THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

ADVANCED CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

134/2 **AGRICULTURE 2**

(For Both School and Private Candidates)

Time : 3 Hours **ANSWERS** **Year : 2008**

Instructions

1. This paper consists of sections **ten (10)** questions in sections A and B.
2. Answer **five (5)** questions choosing at least **two (2)** questions from each section.
3. Each question carries **twenty (20)** marks.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Define the following terms as applied in crop protection:

   (i) Integrated pest management (IPM)

   Integrated pest management is a sustainable approach to controlling pests by combining cultural, biological, physical, and chemical methods in a compatible way while minimizing risks to humans and the environment.

   (ii) Secondary pests

   Secondary pests are minor pests that usually cause little damage but can become major pests when natural enemies are destroyed, often after pesticide use.

   (iii) Host range

   Host range is the variety of plant species that a pest or pathogen can feed on or infect.

   (iv) Vector

   A vector is an organism, often an insect, that transmits pathogens from one host plant to another.

   (b) Identify three insect pests of maize and describe the type of damage each causes.

   Maize stalk borer larvae bore into maize stems causing lodging and poor nutrient flow. Maize weevils attack stored maize grains creating holes and powdery residues. Armyworms defoliate maize plants reducing leaf area for photosynthesis.

   (c) State and explain three limitations of IPM in smallholder farming.

   IPM requires technical knowledge which smallholder farmers may lack. Some methods such as biological control agents are not easily accessible in rural areas. It may be more costly and time consuming compared to relying on quick chemical control.

2. (a) Describe briefly the following plant breeding methods:

   (i) Pure line selection

   Pure line selection involves selecting and propagating plants derived from a single self-pollinated individual to maintain uniformity.

   (ii) Backcrossing

   Backcrossing is the crossing of a hybrid with one of its parents to transfer a desirable trait into a well-adapted variety.

   (iii) Recurrent selection

   Recurrent selection is a cyclical process of selecting superior individuals, intercrossing them, and selecting again to accumulate favorable genes.

   (iv) Tissue culture

Tissue culture is the technique of growing plant cells, tissues, or organs under sterile conditions on nutrient media to regenerate whole plants.

(b) List three objectives of hybridization in crops.
To combine desirable traits from two parents, to exploit hybrid vigor for higher yield, and to develop crops with resistance to pests and diseases.

(c) Explain two limitations of using tissue culture in breeding.
It is expensive and requires specialized laboratory facilities. It can also result in somaclonal variation which may cause undesirable traits.

3. (a) Assess the effectiveness of crop sanitation and rogueing in controlling plant diseases.
Crop sanitation is effective because it removes diseased debris that harbors pathogens, reducing inoculum for new infections. Rogueing controls diseases by uprooting and destroying infected plants before they spread infection. However, these methods are labor-intensive and may not completely eliminate pathogens.

(b) For each of the following plant diseases, describe causative agent, symptoms, and control:
(i) Banana wilt
Causative agent is Xanthomonas campestris pv. musacearum bacteria. Symptoms include yellowing, wilting, and brown streaks in vascular tissue. Control involves destroying infected plants and using resistant varieties.
(ii) Tomato late blight
Causative agent is Phytophthora infestans fungus. Symptoms include dark water-soaked lesions on leaves, stems, and fruits with white fungal growth. Control measures include fungicide sprays and crop rotation.
(iii) Bean anthracnose
Causative agent is Colletotrichum lindemuthianum fungus. Symptoms include dark sunken lesions on pods and stems. Control measures include use of clean seed, resistant varieties, and fungicide application.

4. (a) Define:
(i) Annual weeds
Annual weeds are weeds that complete their life cycle within one growing season.
(ii) Biennial weeds

Biennial weeds complete their life cycle in two seasons, producing vegetative growth in the first and flowering in the second.

(iii) Perennial weeds

Perennial weeds live for more than two years and reproduce through seeds or vegetative structures like rhizomes.

(b) Explain:

(i) Preventive methods of weed control

Preventive control involves measures that stop the introduction and spread of weeds, such as using certified clean seed, proper sanitation of farm tools, and preventing livestock from spreading weed seeds.

(ii) Five disadvantages of chemical weed control

It may pollute the environment, harm non-target organisms, cause weed resistance, increase production costs, and require skilled handling.

(c) Outline four effects of weeds on crop production.

Weeds compete with crops for nutrients, water, light, and space. They harbor pests and diseases. They reduce crop yields and quality. They increase production costs due to additional control measures.

5. (a) Explain two major groups of non-parasitic plant diseases with examples.

   Physiological diseases are caused by unfavorable environmental conditions such as water stress or temperature extremes, for example blossom end rot in tomatoes due to calcium deficiency. Nutritional disorders arise from deficiency or toxicity of minerals, for example chlorosis in maize due to lack of nitrogen.

(b) Outline:

(i) Three viral diseases of vegetables

Tomato mosaic virus in tomatoes, cucumber mosaic virus in cucurbits, and leaf curl virus in chillies.

(ii) Four bacterial diseases of fruits

Fire blight in apples, bacterial canker in citrus, bacterial spot in peaches, and crown gall in grapes.

(iii) Four micronutrient deficiencies in crops and their visible symptoms

Iron deficiency causes interveinal chlorosis in young leaves. Zinc deficiency leads to stunted growth and small leaves. Manganese deficiency causes mottling in leaves. Boron deficiency results in poor fruit set and brittle tissues.

(c) Describe the nature, symptoms, and control of bacterial blight in cotton.
Bacterial blight in cotton is caused by Xanthomonas campestris pv. malvacearum. Symptoms include angular leaf spots, black lesions on stems, and boll rot. Control involves using resistant varieties, crop rotation, and seed treatment with bactericides.

6. (a) Distinguish between zero grazing and semi-zero grazing systems.
   Zero grazing is a system where animals are confined and all feed is brought to them. Semi-zero grazing allows animals to graze for part of the day and are supplemented with feed indoors.

   (b) Explain six advantages of zero grazing system.
   It ensures efficient land use, facilitates close disease monitoring, improves manure collection, reduces animal energy loss from walking, improves feed utilization, and allows controlled breeding.

   (c) Mention four constraints associated with zero grazing in rural areas.
   It requires high initial investment, demands constant labor, needs reliable feed and water supply, and may limit exercise leading to stress in animals.

7. (a) Discuss four harmful effects of ectoparasites on farm animals.
   They cause blood loss and anemia, transmit diseases, irritate animals leading to reduced feeding and production, and damage hides and skins lowering market value.

   (b) Identify four external parasites of poultry and explain how they can be controlled.
   Lice suck blood and can be controlled by spraying with insecticides. Mites cause skin irritation and are controlled by cleaning and disinfecting poultry houses. Fleas cause restlessness and are controlled by using pesticides and proper sanitation. Ticks transmit diseases and can be controlled through acaricides and maintaining clean surroundings.

   (c) (i) Explain four economic losses caused by ticks in cattle.
   Ticks transmit tick-borne diseases, reduce weight gain, lower milk production, and increase treatment costs.
   (ii) Suggest four methods of controlling ticks on farms.
   Use of acaricide dips and sprays, pasture rotation, handpicking in small herds, and introduction of tick-resistant breeds.

8. (a) Define:

   (i) Metabolism

   Metabolism is the sum of all biochemical reactions in the body that provide energy and build body components.

   (ii) Basal metabolism

   Basal metabolism is the minimum energy expenditure required to maintain basic body functions at rest.

   (iii) Vitamins

   Vitamins are organic compounds required in small quantities for normal body functioning and growth.

   (iv) Minerals

   Minerals are inorganic nutrients needed by animals for body structure, enzyme function, and physiological processes.

   (b) Mention four functions of Vitamin A in farm animals.

   It maintains vision, supports reproduction, strengthens immunity, and promotes growth and development.

   (c) State four deficiency symptoms of Vitamin A in cattle.

   Night blindness, infertility, poor growth, and increased susceptibility to infections.

   (d) Discuss four functions of fats in livestock nutrition.

   Fats provide concentrated energy, insulate the body against heat loss, carry fat-soluble vitamins, and form structural components of cell membranes.

9. (a) Briefly describe the role of the following organs in the reproductive system of a bull:

   (i) Testes

   Testes produce sperm cells and testosterone.

   (ii) Epididymis

   Epididymis stores and matures sperm before ejaculation.

   (iii) Seminal vesicles

   Seminal vesicles produce seminal fluid that nourishes and transports sperm.

   (iv) Penis

   Penis delivers sperm into the female reproductive tract during copulation.

(b) Explain the process of spermatogenesis.

Spermatogenesis is the process of sperm production that begins in the testes with the division of germ cells into spermatogonia, which undergo meiosis to form haploid spermatids that differentiate into mature spermatozoa.

(c) Outline four signs of infertility in bulls.

Low sperm count, poor libido, abnormal sperm morphology, and failure to impregnate cows after mating.

10. (a) Identify five characteristics of good silage.

    It should have a pleasant smell, high nutrient content, low pH of about 4, good green color, and be free from molds.

(b) Mention five factors influencing the quality of silage.

Proper moisture content of forage, rapid filling of silo, good compaction, airtight sealing, and use of suitable crops like maize.

(c) Explain three methods of hay conservation.

Hay can be conserved by sun-drying harvested forage, using mechanical drying, or storing under sheds to protect from rain.

(d) State four advantages of silage over hay.

Silage retains higher nutrient quality, is more palatable, allows conservation of excess forage during rainy seasons, and requires less curing time compared to hay.