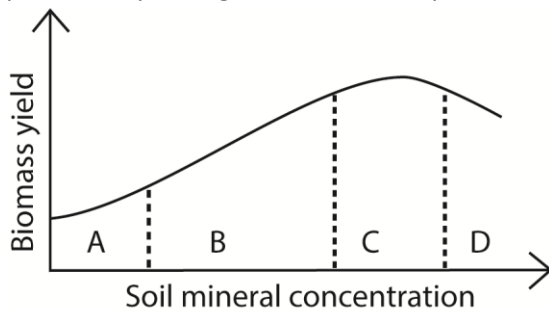
AGRICULTURAL ENGINEERING

Answer **one** question from this section

8. (a) Give the uses of agricultural credit. (05marks)
(b) What conditions do financial institutions take into account before offering credit to farmers? (05marks)
(c) Explain the challenges that limit farmers' ability to repay agricultural credit. (10marks)
9. (a) How does market information improve on the efficiency of marketing agricultural products? (06marks)
(b) Suggest ways of improving the marketing of perishable agricultural products. (05marks)
(c) Explain the challenges of implementing agricultural price stabilization policies. (09marks)
- END

Suggested answers

1. Figure 1 shows the effect of soil minerals nutrient concentration on biomass production of pasture plant. Study the figure and answer questions that follow:



- (a) Account for the biomass yield in each of the stages A, B, C and D
- (v) Stage A (02marks)
Biomass yield increase slowly due to insufficient in soil nutrient concentration to boost plant growth
 - (vi) Stage B (02marks)
Biomass yield increases due to increase nutrient usage by the plant as soil nutrient concentration increase.
 - (vii) Stage C (02marks)
High biomass yield due to adequate/optimal/critical soil nutrient concentration
 - (viii) Stage D (02 marks)
Biomass yield decreases because excessive nutrients lowers biomass yield due to toxicity such as soil **acidification, mineral antagonism and reverse osmosis in roots**, reducing soil fertility and capability to support plant growth.
- (b) (i) From figure 1, suggest the stage that is most suitable for feeding the pasture plants to livestock (01mark)
Pasture C
- (ii) State reasons for your answer in (b)(i)
Has adequate/optimal biomass due to adequate soil nutrient concentration

(c) Explain three factors that may affect biomass yield of pasture plants (06marks)

- Soil water: soil provides water to plant which is a reagent in many biochemical reactions. However optimal amount is required because too little water may not be absorbed by plant while too much water reduces the amount of air in the soil.
- Soil air: this provides oxygen for root and microorganisms' respiration and nitrogen for fixation by root nodules.
- Light: increase in light intensity increases biomass yield
- Prevailing carbon dioxide concentration in air: high concentration of carbon dioxide in air increases biomass yield.
- Soil microorganism; these play a role in soil aeration, recycling of nutrients, and provision of nutrients to plant when they die and decompose
- Temperature: promote plant growth by activating enzymes. At very low temperature the enzymes are inactive while at very high temperature the enzymes are denatured and the plant dies.
- Soil pH affects activity of enzymes; optimum pH necessary depending on plant type
- Soil structure: this is the proportion of sand, silt, and clay in a particular soil. Soils structure determines water retention and aeration of the soil. Plants prefer different soil structure.
- Soil pollution: this may affect the micro and macro-organisms content and quality, pH and other soil contents and interaction.

SECTION B (20MARKS)

CROP PRODUCTION

Answer **one** question from this section

2. (a) State the qualities of a good seed for planting (07marks)

- Should be readily available within locality to reduce transport expenses and time wasted in looking for it.
- Seeds should be pest and disease free to reduce the transmission of such diseases and pest to the seedling.
- Seeds should be of uniform size and shape to allow easy mechanization during planting.
- Seed they should have passed the dormancy stage.
- Seeds should be of uniform colour to allow easy sorting and planting.
- Seeds should be free from contamination by weeds.
- Seeds should be free from mechanical damage.
- Seeds should be big enough.

(b) Give the treatment that can be done to seed before planting. (03marks)

- **Scarification:** Weaken or damage hard seed coats to facilitate water absorption. You can scratch the seed coat with sandpaper or nick it with a knife.
 - **Cold Stratification:** Some seeds need exposure to cold temperatures to signal germination.
 - Soaking in lukewarm water encourages early germination
 - **Seed Priming:** Soak seeds briefly (4-8 hours) and then re-dry them before planting.
 - **Tail Removal:** Seed such as pulsatilla and clematis have tails on their seed. Some people feel that the presence of a tail inhibits germination
 - GA3 Hormone Treatment: In some cases adding GA3 (gibberellic acid) to the seed will speed up germination
- (d) Outline the physiological process that take place during seed germination (10marks)
- Hydrolysis of storage food material into soluble products
 - Translocation of soluble products from storage area to the actively growing centres.
 - Synthesis of enzymes, nucleic acids, structural proteins
 - Respiration to provide energy for cellular activities
 - Glucose and amino acids are translocated from the storage centres (endosperm or cotyledon) of the seed to the growing regions of the embryo.
 - Cell division, elongation and differentiation leads to immergence of a seedling from a seed.
3. (a) Explain the effects of pests in crop production (08marks)
- Pests reduce crops yield and quality by
- Eat the buds, flowers, shoot, fruits e.g. grasshopper, caterpillars and beetles eat leaves/cause defoliation. Reducing fruit production and rate of photosynthesis.
 - Introduce toxins to plants
 - They bore into fruits and seeds e.g. bean bruchid/weevil, maize weevil etc. and eat inside causing holes, discoloring the tubers and causing them to have bitter taste e.g. sweet potato weevils.
 - Suck plant sap and reduce plant vigor e.g. aphids, mealybugs and scales
 - Transmit diseases e.g. maize leaf hopper, white flies etc.
 - Change crop's growth habits e.g. sorghum shoot flies
 - Cause discoloration and bad smell reducing acceptability by customers
 - They penetrate and damage plant roots thus preventing absorption of water and nutrients
 - They reduce the yield of crops.
 - Cause rotting of seeds hindering germination
 - Contaminate products with their excreta
- (b)(i) Outline the effect the cultural methods of controlling crop pest in the field (08marks)
- **Proper seed bed preparation:** repeated tillage either exposes soil borne pests to their natural enemies on the surface or buries the pests very deep in the soil where they are suffocated and die.
 - Crop rotation: this controls pests which feed on specific crops; by not growing such crops, pests either migrate or die due to lack of food

- Closed seasons: this involves foregoing cropping seasons without planting so as to control the build-up of pests in the field. Cropping is suspended for specific period to derive pests out of the host plants.
- Use of resistant crop varieties that tolerate pests. The resistant varieties have characteristics such as hairiness, thick or hard epidermis, unattractive color and/or smell to the pest and early maturation
- Destruction of crop residues after harvesting to eliminate breeding sites and kill the pests.
- Use of certified seeds and planting materials that carry no pests
- Regular weeding of the crops to eliminate breeding, hiding sites and alternative hosts.
- Proper spacing reduces spread of pests from one crop to another
- Proper pruning removes infected branches and micro habitats for the pests
- Thinning prevents overcrowding and spreading of pests
- Proper application of fertilizers ensures that crops grow faster or are able to tolerate pests
- Roguing eradicates pests by removing and destroying pest affected crops from the garden.
- Mulching especially with black polythene controls nematodes in pineapple fields.
- Timely planting ensures that the crops grow and mature before destructive stages of the pest.
- Timely harvesting prevents attack of mature grains such as in millet, sorghum, rice and maize.
- Destroying volunteer plants i.e. plants that provide alternative source of food or breeding ground.
- Intercropping discourages spreading of pest from one crop to another and some crops like tobacco produce natural pest repellants.

(ii) Suggest ways of controlling storage pests. (04marks)

- Hand picking and destruction of pests
- Use extreme (high or low) temperatures to kill pests
- Use of radiations
- Dehydration of pest
- Use of irritating sound
- Pick a storage facility with a good pest control policy.
- Use plastic storage containers with tight lids.
- Keep the storage area clean.
- Maintain a cool, dry climate.
- Use preventive pest control products.

SECTION C (20MARKS)

ANIMAL PRODUCTION

Answer **one** question from this section

4. (a) Explain factors that should be considered when selecting animals for establishing a beef herd

(08marks)

- Adaptability of the animal to environmental conditions
- Availability of the breed within the environment
- Availability of market for animal products for the animal being bred
- Animal temperament should be low for easy handling
- Animal resistance to pests and diseases should be high
- History of success of the breed in the environment
- Feed conversion ratio of the breed i.e. should have a high ability of converting feeds into meat/beef.
- Growth rate of the breed
- Availability of quality feeds for the animals
- Fertility of the animal being considered
- Productivity of the animal in terms of meat/beef

(b) Explain factors that influence the productivity of beef animals. (04marks)

- Breeding type: genetic composition of beef animal determines its growth rate, feed efficiency and reproductive performance that contributed to overall productivity.
- Proper feeding on balanced diet promotes high productivity in beef animals
- Climate conditions, including temperature, humidity, and access to clean water, affect cattle well-being and productivity.
- Health status: Healthy animals are more productive.
- Health care such as regular vaccinations, parasite control, and disease prevention programs are critical.
- Effective management: including proper housing, handling, and record-keeping, contributes to productivity.
- **Parasites:** A part from transmitting pathogens, animal parasites can extract a lot of nutrients that are supposed to be used by the animals' body.

(c) What strategies should be adopted to improve beef production in Uganda? (08marks)

- Extension workers should be provided in remote areas to provide health care.
- Provision of loans farmers in order to buy better quality beef cattle and build their infrastructures like fences, dips etc.
- Improvement of breeds through artificial insemination with exotic semen to boost production.
- Marketing and market information beef livestock.
- Encourage growth of nutritious pasture for better production.
- Ensure easy access to grazing land and encourage modern grazing systems.

- Routine vaccination of animals against killer diseases e.g. rinder pest, foot and mouth diseases.
- Government should provide subsidies to agricultural inputs to encourage farmers keep beef animals.
- Provide security to the farmers.
- Provide water in dry areas through Valley dams, boreholes etc.
- Provide political stability in cattle keeping areas of the country.

5. (a) Explain factors that predispose farm animals to disease infection. (07 marks)

- **Age:** young and old animals are at risk of getting diseases because young animals have underdeveloped immune system while old animals have worn out immune system.
- **Climate:** very cold weather and humid conditions expose animals to respiratory infections such as pneumonia.
- Pollution. Air and water pollution exposes animals to infections and poisoning.
- Inheritance. Some diseases are associated with genetic of an animal.
- Poor hygiene encourages infection
- Injuries skin injuries exposes the animal to infection
- Presence of vectors and parasites that transmit diseases in the environment
- Poor nutrition leads to deficient disease.

(b) In what ways are pathogens transmitted to farm animals? (07marks)

- By contact with sick animals
- Through contaminated water.
- Transmitted by vectors such as ticks and tsetse flies
- Through air such air borne diseases
- Through contaminated feeds
- Through contaminated clothes of the farmer or visitors
- Through contaminated excreta
- Through mating with infected animals e.g. venereal diseases
- From contaminated soil e.g. anthrax

(c) Suggest ways of caring for sick animals. (06marks)

- Give proper veterinary services
- Keep sick animal clean and in hygienic environment
- Provide nutritious food
- Provide beneficial bedding
- Provide adequate clean water
- Allow them to rest

- Sick animal should be isolated
- Keep animal in well ventilated places

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

6. (a) Outline the qualities of a good wall. (06marks)
- Should have sufficient height so that people do not knock their heads
 - Should be weather resistant
 - Should be fire resistant
 - Should have good thermal insulation
 - Should be strong and stable to support the roof.
 - Should resistant to earth quakes.
 - Should be upright
- (b) Explain the factors that influence the choice of the type of material to use when constructing walls of farm buildings. (08marks)
- Cost of construction material, cheaper materials are preferred.
 - The durability; durable materials are preferred
 - Availability of the material
 - Technology/level of skill needed
 - Capital to purchase building materials and pay labour.
 - Farmers preference of the material
 - The strength of the materials/ability to resist stress and strain
 - The ease to work with the materials e.g. painting, vanishing, oiling
 - The type/nature of the material e.g. plastic, wood, metal etc.
- (c) Give the advantages of using mud as a building material for constructing the walls of farm buildings. (06marks)
- Mud is cheap
 - Mud is readily available
 - Mud has good thermal insulation
 - Uses of mud requires low skill
 - Build walls which are resistant to fire
 - Mud makes strong walls to support the roof

7. (a) Outline the qualities of a good yoke for draught animals. (08marks)
- Should be strong to avoid breakage during operations
 - Should be durable
 - Should be light to remove excess weight from the animals
 - Should be easily/locally available
 - Should be smooth to prevent bruising animals
- (b) Explain how a farmer can improve the efficiency of a draught animal to perform work. (12 marks)
- Pairing of draught animals to increase traction
 - Use of light yoke when harnessing the animals
 - Feed animals properly
 - Treat animals diseases
 - Proper hitching of plough on the yoke. Make sure the yoke is fitted properly and the chain length is proper for the team.
 - Using the right type of share for the right soil conditions
 - Sharpening the share properly before using it on the plough
 - Using the right moldboards for the required field condition. Use the digger /stable type for higher pulverization and general for moderate pulverizations.
 - Check and tighten loose nuts and bolts
 - Clear the field of tall vegetation, and tree first.
 - Plough during cool hours of the day.
 - Driving oxen at a constant speed
 - Ploughing the soil containing moderate moisture.
 - Setting the depth wheel correctly to ensure correct Ploughing depths.
 - Allow some break intervals during Ploughing to allow oxen to rest.

SECTION D (20MARKS)

AGRICULTURAL ENGINEERING

Answer **one** question from this section

8. (a) Give the uses of agricultural credit. (05marks)
- For buying of planting materials
 - Help in marketing products
 - Provision of farm building and other farm structure
 - Finance treatment of farm animals
 - Improve farm implements
 - For paying salaries
 - For expansion activities
 - Sponsoring education and training

(b) What conditions do financial institutions take into account before offering credit to farmers?
(05marks)

- Demonstration of ability to pay back the loan including from other sources in case of poor harvest
- Possession of security
- Type of farm enterprise proposed e.g. poultry, piggery
- Good credit history
- Farming experience
- Sound project proposal

(c) Explain the challenges that limit farmers' ability to repay agricultural credit. (10marks)

- High interest rates charged.
- Short grace period which doesn't allow the farmer to realize the borrowed money.
- Poor loan supervision among the loan providers giving room for defection.
- Crop failure and animal death due to calamities.
- Theft by farm employees
- Price fluctuation of agricultural product.
- High taxes.
- Natural hazards such as floods, pests and disease outbreak.
- Inflation which increases the costs of inputs.
- Fall in demand of the products.
- Unplanned loans.
- Lack of proper enforcement.
- Uncertainties such as sickness and death of a farmer.
- Improper record keeping.
- Poor farm management skills.
- Political interference where a farmer may take the loan advanced to be a political payment or reward.

9. (a) How does market information improve on the efficiency of marketing agricultural products?
(06marks)

- Help a farmer to find the market for his produce
- Enable a farmer to negotiate appropriate price for the produce
- Enable locating the source of the produce
- Enable farmer to know their competitor and what they are doing.
- Enable farmers to understand the needs of their customers and decide on what to produce
- Helps farmers to design marketing strategy

(b) Suggest ways of improving the marketing of perishable agricultural products. (05marks)

- Processing thereby adding value for instance turning into tomato sauce
- Preserving to increase self-life e.g. refrigeration
- Improving transport network for easy access to the market
- Producing perishable products near the market
- Advertisement of the products

- Attractive packaging
- Quality standardization
- Early harvesting

(c) Explain the challenges of implementing agricultural price stabilization policies. (09marks)

- conflicts with the policy of liberalization
- standardization of quality and quantity of the produce
- inadequate funding
- poor road and communication network
- need to process agricultural produce and extend self-life
- shortage of storage facilities
- competition from synthetic substitutes
- lack enough market for the produce
- high illiteracy rate among farmers
- subsistence production/low product quantities
- limited diversification of agricultural production
- corruption and embezzlement

END

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Thanks

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